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UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 20-F

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2020

Commission file number 1-13202

Nokia Corporation

(Exact name of Registrant as specified in its charter)

Republic of Finland

(Jurisdiction of incorporation)

Karakaari 7 FI-02610 Espoo, Finland

(Address of principal executive offices)

Esa Niinimäki, Deputy Chief Legal Officer, Corporate, Telephone: +358 (0) 10 44 88 000, Facsimile: +358 (0) 10 44 81 002,

Karakaari 7, FI-02610 Espoo, Finland

(Name, Telephone, E-mail and/or Facsimile number and Address of Company Contact Person)

Securities registered pursuant to Section 12(b) of the Securities Exchange Act of 1934 (the "Exchange Act"):

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
American Depositary Shares	NOK	New York Stock Exchange
Shares		New York Stock Exchange ⁽¹⁾

(1) Not for trading, but only in connection with the registration of American Depositary Shares representing these shares, pursuant to the requirements of the Securities and Exchange Commission.

Securities registered pursuant to Section 12(g) of the Exchange Act: **None**

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Exchange Act: **None**

Indicate the number of outstanding shares of each of the registrant's classes of capital or common stock as of the close of the period covered by the annual report. Shares: 5 653 886 159.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer", "smaller reporting company" or "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer ☒ Accelerated filer ☐
Non-accelerated filer ☐ Smaller reporting company ☐
Emerging growth company ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP ☐
International Financial Reporting Standards as issued by the International Accounting Standards Board ☒
Other ☐

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow. Item 17 ☐ Item 18 ☐

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

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Forward-looking statements

Certain statements contained in this Annual Report constitute "forward-looking statements". Forward-looking statements provide Nokia's current expectations of future events based on certain assumptions and include any statement that does not directly relate to any current or historical fact. The words "believe", "expect", "expectations", "anticipate", "foresee", "see", "target", "estimate", "designed", "aim", "plan", "intend", "influence", "assumption", "focus", "continue", "project", "should", "is to", "will", "strive", "may" or similar expressions as they relate to us or our management are intended to identify these forward-looking statements, as well as statements regarding:

- A) business strategies, market expansion, growth management, and future industry trends and megatrends and our plans to address them;
- B) future performance of our businesses and any future distributions and dividends;
- C) expectations and targets regarding financial performance, results, operating expenses, cash flows, taxes, currency exchange rates, hedging, cost savings and competitiveness, as well as results of operations including targeted synergies and those related to market share, prices, net sales, income and margins;
- D) expectations, plans, timelines or benefits related to changes in our organizational and operational structure;
- E) market developments in our current and future markets and their seasonality and cyclicalities, including the communication service provider market, as well as general economic conditions, future regulatory developments and the expected impact, timing and duration of the COVID-19 pandemic on our businesses, our supply chain, our customers' businesses and the general market and economic conditions;
- F) our position in the market, including product portfolio and geographical reach, and our ability to use the same to develop the relevant business or market and maintain our order pipeline over time;
- G) any future collaboration or business collaboration agreements or patent license agreements or arbitration awards, including income from any collaboration or partnership, agreement or award;
- H) timing of the development and delivery of our products and services, including our short term and longer term expectations around the deployment of 5G and our ability to capitalize on such deployment as well as use our global installed base as the platform for success in 5G, and the overall readiness of the 5G ecosystem;
- I) the outcome of pending and threatened litigation, arbitration, disputes, regulatory proceedings or investigations by authorities;
- J) restructurings, investments, capital structure optimization efforts, divestments and our ability to achieve the financial and operational targets set in connection with any such restructurings, investments, and capital structure optimization efforts including our 2019-2020 cost savings program;
- K) future capital expenditures, temporary incremental expenditures or other R&D expenditures to develop or rollout new products, including 5G; and
- L) the sustainability and corporate responsibility contained in the sustainability and corporate responsibility section of this Annual Report on Form 20-F.

These statements are based on management's best assumptions and beliefs in light of the information currently available to it and are subject to a number of risks and uncertainties, many of which are beyond our control, which could cause actual results to differ materially from such statements. These statements are only predictions based upon our current expectations and views of future events and developments and are subject to risks and uncertainties that are difficult to predict because they relate to events and depend on circumstances that will occur in the future. Risks and uncertainties that could affect these statements include but are not limited to the risk factors specified under "Operating and financial review and prospects-Risk factors" of this Annual Report on Form 20-F and in our other filings or documents furnished with the U.S. Securities and Exchange Commission. Other unknown or unpredictable factors or underlying assumptions subsequently proven to be incorrect could cause actual results to differ materially from those in the forward-looking statements. We do not undertake any obligation to publicly update or revise forward-looking statements, whether as a result of new information, future events or otherwise, except to the extent legally required.

Introduction and use of certain terms

Nokia Corporation is a public limited liability company incorporated under the laws of the Republic of Finland. In this Annual Report on Form 20-F, any reference to “we”, “us”, “the Group”, “the company” or “Nokia” means Nokia Corporation and its consolidated subsidiaries and generally Nokia’s continuing operations, except where we separately specify that the term means Nokia Corporation or a particular subsidiary or business segment only or our discontinued operations. References to “our shares” matters relating to our shares or matters of corporate governance refer to the shares and corporate governance of Nokia Corporation.

Nokia Corporation has published its consolidated financial statements in euro for periods beginning on or after January 1, 1999. In this Annual Report on Form 20-F, references to “EUR”, “euro” or “€” are to the common currency of the European Economic and Monetary Union, references to “dollars”, “US dollars”, “USD” or “\$” are to the currency of the United States, and references to “Chinese yuan” or “Chinese yuan renminbi” or “CNY” are to the official currency of the People’s Republic of China. Solely for the convenience of the reader, this Annual Report on Form 20-F contains conversions of selected euro amounts into US dollars at specified rates or, if not so specified, at the year-end rate of 1.2271 US dollars per euro, and conversions of selected euro amounts into Chinese yuan renminbi at specified rates or, if not specified, at the year-end rate 8.0225 Chinese yuan renminbi per euro. The referred year-end rates were the European Central Bank reference rates on December 31, 2020. No representation is made that the amounts have been, could have been or could be converted into US dollars or Chinese yuan at the rates indicated or at any other rates.

Additional terms are defined in the “Glossary”.

The information contained in, or accessible through, the websites linked throughout this annual report on Form 20-F is not incorporated by reference into this document and should not be considered a part of this document.

Nokia Corporation furnishes Citibank, N.A., as Depositary, with its consolidated financial statements and a related audit opinion of our independent auditors annually. These financial statements are prepared on the basis of International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board and in conformity with IFRS as adopted by the European Union. In accordance with the rules and regulations of the SEC, we do not provide a reconciliation of net income and shareholders’ equity in our consolidated financial statements to the generally accepted accounting principles in the United States, or US GAAP. We also furnish the Depositary with quarterly reports containing unaudited financial information prepared on the basis of IFRS, as well as all notices of shareholders’ meetings and other reports and communications that are made available generally to our shareholders. The Depositary makes these notices, reports and communications available for inspection by record holders of American Depositary Receipts (ADRs), evidencing American Depositary Shares (ADSs), and distributes to all record holders of ADRs notices of shareholders’ meetings received by the Depositary.

In addition to the materials delivered to holders of ADRs by the Depositary, holders can access our consolidated financial statements, and other information included in our annual reports and proxy materials, at nokia.com/financials. This annual report on Form 20-F is also available at nokia.com/financials as well as on Citibank’s website at <https://app.irdirect.net/company/49733/hotline/1>. Holders may also request a hard copy of this annual report by calling the toll-free number 1-877-NOKIA-ADR (1-877-665-4223), or by directing a written request to Citibank, N.A., Shareholder Services, PO Box 43077, Providence, RI 02940-3081, United States. With each annual distribution of our proxy materials, we offer our record holders of ADRs the option of receiving all of these documents electronically in the future.

(1) None of the information contained on the <https://app.irdirect.net/company/49733/hotline/> website constitutes a part of this filing and such information is not incorporated by reference herein.

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Key highlights

Humanity, connected

The world has made it through a uniquely difficult year.

We lived, learned, worked and socialized online. It was a vast change, which happened quickly and without warning. Our customers were put under immense pressure. But with our help, they delivered.

This reminds us that connectivity is not a 'nice to have'. It is a fundamental part of modern society, one that Nokia has a responsibility to provide.

And we are doing so. In 2020 our products and services underpinned new innovations in efficient public services, remote education, optimized logistics, smart healthcare, digital startups, clean energy generation, waste-free manufacturing and traditional networking, among many other uses. We carried out this work with a permanent focus on security, value and performance.

This is the connectivity that the world deserves. We will continue to deliver it.

Global reach

We have combined global leadership in mobile and fixed network infrastructure with the software, services and advanced technologies to serve customers around the world.

Net sales in 2020

EUR 21.9bn

Countries of operation

~130

Average number of employees in 2020

~92 000

Regional split of employees



Financial highlights

For the year ended December 31, Continuing operations	2020 EURm	2019 EURm	2018 EURm
Net sales	21 852	23 315	22 563
Gross profit	8 193	8 264	8 312
Gross margin	37.5%	35.4%	36.8%
Operating profit/(loss)	885	485	(59)
Operating margin	4.0%	2.1%	(0.3)%
(Loss)/profit for the year	(2 513)	18	(549)
	EUR	EUR	EUR
Earnings per share, diluted	(0.45)	0.00	(0.10)
Dividend per share ⁽¹⁾	0.00	0.00	0.10

As of December 31	2020 EURm	2019 EURm	2018 EURm
Net cash and current financial investments	2 485	1 730	3 053

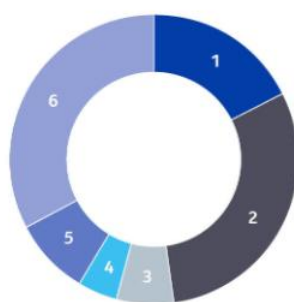
(1) No dividend is proposed by the Board of Directors related to the financial year 2020.

Net sales 2020 by reportable segment⁽¹⁾



1 Networks ⁽²⁾	EUR 16 852m (-7%)
A Mobile Access	EUR 10 630m (-9%)
B Fixed Access	EUR 1 759m (-6%)
C IP Routing	EUR 2 768m (-5%)
D Optical Networks	EUR 1 695m (-3%)
2 Nokia Software	EUR 2 656m (-4%)
3 Nokia Technologies	EUR 1 402m (-6%)
4 Group Common and Other	EUR 982m (3%)

Net sales 2020 by region



1 Asia Pacific	EUR 3 847m (-16%)
2 Europe ⁽³⁾	EUR 6 620m (0%)
3 Greater China	EUR 1 376m (-25%)
4 Latin America	EUR 995m (-32%)
5 Middle East & Africa	EUR 1 893m (1%)
6 North America	EUR 7 121m (2%)

(1) Includes net sales to other segments. Net sales to enterprise customers are included in Networks, Nokia Software and Group Common and Other net sales. Year-on-year change is in parenthesis.

(2) Nokia provides net sales disclosure for the following businesses within the Networks reportable segment: (i) Mobile Access, (ii) Fixed Access, (iii) IP Routing, and (iv) Optical Networks.

(3) All Nokia Technologies IPR and Licensing net sales are allocated to Finland.

Business groups

Mobile Networks

Higher quality and more reliable mobile broadband experiences

Global Services

Helping customers navigate complexity to transform and digitalize their business

Fixed Networks

Using intelligent access to create networks that are faster, better, smarter

IP/Optical Networks

Massively scalable networks that underpin the digital world's dynamic interconnectivity

Nokia Software

Intelligent software platforms optimizing and automating network performance

Nokia Enterprise

Digitalizing asset-intensive industries with mission and business-critical needs

Nokia Technologies

Technology designed to bring the human family closer together

Reportable segments

In 2020, Nokia had three reportable segments. Nokia also discloses segment-level data for Group Common and Other. For more details, refer to Note 5, Segment information, in the consolidated financial statements.

Networks

Nokia provides net sales disclosure for the following businesses within the Networks reportable segment: (i) Mobile Access (comprises Mobile Networks and Global Services operating segments), (ii) Fixed Access (comprises Fixed Networks operating segment), (iii) IP Routing (comprises part of IP/Optical Networks operating segment) and (iv) Optical Networks (comprises part of IP/Optical Networks operating segment).

Nokia Software

Nokia Technologies

This Annual Report on Form 20-F describes the operations and performance of Nokia in 2020. During that time, Nokia had seven business groups and three reportable segments listed above. As of 2021, Nokia has a new operating model comprising four business groups that are also our reportable segments: (i) Mobile Networks, (ii) Network Infrastructure, (iii) Cloud and Network Services, and (iv) Nokia Technologies.

Letter from our President and CEO

This was a challenging year for everyone. Our networks were put to the test by a global crisis and they not only survived but thrived, showing that a new way of doing business is possible. 2020 showed the true value of technology and increased the need to find smart solutions to global problems, from climate change to stalling productivity.

Change and continuity

This was a year of unprecedented change, but also one in which we saw the importance of our technology. Fixed and mobile networks kept the global economy and critical infrastructure running even as the COVID-19 pandemic led to nationwide shutdowns across the world.

I was proud of the role we played in enabling emergency services, food suppliers, and public health agencies to stay connected throughout a global crisis. Kitchens became classrooms and boardrooms operated from bedrooms as millions of people turned to bandwidth-intensive video conferencing and streaming applications. This contributed to a year's worth of traffic growth in a matter of days, but we were able to support our CSP customers in handling the huge upsurge even as global supply chains were disrupted and lockdowns made accessing sites difficult.

The ability of our employees to adapt at speed and come up with creative solutions was our greatest asset this year and proved the resilience and reliability that Nokia is renowned for.

2020 was the year businesses realized that the old adage of "things must change to remain the same" has never been more true. Companies that had done the most to modernize their operations were those best equipped to deal with the disruption. The pandemic accelerated the need for widespread digitalization and automation, leading to the increasing importance of critical networks – networks that combine flexibility with carrier-grade performance.

We launched a strategic analysis into these industry trends, which found that value would increasingly move away from monolithic systems towards software, silicon and services with the importance of virtualization, cloud-native architecture, and open interfaces becoming ever greater. It was clear to us that to support our customers through these changes and to better position Nokia for new opportunities we would also need to change.

Development in an extraordinary year

Overall in 2020, we saw improvement both in our gross margin and operating margin performance up by 2.1 percentage points and 1.9 percentage points year-on-year respectively. This development was supported by a regional mix shift towards the higher-margin North America region, our ongoing R&D efforts to enhance product quality and cost competitiveness, and improvements in our Networks business.

Nokia delivered a strong cash performance for the year and we ended 2020 with net cash and current financial investments at approximately EUR 2.5 billion, up approximately EUR 0.8 billion from 2019. Net sales decreased by 6% year-on-year primarily due to network deployment and planning services within Mobile Access. In Nokia Enterprise, we continued to make great progress in 2020 and delivered double digit year-on-year growth in net sales.

Overall, we took important steps in improving on execution. I was particularly pleased to see the clear financial improvement in Mobile Access, reflecting our ongoing efforts to strengthen the competitiveness and cost position of our mobile radio products. In 2020, we saw growth in radio access products and the 5G gross margin increase due to product cost reduction, partly helped by higher ReefShark shipment volumes. Our aim was to be above 35% for our KPI on shipments of our 5G Powered by ReefShark product portfolio; we ended the year at 43% and we remain on track to realize 70% by the end of 2021. Our progress was validated by our customers. We ended the year with 188 commercial 5G agreements and 44 live 5G networks.

We strengthened our technology leadership in many key areas of our business: together with Elisa and Qualcomm, we achieved the worldwide 5G speed record. We brought AI to the network edge allowing CSPs to deliver improved customer experience, fix customer issues instantly and increase upload and download speeds.

We also launched the world's first automated 4G/5G network slicing technology for mobile core and transport networks and a service to bring down network energy usage. We continued to lead the passive optical network evolution and launched the world's first 25G PON broadband solution to enhance CSPs' fiber network usage.

We continued to lead in private wireless networks ending 2020 with 260 customers. For the second year in a row Analysys Mason ranked Nokia as the #1 telecoms software provider by market share for telecoms software and services combined. And we filed more than 1 500 new inventions with more than 3 500 patent families now declared as essential for 5G.

This was a year that gave added impetus to addressing the digital divide. We continued to work with our customers to connect the unconnected, with 6.6 billion subscriptions on our customer's radio networks worldwide by the end of 2020. For instance, Nokia's community investment programs helped bring fixed wireless access to more than 1 000 children in Kenya this year. We also remained on track to achieve our long-term science-based target of reducing emissions from our products. In 2020, the customer base station sites we modernized used 54% less energy on average. And we made progress in strengthening human rights protections by increasing training for our suppliers on preventing modern slavery and respecting minority rights. We also maintained our focus on ethical business training, which 96% of our employees completed. In addition, 85% of our leaders completed training on navigating bias and building a more inclusive workplace.

New operating model

At the end of October we announced that we would move to a new operating model from the beginning of 2021. As I told our employees, this was not change for change's sake, with an incoming CEO looking to make his mark on an organization. But rather to improve the way we work so we can better align with how customers want to buy and achieve our aim of technology leadership in the areas where we choose to compete. The new structure will simplify and streamline the way we work enabling us to improve cost efficiency and become faster, more agile, more accountable, and more transparent as an organization.

Our four new business groups each have a clear mission and have been empowered with the resources and accountability to achieve their goals. In brief, they are as follows:

- Mobile Networks will focus on regaining leadership in 5G, as well as achieving leadership in O-RAN and vRAN, while maintaining scale with CSP customers and growing its private wireless business with enterprise customers.
- Network Infrastructure will focus on the building blocks and essential solutions of critical networks, using its technology leadership in IP Networks, Optical Networks, Fixed Networks, and Alcatel Submarine Networks to drive digitalization across all industries.
- Cloud and Network Services will focus on creating value for both service providers and enterprise customers as demand for critical networks accelerates, leading the transition to cloud-native software and as-a-service delivery models.
- Nokia Technologies will continue to monetize and grow the value of Nokia's intellectual property and licensing revenue by investing in innovation and its world-leading patent portfolio as well as pursuing other licensing opportunities.

Looking ahead

This was a challenging year for everyone. Our networks were put to the test by a global crisis and they not only survived but thrived, showing that a new way of doing business is possible. 2020 showed the true value of technology and increased the need to find smart solutions to global problems, from climate change to stalling productivity.

Nokia will help enable those solutions by building the critical networks that the world will come to rely on, positioning ourselves for technology leadership and a path to sustainable financial performance.

We know we have our work cut out for us. We expect 2021 to be challenging with meaningful headwinds primarily due to market share loss and price erosion in North America. It will be a time of transition as we adapt to a new structure and finalize our strategy, but by doing so our employees will be empowered to act faster enabling us to accelerate our immediate and long-term plans. We will stay focused on securing technology leadership in the segments where we compete, especially in 5G; continue to strengthen existing customer relationships; and make sure we seize new opportunities in areas where we see a path to value creation.

I would like to thank our employees for their tremendous efforts and commitment this year as well as the warm welcome they have given me.

I would also like to pay tribute to my predecessor, Rajeev Suri, who led Nokia over the past six years and through the first half of 2020. My return to Nokia as President and CEO is both an incredible personal honor and also the next stage of continual evolution for this great company.

Pekka Lundmark
President and CEO

Our strategy

Our “Rebalancing for growth” strategy was launched at the end of 2016 and updated in 2019. It was based on 5 pillars: Lead, Grow, Strengthen, Diversify, and Operational Excellence.

With our “Rebalancing for Growth” strategy, we addressed both our primary CSP market and new growth opportunities. The strategy built on our core strength of delivering large high-performance networks by expanding our business into targeted, higher-growth and higher-margin vertical markets.

On October 29, 2020, Nokia announced the start of a strategic review, to culminate in a renewed strategy to be announced at Capital Markets Day on March 18, 2021.

1. Lead

Lead in high-performance, end-to-end networks with communication service providers.

In the first pillar of our strategy – leading in high-performance, end-to-end networks with communication service providers – we continued to progress in 5G despite challenges in Mobile Access. By the end of 2020, we reached 139 commercial 5G deals and launched 44 live networks with our customers and we achieved our 2020 target for 4G plus 5G market share, excluding China, to end 2020 at approximately 28%.

Focus areas and progress

- We continued to make good progress in the transition to 5G shipments that are “5G Powered by ReefShark” (5G PBR). We exceeded our end of 2020 target of reaching more than 35% of 5G PBR shipments.
- Regarding our conversion rate from 4G to 5G based on actual radio business volume, we ended 2020 in the 90% range, excluding China. The decline from 2019 was primarily driven by some market share loss in North America, partially offset by footprint gains with customers that have increased their focus on security.
- We invested in digital service architecture, advanced analytics, machine learning, automation and serviceability for fast and flawless delivery of our network infrastructure services.
- We provided industry-leading cognitive network services to improve network performance, operational efficiency and subscriber experience, and develop service business models to open new revenue streams for CSPs.
- We are the #2 vendor in Service Provider Routing worldwide (excluding China) having shipped well over 1 million routers to date⁽¹⁾. Our in-house designed FP4 high-performance routing silicon demonstrates our continuing commitment to technology innovation and leadership, driving continued sales momentum with >300 projects won, two thirds of which were new footprint and/or competitor displacements.
- We are the #2 vendor worldwide in optical networking (excluding China), bringing together technology leadership in silicon and systems with our foundational WaveLogic Elements technology including the PSE-V coherent Digital Signal Processor (DSP) and Elenion silicon photonics, as well as software automation and applications optimized for driving efficiency in optical networks through our WaveSuite portfolio and WaveHub ecosystem⁽¹⁾.
- We maintained our leading market share globally with #2 position in fiber and a #1 position in 5G fixed wireless access.
- We are leading the industry transition to next generation fiber technologies, with our 25 Gigabit Symmetrical Passive Optical Network (25G PON) solution that expands Fixed Networks market into business and 5G mobile backhaul market segments.
- We are also running the world’s largest Fixed Wireless Access deployments that complements our fiber business, for example, with Vodafone and Zain.

⁽¹⁾ Source: Dell’Oro. Q4 2020.

2. Grow

Grow our position in the enterprise market and enable Industry 4.0 acceleration through the digitalization of asset-intensive industries, governments and cities, and webscale businesses, with mission-critical networks and digital automation solutions.

Our second pillar was about growing our enterprise business, focusing on two main market needs: the need for high-performance connectivity for hybrid hyper-scale clouds, and the need for mission-critical networks in asset-intensive industries and governments, resulting in Industry 4.0 acceleration driven by private networks and industrial automation. In 2020, we delivered on our ambition: (1) we expanded network sales into select vertical markets, with a focus on asset-heavy industries, including Transportation, Energy, Manufacturing and Logistics, as well as governments and webscale businesses, (2) we have become the leaders in the private wireless market, (3) we are well positioned in the industrial automation market, which we expect will be critical in the Fourth Industrial Revolution, and (4) we achieved double digit growth fueling Nokia's future growth.

Focus areas and progress

- In Nokia Enterprise, we continued to make great progress in 2020 and delivered double digit year-on-year growth in net sales. The strong growth in net sales to enterprise customers was primarily driven by increased demand for mission-critical networking solutions in industries including utilities and the public sector, with continued momentum in private wireless solutions.
- We scaled up our existing business in transportation, energy, government and cities segments by augmenting our IP/Multiprotocol Label Switching (MPLS), Optics, GSM-R and other existing portfolios with private networks, providing customers with the performance and security they require as they digitalize and transform their communications infrastructure and applications.
- We also continued to drive the adoption of multi-cloud, Internet of Things (IoT) and automation with strategic investments in emerging technologies such as Software Defined Networks (SDN), Software Defined Wide-Area network (SD-WAN) applications, and data centers.
- We continued to grow our market share in the webscale segment with IP and Optical portfolios, building large high-performance networks that drive hyperscale cloud connectivity.
- We saw a private wireless inflection point in the market driven by the need for high-performance private wireless networks. Driven by the convergence of operational technology (OT), information technology (IT) and networks, customers in these domains need a higher level of network performance in order to automate and digitalize their operations. We have accelerated our private wireless networks (4G/LTE) business growth and serve 260 customers across the globe and cross-industries.
- We continued to implement a strategy to grow in the manufacturing and logistics segments where the opportunity for high-performance private wireless networks is significant. Our strategy has been to address these customers with our Nokia Digital Automation Cloud platform and our modular private wireless solution.
- In 2020, we continued to build strong market momentum in our target vertical markets with 245 new customers. At the close of 2020, we have 1 545 enterprise customers deploying our networks globally.
- We expanded our market opportunity in high-performance cloud connectivity portfolio with our data center switching launch. We also enhanced our private wireless portfolio, with the launch of our 5G standalone capabilities and Modular Private Wireless solutions.
- We continued to expand our ecosystem of technology and go-to-market partners to increase our scale and coverage especially towards the new manufacturing and logistics segments.
- We continued to implement a new simplified and efficient delivery model for our enterprise projects to improve the enterprise customer experience and further support the growth in our revenues.
- Nokia is well positioned to win the market given our deep experience in delivering carrier-grade network performance and extensive work with webscale companies and enterprises.

3. Strengthen

Strengthen the software business with one Common Software Foundation.

The third pillar was about strengthening our software business with one Common Software Foundation. Nokia was once again, for the second consecutive year, rated as the world's leading telco software business for both telecom software and services. Nokia Software's performance was marked by a series of important product launches and by many key deal-wins, including one of the telco software industry's largest ever deals with a key North American customer, and breakthrough wins with new innovative customers, like DISH, on the basis of our strong technology.

Focus areas and progress

- We continued to accelerate our research and development (R&D) by focusing investment on key growth themes of 5G applications, automation, software suites, and digital innovation platforms; building foundational innovation and leveraging it to lead with a cloud-native portfolio; and streamlining towards more efficient and simple processes.
- We focused our go-to-market capabilities to deliver success for our customers with a consultative selling approach, in order to drive new business and recurring revenue.
- We optimized our services and delivery with investments in people and digital and cloud skills by driving automation capabilities and evolving the services we offer to meet new market needs.
- We continued to reinforce a strong partner ecosystem of system integrators, independent software vendors (ISV), and technology players; and consistent commercial and operational discipline.
- We strengthened the comprehensiveness of our portfolio with several new product launches. These included Network Operations Masters, which provides vendor-agnostic network management functionalities for managing 5G networks, and Digital Operations Center, which provides a secure and fully-automated process to design, deploy and operate network slices at scale across multi-vendor, multi-domain and multi-technology environments.
- Our orders remained strong, reflecting our product and service resonance with customers, and included the win of DISH, which chose Nokia's cloud-native, standalone Core software products to help it build the most advanced, disruptive, fully-automated, 5G network in the US.
- Nokia Software offers the industry's leading cloud-native, multi-vendor and multi-network solutions combined with a robust partner ecosystem.
- As such, Analysys Mason, a leading telco software consultancy firm, again ranked Nokia as the global leader in telecoms software and services by revenue for the second year in a row.

4. Diversify

Diversify the licensing business with new opportunities in automotive, consumer electronics, IoT and brand.

We made good progress against our fourth pillar, diversifying our licensing business beyond mobile devices and into new licensing domains such as automotive, consumer electronics, the Internet of Things (IoT) and brand licensing. Nokia Technologies has done a great job in building on the strength of its mobile device patent licensing and creating new licensing opportunities in the consumer ecosystem, and we see meaningful growth opportunities in expanding our scope.

Focus areas and progress

- We continued to invest in and renew the portfolio through innovation in multiple areas, especially cellular standard essential patents, in part as a result of the extensive research activities of Nokia Bell Labs.
- Our focus is on renewing existing patent licenses on favorable terms and reaching agreements with the remaining uncontracted mobile device players.
- We continue to expand patent licensing into new segments, such as automotive, consumer electronics, and IoT.
- We license our unique cutting-edge audio/visual technologies to consumer device manufacturers.
- We are expanding our brand partnerships business beyond mobile phones.
- We have declared more than 3 500 patent families to the European Telecommunications Standards Institute (ETSI) as essential for the 5G standard, reflecting our continuing leadership and strong momentum in cellular technology R&D and standardization.
- An independent study by PA Consulting concluded we are #1 for ownership of granted patents that researchers found essential to the 5G standard.
- We signed and continued to benefit from patent license agreements for mobile devices, consumer electronic devices, and IoT connected devices.
- In September we successfully renewed one of our major patent license agreements. This new agreement demonstrates the strength of our portfolio, particularly now that we have 5G patents to offer.
- We continue to make good progress with our automotive licensing program. Many automotive brands, including AUDI, Bentley, BMW, Mini, Porsche, Rolls Royce, Seat, Skoda, Volkswagen and Volvo have licenses to use our patented inventions for their connected vehicles.
- Over the course of the year our customers ASUS, Axon, HMD Global, OPPO, OnePlus, and Panasonic launched a number of new smartphones and cameras using our industry leading OZO Audio technology.
- HMD Global launched their first 5G smartphone, the Nokia 8.3 5G and we signed a number of new brand licensing agreements, bringing new Nokia-branded experiences to a range of product categories. Nokia-branded Smart TVs and media streaming devices were launched in India, Austria, Germany and Switzerland, and Nokia-branded earphones and headphones were launched in China.

5.Operational Excellence

Operational excellence for new levels of efficiency, productivity and industry cost leadership.

Operational excellence was the foundation for our strategic priorities. In addition to focused actions to improve our cash position, commercial discipline and operational improvements, we implemented various actions across Nokia to contribute to our commitment to successfully reduce costs in 2020.

Focus areas and progress

- We made significant progress with improving our cost position, and as of the end of 2020, we achieved our EUR 500 million recurring cost savings target.
- Furthermore, we benefited from additional temporary cost savings of approximately EUR 350 million, of which approximately EUR 250 million related to COVID-19, due to lower travel and personnel expenses, and approximately EUR 100 million related to lower annual variable compensation, given Nokia's business performance in 2020.
- We have implemented structural changes to strengthen cash generation across Nokia, and we saw solid cash performance in 2020 with an approximately EUR 0.8 billion improvement in our net cash position, allowing us to end the year with a net cash balance of approximately EUR 2.5 billion.
- We strengthened commercial management process to drive better performance in current contracts and improve outcomes in new ones. Deal decisions now include a sharp focus on cash and return-on-capital-employed metrics, and improved contractual terms.
- We continued to modernize IT and simplify and digitalize our key processes to modernize our ways of working and increase productivity.
- Our Global Services business completed significant operational improvements for instance by digitalizing 100% of its 5G network deployments around the world, bringing high-quality, agility and transparency to customers globally.
- With digital project orchestration and data inventories, Nokia is enabling network rollouts to be carried out swiftly and cost-effectively, matching the agility demands from customers and helping them to bring new services to market faster.
- We continued efforts to improve collaboration and efficiency of R&D and made progress with our workforce strategy to ensure we have a future-fit set of capacity and capabilities. We focused on embedding productivity and effectiveness culture at the heart of our company for the long term.
- We continued our site optimization strategy, reducing real estate spend while creating modern workplaces for our employees.

“Rebalancing for growth” will be replaced with a refreshed corporate strategy

This will be announced at Capital Markets Day on March 18, 2021.

On October 29, 2020, Nokia announced it was embarking on a strategic review, aimed at renewing our strategy, to be announced at Capital Markets Day on March 18, 2021.

On December 16, 2020, we shared further information about Nokia's strategic priorities and the market trends at the heart of our strategic beliefs going forward.

Phase 1 of strategy review: high-level strategic principles and new operating model

On October 29, 2020, Nokia announced the first phase of its new strategy, outlining high-level strategic observations alongside a new operating model designed to better position the company for changing markets and align with customer needs effective from January 1, 2021.

Our industry is undergoing profound changes. Industrial automation and digitalization are increasing customer demand for critical networks, with a trend towards open interfaces, virtualization, and cloud native software. This will revolutionize how we design, deploy, manage and sell our products and solutions. Our strategy renewal will ensure we are well positioned to leverage these trends, improve our performance and position the company for long-term value creation.

We announced that our strategy review had yielded four observations to further build on:

- first, that technology leadership will be the top priority;
- second, that the company's current customer base, consisting of telco operators and enterprises (including webscale companies), provides a solid platform for value creation;
- third, that there is a longer-term opportunity to move into higher-value “network-as-a-service” business models; and

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- fourth, that end-to-end as a core strategic idea will be replaced with a more focused approach, with each of the company's new business groups having a distinct role in the overall strategy.

We also announced that from January 1, 2021 Nokia will have four business groups structured around unique customer offerings, with ownership for becoming one of the technology and market leaders in their respective sector. They will also need to demonstrate a clear route for delivering shareholder value with return on capital employed as a key metric.

Our goal is to better align with the needs of our customers, and through that increase accountability, reduce complexity and improve cost-efficiency. Going forward, we will have a more rigorous approach to capital allocation and will invest to win in those segments where we choose to compete.

The new business groups are:

- **Mobile Networks**, which will include radio access network and microwave radio link products, related network management, network planning and optimization, deployment and technical support services. This business group will offer the full portfolio for customers wanting to buy mobile access networks. It will target leadership in key technologies such as 5G, O-RAN and vRAN. Tommi Uitto was appointed as President of this business group.
- **Network Infrastructure**, which will include IP Routing, Optical Networks and Fixed Networks, as well as Alcatel Submarine Networks business, currently reported under Group Common and Other. This business group will respond to the ever-increasing demand for higher capacity, greater reliability, faster speeds and lower costs. Federico Guillén was appointed as President of this business group.
- **Cloud and Network Services**, which will include the existing Nokia Software business (excluding Mobile Networks network management), Nokia's enterprise solutions, core network solutions including both voice and packet core, and managed and advanced services from its current Global Services unit. This unit will also act as a Go-to-Market and delivery channel for products from other business groups to enterprise customers. Cloud and Network Services will target growth by leveraging the industry transition to cloud-based delivery, network-as-a-service business models, and software- and services-led value creation. Raghav Sahgal was appointed as President of this business group.
- **Nokia Technologies**, which will remain largely unchanged. Jenni Lukander continues as President of this business group.

Phase 2: mid-point update on strategy and operating model

On December 16, 2020, Nokia provided a mid-point update on its strategy and operating model. We announced that Nokia was aligning itself to deliver critical networks to Communication Service Providers (CSPs), enterprises and webscales.

We synthesized our strategy analysis into six strategic beliefs:

1. Networks are playing an increasingly important role in society. This is allowing us to extend our focus to serving critical networks beyond CSPs.
2. Critical networks are built based on a best-of-breed approach with network elements selected on a best performance per Total Cost of Ownership (TCO) basis.
3. Technology leadership underpins momentum and financial returns in critical networks.
4. Establishing technology leadership in some segments requires us to anticipate, shape and invest in the next technology window – where there is no path, we will reassess segment participation.
5. Gradually, value in critical networks is migrating away from monolithic systems towards silicon, software and service, and will be captured through different business models.
6. Sustained investment in long-term innovation provides us with a platform to take the long view.

We are positioning Nokia to lead in a world facing big challenges: environmental issues, resource scarcity, inequality and stalling productivity. Technology will be an essential part of the solution, with an increase in critical networks, which will extend to all corners of society.

Critical networks are advanced networks that run mission-critical services for companies and societies. They are becoming increasingly important and extending to all corners of society. This means that Nokia's addressable market for critical networks with CSPs, webscales and enterprises is also extending. To position ourselves for long-term success, we have defined three focus areas:

Secure technology leadership

Customers will take a best-of-breed approach selecting network elements from multiple individual vendors who are able to offer the best performance per total cost of ownership. Nokia is aiming to be the technology leader in the areas it chooses to play in. We have a strong position in technologies that are important for critical networks, such as open and virtualized radio access networks and we are on course for a 100% cloud-native software portfolio.

Build cloud software and network services future

We see value in critical networks gradually shifting from monolithic systems to silicon, software and services. This will increase the importance of cloud-native and open solutions and lead to more revenue being captured through different business models. We are well-positioned to be a trusted partner in the industry transition to software-led solutions and as-a-service delivery models, as demand for critical networks accelerates. Based on our leading Common Software Foundation, Nokia is a leader in cloud-native software including 5G Core, Digital Operations, Monetization, Security, and Analytics/AI. We are the first to deploy a software portfolio this broad on any cloud, leveraging our modular technology framework. We are experienced in creating both carrier-grade performance networks and working with the world's most demanding webscales. We will continue building our capabilities in this area to ensure technology and market leadership.

Strengthen our long-term research and patent portfolio

Continuing to strengthen Nokia's long-term research and global patent portfolio is a key element in securing technology leadership. We are aiming for leadership in all domains: innovation, product, patents, and standardization. Committing to long-term investment in research and innovation will allow us to anticipate and capitalize on industry changes and position us at the front of the pack when new technology windows open.

With these as focus areas we will invest in a best-of-breed portfolio.

Our renewed operating model is designed to enable the delivery of our strategic ambitions, with a lean corporate center enabling fully accountable business groups.

The third phase of the strategy update, with detailed business group strategies, will take place on Capital Markets Day on March 18, 2021.

Our history

Few companies have Nokia's storied capacity for transformation, for the development of new technologies and for the ability to adapt to shifts in market conditions.

From its beginning in 1865 as a single paper mill operation, Nokia has found and nurtured success in several sectors over the years, including cables, paper products, rubber boots and tires, mobile devices and telecommunications infrastructure equipment.

Nokia's sector-by-sector success over the years has mirrored its geographical rise: from a Finnish-focused company until the 1980s with a growing Nordic and European presence; to a genuine European company in the early 1990s; and with our acquisitions of Alcatel-Lucent, Gainspeed, Deepfield and Comptel in the 2010s, to a truly global company.

Nokia has been producing telecommunications equipment since the 1880s – almost since telephony began.

A storied past

When Finnish engineer Fredrik Idestam set up his initial wood pulp mill in Southern Finland in 1865, he took the first step in laying the foundations for Nokia's capacity to innovate and seize opportunities. Sensing a growing demand for wood pulp products, Idestam opened a second mill shortly after on the Nokianvirta River, inspiring him to name his company Nokia AB.

Idestam's sense of endeavor would continue to prevail throughout Nokia's various phases.

In the 1960s, Nokia became a conglomerate comprising rubber, cable, forestry, electronics and power-generation businesses, resulting from the merger between Idestam's Nokia AB and a phone and power cable producer called Finnish Cable Works Ltd. founded in 1912, as well as other businesses.

Transforming anew

It was not long before transformation would occur again.

Deregulation of the European telecommunications industry in the 1980s triggered new thinking and fresh business models.

In 1982, Nokia introduced both the first fully digital local telephone exchange in Europe and the world's first car phone for the Nordic Mobile Telephone analog standard. The breakthrough of GSM (Global System for Mobile Communications) in the 1980s introduced more efficient use of radio frequencies and higher-quality sound. The first GSM call was made with a Nokia phone over the Nokia-built network of a Finnish operator called Radiolinja in 1991.

It was around this time that Nokia made the strategic decision to make telecommunications and mobile phones our core business. Our other businesses, including aluminum, cables, chemicals, paper, rubber, power generation and television, were subsequently divested.

By 1998, Nokia was the world leader in mobile phones, a position it enjoyed for more than a decade.

And still the business and technology worlds would continue to evolve, as would Nokia.

A shifting industry

In 2007, Nokia combined its telecoms infrastructure operations with those of Siemens to create the NSN joint venture. We later bought Siemens' stake in NSN in 2013 as the business was emerging from a successful strategy shift and the reality of the Fourth Industrial Revolution of connected devices, sensors and people was starting to take shape.

In 2011, we joined with Microsoft to strengthen our position in the highly competitive smartphone market, which in 2014 resulted in the sale of our Devices & Services business. Nokia emerged from the transaction with a firm financial footing and three strong businesses – Nokia Networks, HERE and Nokia Technologies – focused on connecting things and people.

But Nokia's transformation was not complete. Our former HERE digital mapping and location services business, an arena we entered in 2006, had been a key pillar of Nokia's operational performance. However, following a strategic review of the business by the Board in light of plans to acquire Alcatel-Lucent, Nokia decided to sell the HERE business in 2015.

Acquisition of Alcatel-Lucent and beyond

The acquisition of Alcatel-Lucent, completed in 2016, positions Nokia as an innovation leader in next-generation technology and services.

Our reputation as an innovation powerhouse has been bolstered by the addition of Bell Labs, now known as Nokia Bell Labs. It joined a future-focused business backed by tens of thousands of engineers and thousands of patent families, a reflection of Nokia's innovation pedigree, which has produced an extensive array of benefits for consumers, businesses and society as a whole.

This acquisition helped us shape the connectivity and digitalization revolution before us – the Fourth Industrial Revolution – in which billions of people, devices and sensors are connected in a way that opens up a world of possibilities. These can make our planet safer, cleaner, healthier, more sustainable, more efficient and more productive.

This Fourth Industrial Revolution will require high-performance networks powered by 5G that will provide connectivity throughout the landscape. 5G will enable a wireless Internet of Things (IoT), helping to automate any physical business processes in verticals such as manufacturing, transport, logistics, smart cities, utilities, tele-medicine and environmental management.

Nokia today is at the forefront of the 5G evolution through our technology innovations, including 3 500 5G patent families, and we continue to drive open interfaces, virtualization and cloud-native software. We partner with communication service providers (CSPs), enterprise customers and webscales.

Nokia's long history is marked by change and reinvention. We have always been excited by where technology will lead us as we seek to enable the human possibilities of a connected world. We will continue to innovate, reimagining how technology works for us discreetly while blending into, and enriching, our daily lives.

Innovation

By driving tomorrow's innovation while delivering today's technology, we help make businesses more productive, environments cleaner, workplaces safer, economies stronger and enrich people's lives. Our long-standing commitment to innovation enables our customers to deliver extraordinary, transformative experiences. Working alongside communication service providers (CSPs) and enterprise customers across industries and around the world, we are building the future technologies that will make Industry 4.0 a reality and enhance virtually every aspect of life.

Research and development

Our research and development (R&D) efforts are led by our business groups and by Nokia Bell Labs, the world-renowned industrial research arm of Nokia. As one of the industry's leading investors in communication technology R&D, we drive innovation across a comprehensive portfolio of network equipment, software, services and licensing opportunities across the globe. Our continuous product development in 5G, private wireless, intelligent analytics and automation, IoT, and next-generation software-defined networks enables our customers to address the needs of a digitally connected world.

We have a global network of R&D centers, each with individual technology and competence specialties. The main R&D centers are located in Belgium, Canada, China, Finland, France, Germany, Greece, Hungary, India, Italy, Japan, Poland, Portugal, Romania, Slovakia, the UK and the US. The ecosystems around each R&D center helps us to connect with experts on a global scale, and our R&D network is further complemented by cooperation with universities and other research facilities. In Belgium, China, Finland, France, Germany and the US, we have significant Nokia Bell Labs research activities where we are conducting disruptive research for the next phase of human existence.

Nokia Bell Labs

The world-renowned industrial research and innovation arm of Nokia

Nokia Bell Labs has invented many foundational technologies that underpin information and communications networks and all digital devices and systems. The Nokia Bell Labs innovation engine accelerates technology development for Nokia's core communication service provider and enterprise businesses while also researching the fundamental technologies that will shape future society. Over its more than 90-year history, Nokia Bell Labs research breakthroughs have produced nine Nobel Prizes, four Turing Awards and numerous other international awards.

With Nokia Bell Labs, we search for the fundamental limits of what is possible, rather than being constrained by the current state of the art.

We look to the future to understand essential human needs and the potential barriers to enabling this new human existence. We then use our unique diversity of research intellects, disciplines and perspectives to solve key problems through disruptive innovations with the power to enable new economic capabilities, societal behaviors, business models and types of services - in other words, we drive human and technological revolutions.

Nokia Bell Labs focuses on three core areas of innovation:

- **Patents & standards leadership:** Nokia Bell Labs funnels a continuous stream of innovation into Nokia's intellectual property portfolio. In addition to using these innovations to create building blocks for Nokia products, they are also a significant source of patent licensing revenue. Equally significant is Nokia Bell Labs' active leadership in establishing communication technology standards through global standards-setting bodies. Our work in this area accelerates innovation and drives interoperability, expanding the possibilities for communication service providers, industrials and consumers in the 5G era.
- **Disruptive research leadership:** Fundamental research underpins Nokia Bell Labs' mission to innovate the technologies and make the discoveries that improve human existence. Our research has laid the foundations for the digital world we live in through the software that powers it and the communications networks that connect it. Today, Nokia Bell Labs research follows many diverse trajectories but with a common goal: devise the technologies that will have the most sustained impact on the service providers, enterprises and the industries Nokia serves.
- **Technology architecture leadership:** Nokia Bell Labs is creating the next technological architecture for the industry. This includes building and demonstrating the power of seamless network and service orchestration across Nokia's comprehensive product portfolio, which will be critical for the massively scalable networks of the future. Bell Labs Consulting leads customer engagement around future technology architecture, providing independent advice to service providers, enterprises and industries, while our Future X Labs showcase the possibilities of the evolving architectures.

2020 highlights

- Nokia declared more than 3 500 patent families as essential for the 5G standard, reflecting its continuing leadership and strong momentum in cellular technology R&D and standardization, driven largely by foundational 5G commercial technologies invented by Nokia Bell Labs.
- To provide faster realization of 5G strategies and services, Nokia Bell Labs launched a certification program to help industry professionals realize the full business potential of end-to-end 5G networks. The Nokia Bell Labs End-to-End 5G Certification Program is a first-of-its-kind program that offers professionals in communication service providers and enterprises two levels of certification – Associate and Professional – that deliver essential knowledge covering everything from the basics of 5G networks to professional level planning and design.
- To support the higher capacity needs of 5G networks with fiber optics, Nokia Bell Labs announced that its researchers set the world record for the highest single carrier bit rate at 1.52 Terabits per second (Tbit/s) over 80 km of standard single mode fiber – four times the market's current state-of-the-art of approximately 400 Gigabits per second.
- NASA selected Nokia and Nokia Bell Labs' pioneering innovations to build and deploy the first ultra-compact, low-power, space-hardened, end-to-end LTE solution on the lunar surface in late 2022. The network aims to provide critical communication capabilities for many different data transmission applications vital to long-term human presence on the lunar surface.
- Nokia Bell Labs has worked with Alex Thomson Racing to adapt existing and develop new connectivity and sensory technologies to optimize and improve the performance of Alex Thomson and his racing yacht for the Vendée Globe – a 24 000-mile, solo, non-stop, unassisted race around the world. The partnership optimizes the human performance of Alex Thomson while discovering and creating technologies for the 5G era that can enhance industrial IoT and mission-critical networks so that they can operate in harsh physical environments.
- Nokia Bell Labs began 6G research and published the first white paper on the communication and technologies needed in the 6G era, presenting it at multiple industry symposiums and forums.
- Bell Labs consulting published the 'New Collar' white paper, a study that analyzed different US industry sectors and job classes to determine that digital transformation and industrial automation results in a new type of worker. The study also found that the COVID-19 crisis triggered an acceleration of digital transformation across nearly all industries in the world and highlighted the impact on future labor markets.
- Bell Labs consulting released findings as part of the 5G Business Readiness Report, a landmark report from Nokia, that found that 5G-enabled industries have the potential to add \$8 trillion to the global GDP by 2030⁽¹⁾.
- Nokia Bell Labs received the 2020 Technology & Engineering Emmy® Award for pioneering work on the charge-coupled device (CCD), the digital image sensors embedded in nearly every smartphone and digital camera in the world. The CCD was crucial in the development of television, allowing images to be captured digitally for recording transmission.
- Nokia Bell Labs' "Experiments in Arts and Technology" lab collaborated with the Finnish National Opera and Ballet on 'Opera Beyond', a project that explores the opportunities for emerging technologies to help evolve the performing arts in Finland.
- Nokia won the SCTE-ISBE Chairmen's Advanced Technology Award for contributions to the Cable 10G initiative based on Nokia Bell Labs' pioneering innovations in 10G cable systems, including novel scheduling methods and the move towards full duplex 10G systems with extended spectrum in DOCSIS® 4.0.
- Nokia Bell Labs contributed its technical expertise in robot orchestration, robot network controller and human-robot interaction to aid research and promote socially relevant use cases as part of the Nokia Centre of Excellence for Networked Robotics collaboration with the Indian Institute of Science.

(1) Source: Nokia. 5G Business Readiness Report. October 2020.

Sales and Marketing

During 2020, customers of Networks fell mainly into two broad categories. The primary customer group consisted of communication service providers (CSPs), while enterprise customers represented another, relatively fast-growing, area.

Our Customer Operations (CO) organization was, throughout 2020, the primary interface to our CSP customers, with CO Americas focusing on our North America and Latin America markets, while CO EMEA & APAC held responsibility for our Asia Pacific, Europe, Greater China and Middle East & Africa markets. Active in around 120 countries, CO ensured, throughout 2020, that our customers were able to benefit from dedicated management attention and our teams' deep understanding of local markets. Our strong customer relationships were supported by a regional and country-based approach and by customer teams, which have for a long time been – and continue today to be – the face of Nokia to our CSP customers.

In addition to sales, CO was – throughout 2020 – responsible for much of our project delivery, ensuring strong alignment between our customer-facing sales and delivery teams in each account. Our "One CDM" (customer delivery manager) model provided a strong counterpart to our sales-focused customer team setup, ensuring that customers have a seamless experience when working with Nokia.

Enterprise customers were in focus for Nokia and continue to grow in importance. Throughout 2020, enterprise customers were served by a dedicated sales force with a global presence, selling to enterprise customer groups – including transportation, energy, manufacturing and logistics, governments and webscale businesses – both directly and through channel partners (including system integrators, consulting companies, distributors and value-added resellers).

The CO organization also worked very closely throughout the year with Nokia Software to ensure the right level of customer focus and expertise in this crucial area, and with Nokia Enterprise to make sure we could efficiently serve both our CSP and enterprise customers. Nokia's innovative "Service Provider as a Partner" sales approach – in which we work in partnership with operators to address customers in the enterprise space, continues to be a successful route to market for CSPs as well as for Nokia.

Business groups

Mobile Networks

Market overview

The primary market for our Mobile Networks business group includes technologies for Radio Access Networks (RAN) i.e. mobile access as well as Microwave Radio Links (MWR) for transport networks. Mobile access encompasses RAN technologies ranging from 2G/GSM to 5G/NR in licensed and unlicensed spectrum for both macro and small cell deployments. On October 29, 2020, as part of our new operating model, we announced that as of January 1, 2021 it was planned for Mobile Networks to have a wider remit, including RAN and MWR products, associated network management solutions, as well as network planning and optimization, network deployment and technical support services.

Business overview and organization

In Mobile Networks our goal is to be a technology leader in 5G/NR, Single RAN (2G/3G/4G/5G) and MWR and provide the best value to our customers as they evolve their networks. We continue to develop our 5G/NR portfolio according to the latest 3GPP specifications, we have declared more than 3 500 patent families as essential for 5G, and are proud of the number of industry firsts that we have achieved. In January 2020, an independent analytics firm, IPlytics GmbH, ranked Nokia #2 for ownership of granted 5G patents declared in at least one office, and an independent study by the consultancy company PA Consulting concluded that Nokia was #1 for ownership of granted patents that the researchers found essential to the 5G standard. We see a strong appetite for 5G across mobile markets, and we are the only mobile network vendor working with all the major operators in the world's most advanced markets in the US, South Korea and Japan. We are also providing 5G technology in China.

We have a large global installed base in 2G/3G/4G that is providing us with the platform for success in 5G. We have more than 360 customers in 4G/LTE and a robust AirScale platform for Single RAN, which can be upgraded from 4G/LTE to 5G/NR. We built our AirScale portfolio and small cells, software and microwave transport solutions to work across all generations of technology and all relevant spectrum bands for efficient, simplified and optimized sites for our customers. In June 2020, we announced 5G AirScale Cloud RAN in vRAN 2.0 configuration, with full baseband in cloud including Virtualized Centralized Unit (vCU) and Virtualized Distributed Unit (vDU). In July 2020, we announced the addition of new open interfaces that would be built on top of our AirScale portfolio with a suite of O-RAN-defined interfaces expected in 2021.

This broad technology portfolio allows us to help our customers evolve to and launch 5G/NR networks. Nokia was involved in more than 188 5G/NR commercial engagements in 2020, with the total number of 5G commercial deals at 139 at the end of 2020. A total of 44 of those 5G networks were live in 2020 in Asia Pacific, China, the US, Europe, Middle East and Africa. At the end of 2020, we also include within our 139 5G commercial deals 19 public 5G deals with enterprise customers beyond Communication Service Providers (CSP), including the world's first 5G-based network for automated rail operation with Deutsche Bahn in Germany. We have delivered five million 5G/NR software upgradable radios, and we have delivered 5G/NR commercial networks in 600MHz, 700MHz, 800MHz, 850MHz, 2.5GHz (TDD), 3.5GHz, 26 GHz, 28GHz and 39GHz. We have launched commercially 5G/NR vRAN 1.0 which involves Cloud RAN for 5G/NR with a virtualized Centralized Unit (vCU). We have activated 4G/5G DSS (Dynamic Spectrum Sharing) and 5G Stand-Alone (SA) in commercial networks, including in T-Mobile US – the world's first nationwide 5G SA network.

Competition

The RAN market is a highly consolidated market, and our main competitors are Huawei, Ericsson and Samsung. Smaller competitors include ZTE, Fujitsu, NEC, Altistar, Mavenir, Parallel Wireless, JMA Wireless, KMW, Commscope, MTI, and Airspan, for example. The Microwave Radio Links market is more fragmented. There, besides Huawei and Ericsson, our key competitors include, for example, Ceragon, NEC and Aviat.

2020 highlights

- At the end of 2020, we had 139 commercial 5G deals, and we had launched 44 5G networks.
- We delivered 5G/NR commercial networks in 600MHz, 700MHz, 800MHz, 850MHz, 2.5GHz (TDD), 3.5GHz, 26GHz, 28GHz and 39GHz.
- Our combined 4G/LTE and 5G/NR market share excluding China was approximately 27% to 28%.
- We expanded our AirScale portfolio with a Dynamic Spectrum Sharing (DSS) software upgrade for existing Nokia AirScale base stations.
- We had 260 private wireless customers and 19 publicly announced private 5G wireless customers.
- Nokia launched the world's first automated 4G/5G network slicing within RAN, transport and core domains.
- We announced the next-generation 5G AirScale Cloud RAN solution based on vRAN 2.0, with general availability expected in 2021.
- We announced the world's first 5G liquid cooling deployment with Elisa. Our liquid-cooled 5G AirScale Base Station allows operators to cut their BTS site energy expenses by 30% and CO2 emissions by 80%.
- We announced an initial set of O-RAN functionalities with a full suite of O-RAN-defined interfaces expected in 2021.
- Nokia, Elisa and Qualcomm achieved the world's fastest 5G speeds on a commercial 26 GHz network in Finland by delivering 8 Gbps for the first time serving two 5G mmWave devices connected simultaneously.
- Dell'Oro Group, an industry analyst company, outlined in their Q3/2020 Microwave Transmission report that Nokia was one of only three vendors (with Aviat and Huawei) who outperformed the market and increased their market share. Nokia's share of the new E-Band market (5G wireless backhaul) sharply increased by eight percentage points.

Global Services

Market overview

Nokia deploys, supports and operates communication service providers' (CSP) and enterprise networks. This includes network infrastructure services and professional services for mobile networks and managed operations for fixed, mobile, IP and optical domains. In addition, new growth areas are network cognitive services and analytics, deploying and operating networks in public sector, energy and transport markets and introducing new business models for CSPs, such as our Worldwide IoT Network Grid (WING).

Business overview and organization

Nokia's services, solutions and multi-vendor capabilities guide CSPs in their digital transformation journey and help navigate through the evolving technology landscape, network complexity and data growth. We work with CSPs to improve end-user experience while providing support in day-to-day network planning, implementation, operations and maintenance.

The offering, which was part of the Global Services business group in 2020, allows Nokia to differentiate in the 5G market while helping CSPs prioritize their 5G investments and bring 5G-based services to the market faster. Nokia 5G digital services portfolio helps CSPs assess the technical choices and design and deploy end-to-end 5G networks that meet the needs of diverse 5G use cases such as cloud gaming, connected cars and autonomous factory robots.

A key focus area in Global Services is empowering CSPs to transform to digital service providers, supported by a digital architecture for the full lifecycle of network design, deployment, operations and technical support – for both legacy and cloud-based networks. The Nokia AVA cognitive use cases provide advanced AI and analytics as well as a common data lake to help boost network performance, operational efficiency and customer experience. We also help digital service providers to seize the possibilities of Internet of Things (IoT) and enter new markets using Nokia Worldwide IoT Network Grid (WING), which provides seamless connectivity across geographical borders and technologies. We enable our customers to enter new markets rapidly and with low risk through pay-as-you-grow or revenue share models.

Enterprise is a strategic growth area for Nokia. In 2020, Global Services was focused on enabling the digitalization of asset-intensive industries with connectivity-driven services and digital automation solutions. Our new digital service framework shortens sales cycles and drives rapid, repeatable service delivery helping our enterprise customers to minimize complexity. We deploy private broadband networks to accelerate the digitalization of industries, enabling higher productivity, operational efficiency and increased worker and asset safety. Our global expertise in managed services enables our enterprise customers to reap the benefits of operational transformation, managed security and network operations support for their new IP/MPLS and mission-critical private LTE networks.

Competition

In a market segment that combines products and services as well as managed services, Nokia competes against traditional network equipment providers such as Ericsson and Huawei, while for the service-led businesses such as cognitive, IoT and enterprise services, we see other competitors such as Cisco, HPE, and IBM emerging.

2020 highlights

- Nokia digitalized 100% of global 5G network deployments, enabling customers to benefit from a faster, more sustainable and higher-quality network deployment process.
- Global Services launched the Nokia AVA Quality of Experience (QoE) at the Edge service which enables artificial intelligence to be deployed at the edge, allowing real-time automated actions to improve customer experience, and Nokia AVA 5G Cognitive Operations which uses AI to inform network slice creation and help CSPs comply with committed service level agreements (SLAs) for massively scaled 5G networks and enterprise services.
- Nokia WING, a managed service for global IoT deployments that provides seamless connectivity across geographical borders and technologies, saw continued momentum with US Cellular, Smart Philippines, China Mobile IoT, Vodafone India and Telecom Argentina, and continued partnership with AT&T. Nokia also upgraded the WING service with 5G and Edge capability to enable operators to offer 5G IoT services faster and cost-effectively.
- GlobalData, an industry analyst company, rated Nokia as 'Leader' in managed services for the second consecutive year, a testimony to our advanced operations capabilities. In managed services, Nokia announced agreements with Rakuten Mobile to implement a 'zero touch' operational environment for 4G and 5G services and with A1 Austria on all existing and new private LTE and 5G enterprise campus network deployments. We also introduced cognitive operations to enable CSPs to transform their network and services operations through extreme automation enabled by AI.
- In Enterprise Services, Nokia introduced four private wireless connectivity segment solutions for connected mining, private wireless for ports and airports, and train to ground. Nokia also announced agreements with Grand Paris Express France, Area X.O. Canada, Vale Brazil, Norcat Canada, BV Singapore, Ameren USA, PGE Systemy Poland, among others.

Fixed Networks

Market overview

The primary market of Fixed Networks (FN) is the communication service providers (CSP). FN has been diversifying outside the CSP market into new segments such as new infrastructure wholesalers and enterprises. FN's mission is to provide affordable ultrabroadband solutions to connect more people, sooner. FN builds solutions that deliver hundreds of megabits or even gigabit broadband to homes, small businesses and cell sites, and sustain that gigabit experience into every corner of the home using mesh Wi-Fi solutions. Fiber-to-the-home (FTTH) is now established as the main solution but other fiber-rich access technologies, such as fixed wireless access (FWA) and xDSL upgrades, continue to be an attractive complement. The key to making the universal "gigabit to the home" business case work – connect more people, sooner – is to select the right tool from a broad toolkit. In the 5G era, FN's FWA and the reuse of FTTH for connecting denser 5G cells site grid are seeing significant traction.

Business overview and organization

The Fixed Networks focus is based on three pillars: fiber-based access infrastructure to bring a gigabit to every home, business and 5G cell site; Wi-Fi solutions to bring a gigabit into the home; and cloud/virtualization solutions to automate and simplify the network. Innovation and thought leadership are a cornerstone of all three areas.

The first pillar of the strategy is about offering the right technology mix to deliver gigabit access to more people, everywhere. It includes fiber, fixed wireless access, and xDSL upgrades, and we have a top three position in every market we serve. Nokia is a leader in fiber access with more than 270 customers. In 2020, FN introduced the industry's first 25G PON technology. FN remain a market leader in copper technologies, such as VDSL and G.fast and have taken a leading position in the burgeoning fixed wireless access market, including 4G and 5G outdoor receivers and 5G indoor gateways, with more than 85 customers and trials. Our in-house developed Quillion chipset ensures we have best-in-class performance across our portfolio and can innovate at pace.

The second pillar is about ensuring perfect gigabit connectivity throughout the home. Our Nokia WiFi portfolio includes mesh Wi-Fi solutions to provide Wi-Fi coverage in every corner of the building and advanced cloud-based controllers that not only manage and optimize Wi-Fi performance in a single home but also between buildings and across a network. In 2020, we were first to market with a self-optimizing mesh Wi-Fi 6 solution, providing a superior experience for consumers. We have 45+ CSP references for our Nokia WiFi solution.

As CSPs continue to combine different technologies and deployment models, their networks become more complex. The third pillar of the Fixed Networks strategy looks at simplifying and automating operations, with the cloud and virtualization playing a key role. FN's Software-Defined Access Network (SDAN) solution takes an open and pragmatic approach, with concrete use cases such as access network slicing, and a smooth evolution path for the installed base. Advances in FN's SDAN controller cloud platform, Altiplano, take CSPs a step closer to the autonomous network. There are now more than 250 SDAN-ready deployments.

Underpinning these three pillars is FN's market-leading services that provide CSPs with smart and efficient ways to transform their networks, adopt new technologies and operate their networks. FN has more than 75 network transformation projects to its name and 30+ multi-vendor maintenance contracts.

Competition

The competitive landscape in fixed access for CSPs has two major key players, Nokia and Huawei. ZTE follows in third position. Despite the dominant position in China held by these two Chinese players, Nokia holds a #2 position worldwide, particularly strong in optical line termination (OLT), with 37% market share in the 12 months rolling period ending in June 2020. Smaller players, such as Calix and Adtran, are relevant in North America and Fiberhome in China but have limited footprint worldwide, with an estimated market share below 10% and no comparable breadth of portfolio. Nokia is the only major vendor with a trustworthy market-leading position in every territory.

2020 highlights

- Nokia continues to be a market leader in fiber and fiber extensions (DSL upgrades such as VDSL, G.fast) and has become a leader in the new 5G fixed wireless access segment. We are the only vendor with a leading market share in all regions worldwide, and the only Western supplier in China.
- 2020 saw Fixed Networks launch two industry-first solutions: 25G PON enables CSPs to converge home broadband, business services, and 5G mobile transport on a single PON; self-optimizing Wi-Fi 6 brings high-performance gigabit Wi-Fi to every corner of the home.
- Our three-pillar strategy is paying off and 2020 saw growth in core solutions as well as new technologies such as whole-home Wi-Fi, fixed wireless access and virtualization. Notable project announcements in 2020 include: Vodacom South Africa (FWA); Openreach and Vivacom Bulgaria (XGS-PON); NetCologne; and Converge ICT (SDAN).
- Nokia, along with AOI, Chorus, Chunghwa Telecom, Ciena, MACOM, MaxLinear, NBN Co., Sumitomo Electric Industries, Ltd., and Tibit Communications, has established a multi-source agreement (MSA) to promote and accelerate the development of 25G PON, an important next-generation technology that supports emerging 5G and industrial demands.

IP/Optical Networks

Market overview

CSP networks are under tremendous pressure from cloud-based applications, ultra-broadband evolution and emerging Industry 4.0 applications and services. Our IP and optical networking solutions reduce time to market and risk as CSPs launch new consumer, mobile and enterprise services, rapidly scale them to meet surging demands, and continually add new features and functions. Our insight-driven network automation solutions help to further ensure that network services are delivered with consistent quality, reliability and security and that restorative actions are automatically initiated when any parameter varies beyond set limits. Overall, our comprehensive portfolio enables CSPs to build and operate automated, secure, and high-performance networks at massive scale.

These carrier-grade, mission-critical attributes also address the needs of – and are valued by – other customer segments including webscale companies and enterprises. In the enterprise segment, we address verticals including transport, energy and the public sector as well as healthcare, finance and retail enterprises leveraging similar solution sets augmented with purpose-built capabilities.

Business overview and organization

Our IP/Optical Networks business group provides the high-performance and massively scalable networks that underpin the digital world's dynamic interconnectivity. Our portfolio of robust and innovative systems, software and services play across multiple domains including IP routing and switching, optical networking and network automation.

The IP/Optical Networks product portfolio includes:

- IP routing solutions for aggregation, edge, core, data center and internet peering applications;
- IP service gateways for residential, business, mobile and Industrial IoT services and unique hybrid solutions enabling converged service delivery;
- IP network intelligence, analytics and distributed denial of service (DDoS) security solutions;
- optical networking solutions including coherent optical transponders, OTN (Optical Transport Network) switching and transport, WDM (Wavelength-Division Multiplexing), ROADMs (Reconfigurable Optical Add-Drop Multiplexer), and optical line systems for metro access and aggregation, data center interconnection, longhaul and subsea applications;
- network automation platforms that analyze, control and manage multi-vendor IP and optical networks;
- data center automation and software-defined WAN solutions that configure network connectivity among clouds and to any enterprise branch office with the ease and efficiency of cloud compute; and
- an extensive portfolio of professional services to accelerate the benefits of integrating new technologies to transform networks and leverage the latest innovations in SDN, virtualization and programmable IP and optical networks.

Competition

Our competitive landscape in this space includes Cisco, Juniper Networks, Huawei, and Ciena.

2020 highlights

- Nokia redefined data center fabrics with the launch of a new and modern Network Operating System (NOS) and a declarative, intent-based automation and operations toolkit, allowing cloud and data center builders to scale and adapt operations brought on from technology shifts such as 5G and Industry 4.0. Apple is an early adopter of the innovative technology, deploying the solution within its cloud operations in its data centers.
- Nokia launched its WaveFabric Elements portfolio of photonic chips, devices and subsystems, including its fifth generation coherent digital signal processor family, the Photonic Service Engine V (PSE-V).
- Nokia introduced new capabilities to automate 4G/5G network slicing across the RAN, transport and core domains, including new functionalities to its Network Services Platform (NSP) to enable it to play a key role in transport and core slicing.
- Rakuten Mobile selected the Nokia 1830 Photonic Service Switch to power its reconfigurable photonic mesh mobile backhaul network. Nokia's cutting-edge coherent and optical component technologies will enable Rakuten Mobile to flexibly grow its network bandwidth for the rapid rollout of 4G and 5G services.
- Equinix deployed a new Nokia IP/MPLS network infrastructure to support its global interconnection services. This enables Equinix to consolidate into one, efficient webscale infrastructure to provide FP4-powered connectivity to all data centers – laying the groundwork for customers to deploy 5G networks and services.
- DISH Network selected Nokia's cloud-native, standalone core software products to help it build the most advanced, disruptive, fully-automated, cloud-native 5G network in the US. The agreement includes subscriber data management, device management, packet core, voice and data core, as well as integration services.

Nokia Software

Market overview

Nokia Software holds the #1 position in the telecoms software market⁽¹⁾.

Its market is driven by large-scale service and network operations automation; digital business transformation; and the shift to 5G and the cloud. The business also saw an increase in operator demand to optimize and secure their networks to cope with the communications shifts of COVID-19.

Business overview and organization

Built on Nokia's cloud-native Common Software Foundation (CSF), Nokia's multi-vendor and multi-network software solutions enrich and secure user experiences; automate operations and infrastructure; and drive new revenue streams and cost-efficiencies. Nokia's CSF ensures our software solutions are easy to deploy, integrate, use, scale and service. Nokia was the first to build a cloud-native software platform at scale in the telecoms software market.

Nokia Software's business has two parts, Applications and Core. Nokia Software applications improve customer experiences with better intelligence, security, operations and services. Nokia's core network solutions span 5G, mobile broadband, and IoT; and simplify operations and enable new services and revenue streams.

Nokia Software's strategy is to focus investments in the strategic areas of 5G, automation, portfolio integration, and digital innovation platforms. Investment in a cloud-native CSF and our multi-vendor, multi-network agnostic approach sets us apart from most large competitors. Against smaller players, Nokia has the advantage of global delivery capabilities and a large installed base, backed by a broad portfolio.

Competition and ecosystem

Nokia's software competitors fall into two main categories: independent software vendors (ISVs) and network equipment providers (NEPs). The main ISV competitors are Amdocs, Netcracker and Oracle. The main NEP competitors are Huawei and Ericsson, which sell software as part of large infrastructure deals. In addition, we see increasing competition from niche, boutique software players.

In the past year, "webscale" players such as Amazon Web Services, Google Cloud Platform, and Microsoft Azure have taken actions to increase their service offering to CSPs. These developments will accelerate the move to cloud-native telecoms software, on which Nokia Software has geared its strategy, and will open new possibilities for partnering with these webscale players.

While also this market segment faces some pricing pressure, telecom software provides significant long-term opportunity for vendors that can drive technology and operational leadership and set the pace of transformation in the industry.

Nokia's software business is #1 in applications and applications services by revenue, according to Analysys Mason, and has 20–25% market share in core networks, according to Nokia data.

⁽¹⁾ Source: Analysys Mason. September 2020.

2020 highlights

- We launched several cloud-native software applications:
 - Nokia Network Operations Master to provide vendor-agnostic network management functionalities for managing 5G networks;
 - Nokia Assurance Center software to automate network and service operations by using machine learning to help CSPs deliver service level agreements required for new network functions;
 - Nokia Experience Center software to enable automated action prioritization based on what is experienced by customers;
 - Digital Operations Center software to give CSPs new revenue-enhancing opportunities with an automated platform that manages 5G slice-based services securely; and
 - Upgraded cognitive Self-Organizing Networks software to provide CSPs with zero-touch operations for 5G and enabling real-time solution deployments.
- Core saw continued commercial momentum and innovation. Industry research group Global Data ranked Nokia's Telecom Applications Server as "Leader" again and Nokia's Session Border Controller as "Very Strong" in all categories.
- Secured the #1 market share for Self-Organizing Networks, according to LightCounting.
- Nokia Software's technology leadership furthered both our Core and Apps deal-win rate and increased their footprint in dozens of new and/or existing customers, including:
 - Rakuten selected Nokia's Core services, Monetization and Digital Experience solutions;
 - DISH chose Nokia's cloud-native 5G standalone Core software to build the operator's US 5G network with scale, performance, and efficiency;
 - China Unicom awarded Nokia approximately 10% share of the operator's 5G core network;
 - Singtel selected Nokia to collaborate on developing and trialling 5G network slicing capabilities, based on a Network as a Service (NaaS) approach that provides customers with highly customizable services;
 - Optus selected Nokia to help it provide IoT software solutions to Australian mining, utilities and transportation industries;
 - Airtel deployed India's largest open cloud-based VoLTE network with Nokia's CloudBand Infrastructure software;
 - Ooredoo Qatar rolled out Nokia's cloud-native 5G Core network software for commercial 5G services; and
 - Sunrise deployed Nokia's Converged Charging software to drive 5G monetization.
- There was significant growth in our enterprise business (outside of CSP customers) driven, for example, by deals with Highways England and EltaLab, a Private 5G Core/Apps win in Austria with Citycom; and the first commercial win for the Nokia Enterprise Voice Core solution.

Nokia Enterprise

Market overview

In 2020, Nokia continued to grow its business with enterprise customers focusing on two main market needs – the need for high-performance connectivity for hybrid hyperscale clouds and the need for mission-critical networks in asset-intensive industries. Driven by the continued growth in cloud adoption, our webscale customers continue to require high-performance cloud connectivity. In 2020, we expanded our market opportunity in high-performance cloud connectivity portfolio with our data center switching launch. We also enhanced our private wireless portfolio, with the launch of our 5G standalone capabilities and Modular Private Wireless solutions.

Our enterprise customers were highly impacted by COVID-19. However, in aggregate, our customers proved to be resilient as they adapted to social distancing and local health requirements, which redefined the global workplace with remote and autonomous workplaces. In addition, global business value shifted towards resilient global supply chains as well as the prioritization of business continuity plans, increasing the demand for mission-critical networking. We continue to monitor the overall market impact of the pandemic across the enterprise segments we serve.

Nokia continues to address the enterprise market through a combination of direct sales and service provider, system integrators, industrial, direct and indirect reseller, and distribution partners.

We bring our customers a lauded ethics track record, and corporate values that instill integrity and security, coupled with market expertise tailored to their individual needs. Our comprehensive services portfolio wraps our technology offers with deployment assurance, ensuring our customers get performance, innovation and results from the solutions they've trusted us to mobilize in their networks.

Business overview and organization

Nokia has been serving enterprise clients for decades. In that time, we have developed a deep knowledge of the business requirements of the segments we serve. We leverage this long-developed expertise, to architect, build, and deliver solutions to our customers and our partners' end-customers. Those solutions include innovative, high-performance, carrier-grade wireless networks, fixed networks, IP routing, optical networks, and communication and security software. In addition, we leverage our ecosystem of partners to round out our solutions in areas where we do not participate broadly such as devices, autonomous guided vehicles, and spectrum. We pre-integrate many of our solutions and customize these towards segment-specific requirements and a suite of lifecycle services.

Our innovation roadmap is the Nokia Bell Labs Future X for industries network architecture. It provides a blueprint for industrial networks, intelligently combining high-performance, ubiquitous access with intelligent IP/optical networks, and agile multi-cloud-enabled solutions for industrial automation. Analytics-driven digital value platforms and business applications are tailored to the unique needs of each industry – with security embedded at all levels of the architecture.

Our approach has been validated in the market with 1 545 mission-critical customers and our private wireless solutions are used by 260 customers globally.

Our Energy, Transportation, Government and Cities, and Manufacturing and Logistics segment customers continued to deploy mission-critical connectivity and applications powered by Industry 4.0 acceleration and the need to connect, automate, manage, and control critical industrial assets.

Transportation

Nokia continues to expand our market penetration into railways, aviation, and maritime segments. We deliver solutions that improve workplace safety and efficiency, enable autonomous operations, and help build better customer experiences. Our solutions support railway signaling, air traffic control critical communications, airport communications, and connectivity as well as effectively automating passenger screening for health and safety. Nokia is well positioned in the railway market as it transitions to the 5G-enabled Future Railway Mobile Communications System (FRMCS), a new standard for railway communications.

Energy

Nokia provides energy companies, including power utilities, mining, and oil and gas companies, with private wireless networks that offer an affordable, agile, and secure way to deliver improved automation to a range of mission-critical operations in remote and harsh environments, from wind farms to offshore oil rigs, protecting lives, ensuring business continuity, and increasing productivity. Our solutions have proved essential during COVID-19 as we helped our power utility customers adapt to major changes in grid usage – powering up field hospitals, and balancing power distribution needs as usage shifted from commercial to residential.

Government and cities

The Public Safety, Smart City, and National Government segments were influenced in 2020 by the response to COVID-19 and the need for broadband to support citizens with education and work in a remote and virtual environment. Globally, we anticipate an acceleration of Government Driven Broadband Initiatives (GDBI) and digital government projects stemming from gaps in broadband availability, which have become essential today. Our community broadband solutions help governments, state, provincial, local agencies, and municipal power utilities to address inner-city connectivity coverage gaps and address rural broadband needs.

Nokia's public safety solutions provide first responders with real-time, broadband mission-critical communications that help save lives and manage crisis situations.

We also help design future-proof cities powered by the required connectivity infrastructure and applications to deliver a safer and more inclusive environment for all citizens. In the realm of Smart Cities, Nokia offers the 'city as a platform' solution, a unique platform-based approach to provide connectivity, data sharing and usage control capabilities for municipal services such as smart parking, lighting, traffic management. The outcome for municipalities is an improved quality of life of all citizens.

Manufacturing and logistics

Nokia enables Industry 4.0 acceleration in the Manufacturing, Supply Chain, and Logistics segments. Our private wireless networking solutions and IoT platforms help to automate operations, increase productivity, and reduce costs. Through the digitalization and automation of operational systems, manufacturers and logistics companies can build resiliency and ensure business continuity during impact events.

Nokia has built a foundational customer base providing easy to implement private wireless solutions to enable greater degrees of factory and warehouse automation. In 2020, we gained traction with deployments with A1 and Magna International in Austria, and Toyota Production Engineering in Japan, and Bosch in Germany.

Webscale companies

Webscale companies handle billions of transactions per day in their networks. These customers demand hyper-efficiency in content delivery and support exceptional online experiences. We help connect webscale infrastructure with high-performance IP routing, open optical systems, and alternative access and subsea networking solutions. Nokia co-develops advanced open network components with our webscale customers to enhance the performance of public and hybrid cloud platforms, driving market leadership and enabling timely product availability. In 2020, we announced our new data center switching portfolio with initial customer support from Apple, BT, LINX, Equinix, Turkcell, and others.

Competition

We operate in a complex ecosystem where some companies are our customer, our partner, and our competitor. In that ecosystem, our competitors range from broad networking companies with which we have competed for some time, and specialized competitors focusing on a single customer segment, to a large set of new, smaller competitors who are typically attracted to the transformational value and opportunity of 5G.

Networking competitors include Cisco, Juniper, Ciena, Ericsson, and Huawei (in select geographies). In addition to our primary competitors, we also face more segment specific competitors such as Motorola, Calix, and Adtran in the public sector, Kontron in the transportation segment, Arista in the webscale segment, and in the private wireless domain companies such as Athonet and Celona.

Nokia maintains a key advantage for our customers as we offer solutions and expertise spanning broadband wireless, LTE and 5G and we have proven leadership in the market with successful private wireless deployments. Our unique Digital Automation and Modular Private Wireless are leading solutions in the market⁽¹⁾.

Nokia has a proven co-development track record of working with our customers on high-performance product development that results in market breakthroughs. Our high-performance FP4 and PSE-V digital signal processors (DSP) optimize power, performance, and cost across multiple form-factors with our DSPs supporting applications from metro to subsea deployments. Our focus on open systems offers customers flexibility, business agility and reduces the risks associated with vendor lock-in.

(1) Source: GlobalData. September 20, 2020.

2020 Highlights

- We increased our private wireless networks (4.9G/LTE) business with 260 customers across the globe and cross-industries, marking our leadership position in the market. We also launched the world's first commercially available 5G standalone (SA) private wireless solutions for the industrial world, a 'direct to 5G' entry point for high-spec industrial use case validation, pushing the 5G ecosystem and leapfrog enterprises into the future with industrial applications such as robotics, mixed reality platforms, digital automation of operations, and 4K video.
- We expanded our global collaboration with service providers as partners (e.g. Verizon, AT&T, A1, NTT Docomo) to serve enterprises leveraging spectrum sharing capabilities, and leading to Industry 4.0 acceleration driven by private wireless. This resulted in business growth across markets and segments.
- We have moved up the value chain of industrial automation services adding horizontal and vertical capabilities that are critical to client use-cases, including positioning, video analytics, industrial protocol support, security, and management of end devices. These capabilities allow us to deliver segment-specific outcomes as-a-service, expand our automation and integration capabilities and provide our customers with the ability to digitalize industry-specific applications and facilitate the convergence of operational technologies (OT) and information technologies (IT).
- We solidified our leadership position in the private wireless market with the mining industry, helping our customers with open-pit and underground mines move past the limitations of Wi-Fi and gain the performance needed for their industrial automation and workplace safety programs. We achieved key wins in Chile, Australia and Canada, where our Nokia Private wireless solutions are helping to make mines safer, more productive and sustainable.
- We were honored to be selected by NASA as a key partner for its next mission to the moon. Our innovations, deployed in the most extreme environments, are driven by Nokia Bell Labs for NASA and will provide the first-ever cellular network on the moon as it is established as a base of operations for forthcoming missions. Connectivity and performance will be critical to providing NASA with timely communications and control for automated operations. In the same timeframe, Nokia was selected by the U.S. Department of Defense to develop effective methodologies to allow the sharing or coexistence between airborne radar systems and 5G cellular telephony systems in the 3.1–3.45 GHz band. We were also selected by EE (part of the British Telecom Group) to build the world's first 4G LTE air-to-ground network for emergency services in the UK.
- New York Power Authority (NYPA), the US' largest state public power organization, selected our private wireless solutions to help them become the first end-to-end digital utility in the US. Following the successful trial, our solutions will help NYPA modernize its network, conduct and monitor operations and manage data from the deployment of intelligent sensor-based technologies. With power utility AMEREN, our private wireless solutions were selected for field trials to prove the implementation of secure, robust wireless coverage over the utility's entire 64 000 square mile (103 000 sq. km.) service territory. We received an award and recognition for this effort.
- Toyota Production Engineering Company will deploy a private LTE/4.9G network at TPEC's site supporting a range of IoT-based devices that enable equipment digitization and visualization. Over time, the network will be upgraded to 5G, featuring ultra-low latency to support even faster throughput. 5G networking will help the manufacturing process to evolve into a more automated operating environment.
- Continuing our success in the Maritime segment, in 2020, Nokia helped maritime terminal operators automate operations for efficiency, continuity and improved safety.
- In railways, Nokia helped Japanese rail operator Odakyu Electric Railway leverage machine-learning and video analytics to enhance the safety of rail crossings.
- In aviation, our 5G solutions are helping Lufthansa Technik to adapt to social distancing safety guidelines by providing high-definition video table inspections of aircraft maintenance and repairs with remote inspection teams – keeping operations flowing efficiently and safely.
- We have continued to accelerate our penetration of the webscale segment with innovative data center interconnect (DCI) network solutions. With significant contract wins with China-based webscale giants Tencent and Baidu, we continue to strengthen our already strong presence in the software-defined DCI infrastructure market.

Nokia Technologies

Market overview

Nokia Technologies is responsible for managing and monetizing Nokia's intellectual property, including patents, technologies, and the Nokia brand, building on Nokia's continued innovation and decades of research and development (R&D) leadership. We have three focus areas: Patent Licensing which monetizes our patent portfolio; Technology Licensing which helps device manufacturers integrate Nokia's technologies into their products; and Brand Partnerships, which licenses the Nokia brand.

Business overview and organization

Nokia Technologies is focused on licensing.

- We manage the Nokia patent portfolio, working with all other Nokia businesses, and continue to grow our patent licensing and monetization activities, which drive most of Nokia Technologies' net sales. This includes our successful mobile devices licensing program, where we currently have licensing agreements with most of the major smartphone vendors.
- Nokia owns one of the broadest and strongest patent portfolios in the mobile communications sector. At the end of 2020, Nokia's patent portfolio included around 20 000 patent families (each family being composed of several individual patents), of which the vast majority will still be in force through 2030.
- We also have patent licensing programs for other markets which use our standardized technologies, including consumer electronics, connected cars, smart meters, payment terminals, asset tracking and other IoT devices and related industries.
- Nokia Technologies enables the commercialization of selected fundamental innovations from Nokia Bell Labs and other Nokia business groups in new areas via close collaboration with other companies.
- We continue to license our innovative multimedia technologies, such as OZO spatial audio and video technologies, to smartphone and camera manufacturers through our Technology Licensing business, and drive advanced audio and video research and standardization through our Media Technologies Research unit.
- Nokia is a global brand that is recognized by almost anyone. We continue to work with HMD global Oy (HMD Global) – our exclusive licensee for Nokia-branded phones and tablets – along with new brand partners in other product categories, to increase the reach and strength of the Nokia brand.

Research and development

The Media Technologies Research unit in Nokia Technologies continues to invent and develop relevant and valuable solutions in emerging consumer experiences, with the target also to further promote the standardization of important audio and video technologies.

Patents and licenses

For more than 30 years, we have defined many of the fundamental technologies used in virtually all mobile devices and taken a leadership role in standards setting. As a result, we have been ranked #1 in several independent third-party studies for our 2G, 3G, 4G and 5G patents that have been declared essential for cellular standards. We continue to generate new intellectual property at a robust rate and expect to remain in the top tier in 5G standard essential patents.

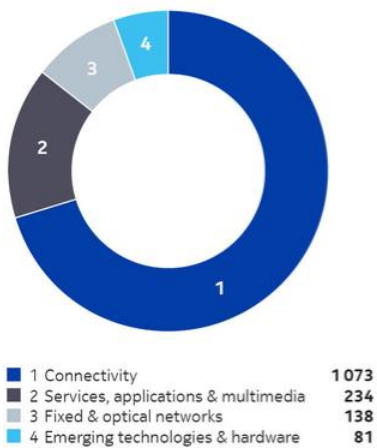
As part of our active portfolio management approach, we are continuously evaluating our collective assets and taking actions to optimize the size of our overall portfolio while preserving the high quality of our patents. At the end of 2020, our portfolio stood at around 20 000 patent families (each family being composed of several individual patents), built on combined R&D investments of more than EUR 129 billion over the last two decades. This comprises more than 3 800 patent families declared as essential to one or more cellular standard, including more than 3 500 patent families declared as essential to the 5G standard, which enable all 5G networks, connected 5G devices and 'things'.

We continue to refresh our portfolio from R&D activities across all Nokia businesses, filing patent applications on more than 1 500 new inventions in 2020.

2020 highlights

- In 2020, Nokia across different units invested around EUR 4.1 billion in R&D. This investment yielded altogether more than 1 500 new patent filings, continuing to renew our industry-leading portfolio.
- During the year, we signed and continued to benefit from patent license agreements for mobile devices, consumer electronic devices, and IoT connected devices. In September, we successfully renewed one of our major patent license agreements. This new agreement demonstrates the strength of our portfolio, particularly now that we have 5G patents to offer.
- By December 2020, we had declared more than 3 500 patent families (each family being composed of several individual patents) to the European Telecommunications Standards Institute (ETSI) as essential for the 5G standard, reflecting Nokia's continuing leadership in cellular technology R&D and standardization.
- An independent study conducted by PA Consulting concluded that Nokia is #1 for ownership of granted patents that the researchers found essential to the 5G Standard.
- Over the course of the year, our customers ASUS, Axon, HMD Global, OPPO, OnePlus, and Panasonic launched a number of new smartphones and cameras using our industry-leading OZO Audio technology.
- During 2020, we signed a number of new brand licensing agreements, bringing new Nokia-branded experiences to a range of product categories including Smart TVs, media streaming boxes and audio accessories, and HMD Global launched its first 5G smartphone, the Nokia 8.3 5G.

Breakdown of patent filings in 2020
by technology



Principal industry trends

Networks and Nokia Software

We are a leading vendor in the network and IP infrastructure, software, and the related services market. We provide a broad range of products, from the hardware components of networks used by communication service providers and increasingly by customers in other select verticals, to software solutions, as well as services to plan, optimize, implement, run and upgrade networks. In 2020, our Networks reportable segment was comprised of the following businesses: Mobile Access, Fixed Access, IP Routing and Optical Networks. We aim to be innovation leaders, drawing on our frontline R&D capabilities to deliver leading products and services for our customers, and ultimately ensure our long-term value creation.

Industry trends

The network and IP infrastructure, software and related services industry has witnessed three main trends in recent years, which have also affected our Networks and Nokia Software segments. First, the increase in the use of data services and the resulting exponential growth in data traffic has led to an increased need for high-performance, high-quality and highly reliable networks. The rise in data traffic has, however, not been directly reflected in growth of communication service providers' revenue. Consequently, there is an imperative to be efficient and cost-competitive for both communication service providers and network infrastructure and services vendors.

Second, we are witnessing continued consolidation among communication service providers, driven by their desire to provide a wider scope of services, especially through the convergence of disparate network technologies across mobile, fixed, and IP and optical networks. In order to improve networks in terms of coverage, capacity and quality, communication service providers are continuing their transition to all-IP architectures, with an emphasis on fast access to their networks through fiber, LTE and 5G access and new digital services delivery. We are also seeing similar trends with cable operators, who are investing in the deployment of high-speed networks.

Third, we see a stronger demand for large high-performance networks in some key areas outside the traditional communication service provider space. Webscale companies and extra-large enterprises - such as Apple, Facebook, Google, Alibaba and Amazon - are investing in cloud technology and network infrastructure to build these high-performing, secure networks. In addition, other target vertical markets such as energy, transportation and the public sector are investing to build carrier-grade, mission-critical networks.

The first three pillars of our strategy in 2020 were aligned with these industry trends for our Networks and Nokia Software segments. We continued to execute well on our strategy, with a particular focus on high-performance, end-to-end networks, expansion into new select verticals and building a strong software business at scale. More information about our strategy in 2020 can be found in "Business Overview – Our Strategy".

Additionally in 2020, we continued to witness some customers reassessing their vendor selection strategies, in light of ongoing security concerns. We are seeing some gains with operators who are reconsidering their vendors as a result of geopolitical issues. We estimate that we have won about half of the value of such deals available to date.

Pricing and price erosion

While we experience varying levels of price erosion across our businesses, it is particularly evident in our Mobile Access business group, given the highly standardized nature of the business. In 2020, we witnessed increased competitive intensity in some accounts, particularly in North America, as certain competitors sought to take share in 5G.

Product mix

Our Networks and Nokia Software segments offer a combination of hardware, software and services. The profitability of our Networks and Nokia Software segments is affected by our product mix, including the share of software in the sales mix. For example, this is particularly evident during large technology cycles, as initial deployments consist of a larger portion of hardware and services and less software. As the initial phases of deployments tend to be lower margin, this is offset by the ongoing deployment of previous generation technologies, which tend to be higher margin. This ratio shifts more towards higher-margin software further into the cycle, as additional capacity and features are deployed. In 2020, we experienced a decrease in network deployment services, following elevated levels in 2019.

Products and services also have varying profitability profiles. Hardware and software products generally have higher gross margins than services, but they require significant R&D investment. Services are typically labor-intensive, while carrying low R&D investment, and have relatively low gross margins.

Seasonality and cyclical nature of projects

Net sales in our Networks and Nokia Software segments are affected by seasonality in the spending cycles of communication service providers, with generally higher sales in the fourth quarter, followed by generally lower sales in the first quarter. Also, we have recently witnessed that Networks and Nokia Software segments generate the majority of their respective operating profit and free cash flow in the fourth quarter. In addition to normal industry seasonality, there are normal peaks and troughs in the deployment of large infrastructure projects. As an example, the 5G technology cycle accelerated in 2020 and is expected to continue over the coming years. The timing of these projects depends on a number of factors, including new radio spectrum allocation, network upgrade cycles and the availability of new consumer devices and services, which in turn could affect the net sales of our businesses.

Continued operational efficiency improvements

In 2018, following the completion of the Alcatel-Lucent integration and the related cost savings program, we announced a new cost reduction program where we intend to target substantial savings while continuing to make further investments to drive future growth and higher returns. The savings were expected to come from a wide range of areas, including investments in digitalization to drive more automation and productivity, further process and tool simplification, significant reductions in central support functions to reach best-in-class cost levels, prioritization of R&D programs to best create long-term value, a sharp reduction of R&D in legacy products, driving efficiency from further application of our Common Software Foundation and innovative software development techniques, the consolidation of selected cross-company activities and further reductions in real estate and other overhead costs.

In 2020, we completed our cost savings program, generating the expected savings through the actions listed above. The cost savings program resulted in EUR 500 million of net benefits in full year 2020, compared to full year 2018.

Cost of components and raw materials

There are several important factors driving the profitability and competitiveness of our Networks and Nokia Software segments: scale, operational efficiency, pricing, and cost discipline. The costs of our Networks products are comprised of, among others, components, manufacturing, labor and overheads, royalties and licensing fees, depreciation of product machinery, logistics and warranty and other quality costs. In 2020, margins in our Networks segment were positively impacted by progress in Mobile Access, where we continued to focus on driving improvements in our portfolio by strengthening our roadmaps, reducing product costs and improving our product performance.

Profitability can be affected by changes in the sales volume, as well as the requirement to source large volumes of components on short notice, which can impact the cost of sales or, in cases where component shortages emerge, the net sales.

Product design and serviceability

Factors such as product design and serviceability also have an impact on our cost structure with Networks. For example, product design decisions, such as the use of system-on-chip, or “SoCs” in our Mobile Access products, allow us to improve our product costs as the proportion of SoCs increases within our products. Additionally, costs can be reduced through improved product serviceability. In 2020, these factors contributed to the improving 5G product cost position.

Nokia Technologies

Nokia Technologies is focused on pursuing new licensing opportunities for our valuable intellectual property, including patents, innovative technologies and know-how, and the Nokia brand.

General trends in IPR licensing

In general, there has been increased focus on IPR protection and licensing in the market, and this trend is expected to continue. As such, new agreements are generally a product of lengthy negotiations and occasionally through arbitration or litigation, and therefore the timing and outcome may be difficult to forecast. Due to the structure of patent license agreements, the payments may be infrequent, at times may be partly retrospective, and the lengths of license agreements can vary.

Additionally, there are clear regional differences in the ease of protecting and licensing patented innovations. We have seen some licensees actively avoiding making license payments, and some licensors using aggressive methods to collect them; both behaviors have attracted regulatory attention. We expect discussion of the regulation of licensing to continue at both global and regional level. Some of those regulatory developments may be adverse to the interests of technology developers and patent owners, including us.

Corporate governance

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Corporate governance statement

This corporate governance statement is prepared in accordance with Chapter 7, Section 7 of the Finnish Securities Markets Act (2012/746, as amended) and the Finnish Corporate Governance Code 2020 (the “Finnish Corporate Governance Code”).

Introduction

In 2020, we continued delivering on Nokia's commitment to strong corporate governance and related practices. To do that, the Board activities are structured to develop the company's strategy and to enable the Board to support the management on the delivery of it within a transparent governance framework. The table below sets out a high-level overview of the key areas of focus for the Board's and its Committees' activities during the year in addition to regular business and financial updates at each Board meeting and several reviews of the impacts and actions relating to the COVID-19 pandemic.

	January	February/ March	April	May	July	September/ October	December
Board	<ul style="list-style-type: none"> - Digitalization update - Ethics & compliance and litigation update - Board evaluation 	<ul style="list-style-type: none"> - CEO change - Postponing 2020 AGM due to COVID-19 - Remuneration Policy to be presented to the AGM - Nokia Equity Program 2020 	<ul style="list-style-type: none"> - Transformation update - Convening the remote AGM 	<ul style="list-style-type: none"> - Technology Strategy update - Digitalization update - Appointment of the new Board Chair and Vice Chair 	<ul style="list-style-type: none"> - Annual sustainability review - Key market strategies 	<ul style="list-style-type: none"> - Annual strategy meeting - New operating model planning 	<ul style="list-style-type: none"> - Annual plan and long-range plan - Enterprise Risk Management - Business group strategy planning
Corporate Governance and Nomination Committee	<ul style="list-style-type: none"> - Board composition and remuneration - Corporate governance statement 	<ul style="list-style-type: none"> - AGM proposals 		<ul style="list-style-type: none"> - Organization of the Board and its Committees 		<ul style="list-style-type: none"> - Future Board composition - Corporate governance update 	<ul style="list-style-type: none"> - Board evaluation process - Board's diversity principles - Proxy advisor policy update
Personnel Committee	<ul style="list-style-type: none"> - Incentive targets and objectives - Nokia Equity Program - Investor feedback on remuneration practices 	<ul style="list-style-type: none"> - CEO remuneration - Remuneration Policy review 		<ul style="list-style-type: none"> - GLT LTI nominations - Investor feedback from Remuneration Policy voting in AGM 	<ul style="list-style-type: none"> - AGM update - PC Advisor update - Review of Share Ownership and Clawback Policies 	<ul style="list-style-type: none"> - Alignment on LTI approach - Risk review 	<ul style="list-style-type: none"> - 2021 incentive program framework - Culture - Remuneration Report for 2020
Audit Committee		<ul style="list-style-type: none"> - Q4 and full-year 2019 financials, annual report - Compliance, internal audit and internal controls updates - Auditor reporting - Update by the new auditor - AGM proposals to the Board - Structured finance update 	<ul style="list-style-type: none"> - Q1 financials - Compliance, internal audit and internal controls updates - Auditor reporting - Tax update - Cybersecurity - Conflict Minerals Report 		<ul style="list-style-type: none"> - Q2 financials - Auditor reporting - Compliance, internal audit and internal controls updates - Climate-related financial disclosures 	<ul style="list-style-type: none"> - Q3 financials - Auditor reporting - Compliance, internal audit, internal controls updates - Financial IT - Cybersecurity 	<ul style="list-style-type: none"> - CFO organization - Pensions update - 20-F and annual report update - Financing strategy - Annual Charter and Policy review
Technology Committee	<ul style="list-style-type: none"> - Review of strategic technology initiatives - Updates on major innovation and technology trends 			<ul style="list-style-type: none"> - Review of strategic technology initiatives - Updates on major innovation and technology trends 		<ul style="list-style-type: none"> - Review of strategic technology initiatives - Updates on major innovation and technology trends 	<ul style="list-style-type: none"> - Review of strategic technology initiatives - Updates on major innovation and technology trends

Furthermore, there were a number of significant corporate governance events in 2020. In addition to the new Board Chair and Vice Chair, the President and CEO and the Chief Financial Officer were changed and we also announced several changes in the Group Leadership Team structure and composition. We also held our first-ever fully remote annual general meeting at which the first vote was taken on the Remuneration Policy applicable to the Board members and the President and CEO.

Changes in the Board, management and auditor in 2020

At the end of 2019 then Chair of the Board Risto Siilasmaa informed the Board's Corporate Governance and Nomination Committee that he will no longer be available to serve on the Nokia Board of Directors after the Annual General Meeting in 2020. Mr. Siilasmaa had been a Nokia Board member since 2008 and served as Board Chair from 2012 onwards. He also served as interim CEO of Nokia from 2013 to 2014. Consequently, Vice Chair Sari Baldauf was elected as the new Chair of the Board and Kari Stadigh as the new Vice Chair following their re-election to the Board by the Annual General Meeting in 2020.

On March 2, 2020, Nokia's Board of Directors appointed Pekka Lundmark as the President and CEO of Nokia and he started in his new role on August 1, 2020. The previous President and CEO Rajeev Suri stepped down from his position on July 31, 2020 while continuing to serve as an advisor to the Nokia Board until January 1, 2021.

On June 11, 2020, Nokia announced the appointment of Marco Wirén as the new Chief Financial Officer of Nokia, effective September 1, 2020. The previous Chief Financial Officer Kristian Pullola stepped down from his position on August 31, 2020.

On October 29, 2020, Pekka Lundmark announced the composition of the new Group Leadership Team, effective January 1, 2021. Refer to the section on the Group Leadership Team and the President and CEO below for further information.

On January 1, 2020 Deloitte Oy started as the new auditor of the company as result of the auditor rotation resolved by the Annual General Meeting in 2019.

Annual General Meeting 2020 and 2021

On March 18, 2020, Nokia cancelled the Annual General Meeting originally convened to be held on April 8, 2020 due to the COVID-19 pandemic and related restrictions on public gatherings.

On April 27, 2020, the Board resolved on extraordinary measures pursuant to the temporary legislation approved by the Finnish Parliament on April 24, 2020. In order to prevent the spread of the COVID-19 pandemic, the Annual General Meeting was convened to be held without shareholders and their proxy representatives being present at the meeting venue. Participation in the Annual General Meeting and use of shareholder rights was possible only by voting in advance, by submitting counterproposals and asking questions in advance.

The Annual General Meeting 2020 eventually took place at the Company's headquarters in Espoo on May 27, 2020. Approximately 43 000 shareholders representing approximately 2 300 million shares and votes were represented at the Annual General Meeting through advance voting. The Annual General Meeting supported all of the Board's proposals by at least 86 percent of the votes cast.

As the COVID-19 situation remains serious, Nokia Corporation's Annual General Meeting 2021 is planned to be held on April 8, 2021 under extraordinary measures pursuant to the temporary legislation, which entered into force on October 3, 2020 to prevent the spread of the COVID-19 pandemic.

Participation and exercise of shareholder rights in the meeting will be possible only by voting in advance and by submitting counterproposals and asking questions in advance. It is not possible for the shareholders or their proxy representatives to participate in the meeting at the meeting venue. Proposals of the Board of Directors to the Annual General Meeting 2021 were published on February 4, 2021.

Regulatory framework

Our corporate governance practices comply with Finnish laws and regulations, our Articles of Association approved by the shareholders and corporate governance guidelines (Corporate Governance Guidelines) adopted by the Board of Directors. Corporate Governance Guidelines reflect our commitment to good corporate governance. They include the directors' responsibilities, the composition and election of the members of the Board and its Committees, and certain other matters relating to corporate governance. We also comply with the Finnish Corporate Governance Code issued by the Securities Market Association.

In addition, we comply with the rules and recommendations of Nasdaq Helsinki and Euronext Paris as applicable to us due to the listing of our shares on the exchanges. Furthermore, as a result of the listing of our American Depositary Shares on the New York Stock Exchange (NYSE) and our registration under the US Securities Exchange Act of 1934, we follow the applicable U.S. federal securities laws and regulations, including the Sarbanes-Oxley Act of 2002 as well as the rules of the NYSE, in particular the corporate governance standards under Section 303A of the NYSE Listed Company Manual. We comply with these standards to the extent such provisions are applicable to us as a foreign private issuer.

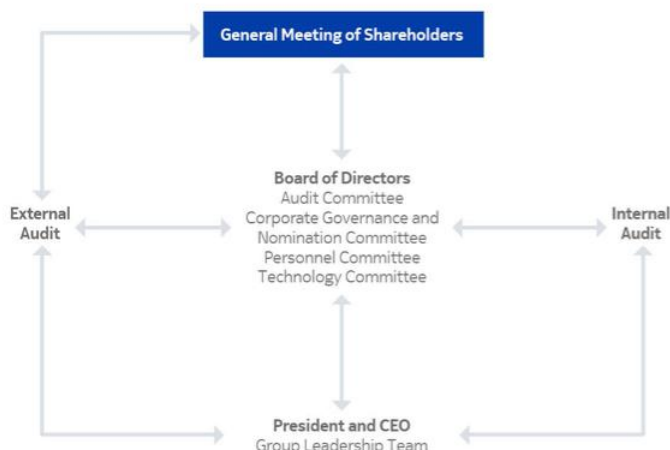
To the extent any non-domestic rules would require a violation of the laws of Finland, we are obliged to comply with Finnish law. There are no significant differences in the corporate governance practices applied by Nokia compared with those applied by the US companies under the NYSE corporate governance standards with the exception that Nokia complies with Finnish law with respect to the approval of equity compensation plans. Under Finnish law, stock option plans require shareholder approval at the time of their launch. All other plans that include the delivery of company stock in the form of newly issued shares or treasury shares require shareholder approval at the time of the delivery of the shares unless a shareholder approval has been granted through an authorization to the Board, a maximum of five years earlier. The NYSE corporate governance standards require that the equity compensation plans are approved by the company's shareholders. Nokia aims to minimize the necessity for, or consequences of, conflicts between the laws of Finland and applicable non-domestic corporate governance standards.

In addition to the Corporate Governance Guidelines adopted by the Board, the Committees of the Board have adopted charters that define each Committee's main duties and operating principles. The Board has also adopted the Code of Conduct that applies to directors, executives, and employees of Nokia, as well as employees of Nokia's wholly-owned affiliates and subsidiaries. The Code of Conduct also applies to directors, officers, and employees of other business entities (such as joint ventures) in which Nokia owns a majority of the shares or exercises effective control. Furthermore, the Board has adopted the Code of Ethics applicable to our key executives, including the President and CEO, CFO and Corporate Controller.

Main corporate governance bodies of Nokia

Pursuant to the provisions of the Finnish Limited Liability Companies Act (2006/624, as amended) (the Finnish Companies Act) and Nokia's Articles of Association, the control and management of Nokia are divided among the shareholders at a general meeting, the Board, the President and CEO and the Group Leadership Team, chaired by the President and CEO.

Corporate governance framework



General Meeting of Shareholders

Nokia shareholders play a key role in corporate governance, with our Annual General Meeting offering a regular opportunity to exercise their decision-making power in the company. In addition, at the meeting the shareholders may exercise their right to speak and ask questions, although in 2020 the use of shareholder rights happened by remote means only due to the COVID-19 pandemic and related precautions taken in order to ensure the health and safety of our shareholders, employees and other stakeholders. Refer to section "Introduction–Annual General Meeting 2020 and 2021" above for further information.

Each Nokia share entitles a shareholder to one vote at general meetings of Nokia. The Annual General Meeting decides, among other things, on the election and remuneration of the Board, the adoption of the annual accounts, the distribution of profit shown on the balance sheet, and discharging the members of the Board and the President and CEO from liability, as well as on the election and fees of the external auditor. Starting from the 2020 Annual General Meeting, the Remuneration Policy shall be presented to the general meeting at least every four years and the Remuneration Report annually from 2021. Resolutions regarding the policy and report are advisory.

In addition to the Annual General Meeting, an Extraordinary General Meeting may be convened when the Board considers such a meeting to be necessary, or when the provisions of the Finnish Companies Act mandate that such a meeting must be held.

Board of Directors

The operations of Nokia are managed under the direction of the Board, within the framework set by the Finnish Companies Act and Nokia's Articles of Association as well as any complementary rules of procedure as defined by the Board, such as the Corporate Governance Guidelines and the charters of the Board's Committees.

Election and composition of the Board of Directors, election of the Chair and Vice Chair of the Board and the Chairs and members of the Board's Committees

Pursuant to the Articles of Association of Nokia Corporation, we have a Board that is composed of a minimum of seven and a maximum of 12 members. The Board is elected at least annually at each Annual General Meeting with a simple majority of the shareholders' votes cast at the meeting. The term of a Board member begins at the close of the general meeting at which he or she was elected, or later as resolved by the general meeting, and expires at the close of the following Annual General Meeting. The Annual General Meeting convenes by June 30 annually.

Our Board's leadership structure consists of a Chair and Vice Chair elected annually by the Board, and confirmed by the independent directors of the Board from among the Board members upon the recommendation of the Corporate Governance and Nomination Committee. The Chair of the Board has certain specific duties as stipulated by Finnish law and our Corporate Governance Guidelines. The Vice Chair of the Board assumes the duties of the Chair of the Board in the event he or she is prevented from performing his or her duties.

The independent directors of the new Board also confirm the election of the members and chairs for the Board's Committees from among the Board's independent directors upon the recommendation of the Corporate Governance and Nomination Committee and based on each Committee's member qualification standards. These elections take place at the Board's assembly meeting following the general meeting.

Board diversity

The Board has adopted principles concerning Board diversity describing our commitment to promoting diverse Board composition and how diversity is embedded into our processes and practices when identifying and proposing new Board candidates as well as re-election of current Board members.

At Nokia, diversity is not a static concept but rather a relevant mix of required elements for the Board as a whole that evolves with time based on, among other things, the relevant business objectives and future needs of Nokia. The Board diversity is treated as a means of improvement and development rather than an end in itself. Diversity of our Board is considered from a number of aspects including, but not limited to, skills and experience, age, nationality, ethnicity, cultural and educational backgrounds, gender identity, sexual orientation as well as other individual qualities. Both genders shall be represented on the Board.

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Nokia acknowledges and supports the resolution adopted by the Finnish Government on February 17, 2015 on gender equality on the boards of directors of Finnish large and mid-cap listed companies. We report annually our objectives relating to both genders being represented on our Board, the means to achieve them, and the progress we have made in achieving them. We have met our aim to have representation of at least 40% of both genders on our Board.

Currently there are six different nationalities represented in the Board and 44% of the Board members are female.

	Gender	Year of Birth	Nationality	Tenure ⁽¹⁾	Independence of the company and major shareholders ⁽²⁾	Audit Committee ⁽²⁾	Corporate Governance and Nomination Committee ⁽²⁾	Personnel Committee ⁽²⁾	Technology Committee ⁽²⁾
Sari Baldauf (Board Chair)	Female	1955	Finnish	2	Independent		Member		Member
Kari Stadigh (Board Vice Chair)	Male	1955	Finnish	9	Independent		Chair	Member	
Bruce Brown	Male	1958	American	8	Independent		Member	Chair	Member
Thomas Dannenfeldt	Male	1966	German	0	Independent	Member			Member
Jeanette Horan	Female	1955	British	3	Independent	Member			Member
Edward Kozel	Male	1955	American	3	Independent	Member			Chair
Elizabeth Nelson	Female	1960	American	8	Independent	Member		Member	
Søren Skou	Male	1964	Danish	1	Independent			Member	
Carla Smits-Nusteling	Female	1966	Dutch	4	Independent	Chair	Member		

(1) Terms as Nokia Board member before the Annual General Meeting on May 27, 2020.

(2) As of May 27, 2020.

Experience and skills of the Board members

General management and business operations		Finance and accounting	
Chief Executive Officer		Communications Service Provider market	
Chief Financial Officer		Enterprise business	
Chief Technology Officer		Technology	

Members of the Board of Directors

Until the Annual General Meeting held on May 27, 2020, the Board consisted of 10 members: Sari Baldauf (Vice Chair), Bruce Brown, Jeanette Horan, Edward Kozel, Elizabeth Nelson, Olivier Piou, Risto Siilasmaa (Chair), Søren Skou, Carla Smits-Nusteling and Kari Stadigh.

The Annual General Meeting held on May 27, 2020 elected nine members to the Board for a term ending at the close of the next Annual General Meeting. Sari Baldauf, Bruce Brown, Jeanette Horan, Edward Kozel, Elizabeth Nelson, Søren Skou, Carla Smits-Nusteling and Kari Stadigh were re-elected and Thomas Dannenfeldt was elected as a new member. Following the meeting, the Board also elected Sari Baldauf to serve as the new Chair and Kari Stadigh as the new Vice Chair of the Board.

Proposals of the Board of Directors to the Annual General Meeting 2021 were published on February 4, 2021. Elizabeth Nelson has informed that she will no longer be available to serve on the Nokia Board of Directors after the Annual General Meeting. Consequently, the Board proposes, on the recommendation of the Board's Corporate Governance and Nomination Committee, that the following eight current Board members be re-elected as members of the Nokia Board of Directors for a term ending at the close of the next Annual General Meeting: Sari Baldauf, Bruce Brown, Thomas Dannenfeldt, Jeanette Horan, Edward Kozel, Søren Skou, Carla Smits-Nusteling, and Kari Stadigh. The Corporate Governance and Nomination Committee will also propose in the assembly meeting of the new Board of Directors that Sari Baldauf be re-elected as Chair of the Board and Kari Stadigh as Vice Chair of the Board, subject to their election to the Board of Directors.

The current and proposed members of the Board are all non-executive. For the term that began at the Annual General Meeting 2020 and for the term starting from the Annual General Meeting 2021, all Board member candidates have been determined to be independent from Nokia and significant shareholders under the Finnish corporate governance rules and the rules of the NYSE, as applicable. Any possible changes impacting the independence assessment would be assessed as of the date of the Annual General Meeting.

We do not have a policy concerning the combination or separation of the roles of the Chair of the Board and the President and CEO. Our leadership structure is dependent on our needs, shareholder value and other relevant factors applicable from time to time, while respecting the highest corporate governance standards. In 2020, the roles of the Chair of the Board and the President and CEO were separate.

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Biographical details of our current Board members

Chair Sari Baldauf

b. 1955

Chair of the Nokia Board. Board member since 2018. Chair since 2020. Member of the Corporate Governance and Nomination Committee and the Technology Committee.

Master of Business Administration, Helsinki School of Economics and Business Administration, Finland. Bachelor of Science, Helsinki School of Economics and Business Administration, Finland. Honorary doctorates in Technology (Helsinki University of Technology, Finland) and Business Administration (Turku School of Economics and Business Administration and Aalto University School of Business, Finland).

Executive Vice President and General Manager, Networks Business Group, Nokia, 1998–2005. Various executive positions at Nokia in Finland and the United States 1983–1998.

Member of the Supervisory Board and Member of the Nomination Committee of Daimler AG. Member of Supervisory Board of Daimler Truck AG. Member of the Board of Directors and Chair of the Audit Committee of Aalto University. Chair of the Board of Directors of Vexve Armatury Oy. Senior Advisor of DevCo Partners Oy. Member of the Board of Directors of Demos Helsinki. Member of the Board of Directors and Member of the Executive Committee of Technology Industries of Finland.

Member of the Supervisory Board of Deutsche Telekom AG 2012–2018. Chair of the Board of Directors of Fortum Oyj 2011–2018. Member of the Board of Directors of Akzo Nobel 2012–2017.

Vice Chair Kari Stadigh

b. 1955

Vice Chair of the Nokia Board. Board member since 2011. Vice Chair since 2020. Chair of the Corporate Governance and Nomination Committee and member of the Personnel Committee.

Master of Science (Eng.), Helsinki University of Technology, Finland. Bachelor of Business Administration, Hanken School of Economics, Helsinki, Finland.

Group CEO and President of Sampo plc 2009–2019. Deputy CEO of Sampo plc 2001–2009. President of Sampo Life Insurance Company Limited 1999–2000. President of Nova Life Insurance Company Ltd 1996–1998. President and COO of Jaakko Pöyry Group 1991–1996.

Member of the Board of Directors of Metso Outotec Corporation.

Chair of the Board of Directors of Mandatum Life Insurance Company Limited 2001–2019. Chair of the Board of Directors of If P&C Insurance Holding Ltd 2002–2019. Member of the Board of Directors of Nordea Bank AB (publ) 2010–2018. Chair of the Board Risk Committee (BRIC) of Nordea Bank AB (publ) 2011–2018.

Bruce Brown

b. 1958

Nokia Board member since 2012. Chair of the Personnel Committee. Member of the Corporate Governance and Nomination Committee and the Technology Committee.

MBA Xavier University, the United States. BS (Chemical Engineering), Polytechnic Institute of New York University, the United States.

Chief Technology Officer of the Procter & Gamble Company 2008–2014. Various executive and managerial positions in Baby Care, Feminine Care, and Beauty Care units of the Procter & Gamble Company since 1980 in the United States, Germany and Japan.

Member of the Board of Directors, the Audit Committee and the Nominating and Corporate Governance Committee of P. H. Glatfelter Company.

Member of the Board of Directors, the Audit Committee and the Compensation Committee of Medpace Inc 2016–2019. Member of the Board of Directors of Agency for Science, Technology & Research (A*STAR) in Singapore 2011–2018.

Thomas Dannenfeldt

b. 1966

Nokia Board member since 2020. Member of the Audit Committee and the Technology Committee.

Degree in Mathematics, University of Trier, Germany.

Chief Financial Officer of Deutsche Telekom AG 2014–2018. Chief Financial Officer of Deutsche Telekom's German operations 2010–2014. Various operational positions (sales, marketing, customer care, finance and procurement in fixed and mobile business, national and international positions) in Deutsche Telekom 1992–2010.

Chair of the Supervisory Board of CECONOMY AG and member of the Board of Advisors at axessio GmbH.

Member of the Board of Directors of T-Mobile US 2013–2018 and Buy-In 2013–2018. Chair of the Board of Directors of T-Systems International 2013–2018 and EE 2014–2016.

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Jeanette Horan

b. 1955

Nokia Board member since 2017. Member of the Audit Committee and the Technology Committee.

MBA, Business Administration and Management, Boston University, the United States. BSc, Mathematics, University of London, the United Kingdom.

Various executive and managerial positions in IBM 1998–2015. Vice President of Digital Equipment Corporation 1994–1998. Vice President, Development of Open Software Foundation 1989–1994.

Member of the Supervisory Board at Wolters Kluwer, and the Chair of the Remuneration Committee. Member of the Board of Advisors at Jane Doe No More, a non-profit organization. Member of the Board of Directors of the Ridgefield Symphony Orchestra, a non-profit organization.

Member of the Board of Advisors of Cybereason 2017–2018. Member of the Board of Directors of West Corporation 2016–2017 and Microvision 2006–2017.

Edward Kozel

b. 1955

Nokia Board member since 2017. Chair of the Technology Committee and member of the Audit Committee.

Degree in Electrical Engineering and Computer Science, University of California, the United States.

President and CEO of Range Networks 2013–2014. Owner of Open Range 2000–2013. Chief Technology and Innovation Officer and member of the Board of Management of Deutsche Telekom 2010–2012. CEO of Skyriders 2006–2008. Managing Director of Integrated Finance 2005–2006. Senior Vice President, Business development and Chief Technology Officer and Board Member of Cisco 1989–2001.

Member of the Advisory Board at Telia Ventures.

Various Board Memberships in 1999–2009.

Elizabeth Nelson

b. 1960

Nokia Board member since 2012. Member of the Audit Committee and the Personnel Committee.

MBA (Finance), the Wharton School, University of Pennsylvania, the United States. BS (Foreign Service), Georgetown University, the United States.

Executive Vice President and Chief Financial Officer, Macromedia, Inc. 1997–2005. Vice President, Corporate Development, Macromedia, Inc. 1996–1997. Various roles in Corporate Development and International Finance, Hewlett-Packard Company 1988–1996.

Chair of the Board of Directors of DAI. Independent Member of the Board of Directors and Chair of the Audit Committee of Upwork Inc.

Independent Member of the Board of Directors and Chair of the Audit Committee of Berkeley Lights, Inc.

Independent Lead Director and Chair of the Audit Committee of Zendesk Inc 2013–2019. Member of the Board of Directors of Pandora Media 2013–2017.

Søren Skou

b. 1964

CEO of A.P. Møller Mærsk A/S. Nokia Board member since 2019. Member of the Personnel Committee.

MBA (honours), IMD, Switzerland. Business Administration, Copenhagen Business School, Denmark. Maersk International Shipping Education (M.I.S.E.).

Maersk Line Copenhagen CEO 2012–2016. Maersk Tankers Copenhagen CEO 2001–2011. Maersk Tankers Copenhagen Head of Crude and Product 1999–2001. Maersk Line Copenhagen Head of Department 1997–1998. Maersk Line Beijing Operations Manager 1994–1996. Maersk Line Copenhagen and New Jersey, Charterer and other roles 1983–1994.

Member of International Council of Containership Operators (ICCO).

Carla Smits-Nusteling

b. 1966

Nokia Board member since 2016. Chair of the Audit Committee and member of the Corporate Governance and Nomination Committee.

Master's Degree in Business Economics, Erasmus University Rotterdam, the Netherlands. Executive Master of Finance and Control, Vrije University Amsterdam, the Netherlands.

Member of the Board of Directors and Chief Financial Officer of KPN 2009–2012. Various financial positions in KPN 2000–2009. Various financial and operational positions in TNT/PTT Post 1990–2000.

Member of the Supervisory Board since 2013 and Chair of the Audit Committee of ASML. Chair of the Board of Directors of TELE2 AB. Member of the Board of Directors, Chair of the Audit Committee and member of the Remuneration and Nomination Committee of Allegro.eu SA. Member of the Board of Directors of the Stichting Continuïteit Ahold Delhaize (SCAD) foundation. Lay Judge in the Enterprise Court of the Amsterdam Court of Appeal since 2015.

Member of the Management Board of the Unilever Trust Office 2015–2019.

Due to transitioning from one board to another, Carla Smits-Nusteling temporarily holds four audit committee positions in public companies, including Nokia. She recently joined the Board and Audit Committee of Allegro.eu SA while she will step down from the ASML Board and Audit Committee on April 29, 2021. As required under the NYSE corporate governance standards, the Board has determined that her ability to effectively serve on Nokia's Audit Committee is not impaired due to this short period of serving on more than three audit committees of listed companies.

Operations of the Board of Directors

The Board represents and is accountable to the shareholders of Nokia. While its ultimate statutory accountability is to the shareholders, the Board also takes into account the interests of the Company's other stakeholders. The Board's responsibilities are active, not passive, and include the responsibility to evaluate the strategic direction of Nokia, its management policies and the effectiveness of the implementation of such by the management on a regular basis. It is the responsibility of the members of the Board to act in good faith and with due care, so as to exercise their business judgement on an informed basis, in a manner that they reasonably and honestly believe to be in the best interests of Nokia and its shareholders. In discharging that obligation, the members of the Board must inform themselves of all relevant information reasonably available to them. The Board and each Board Committee also have the power to appoint independent legal, financial or other advisors as they deem necessary. The Company will provide sufficient funding to the Board and to each Committee to exercise their functions and provide compensation for the services of their advisors.

The Board is ultimately responsible for monitoring and reviewing Nokia's financial reporting process, effectiveness of related control and audit functions and the independence of Nokia's external auditor, as well as for monitoring the statutory audit of the annual and consolidated financial statements. The Board's responsibilities also include overseeing the structure and composition of our top management and monitoring legal compliance and the management of risks related to our operations. In doing so, the Board may set annual ranges and/or individual limits for capital expenditures, investments and divestitures and financial and non-financial commitments that may not be exceeded without a separate Board approval.

In risk management policies and processes, the Board's role includes risk analysis and assessment in connection with financial, strategy and business reviews, updates and decision-making proposals. Risk management policies and processes are integral parts of Board deliberations and risk-related updates are provided to the Board on a recurring basis. For a more detailed description of our risk management policies and processes, refer to "—Risk management, internal control and internal audit functions at Nokia—Main features of risk management systems" below.

Under our Corporate Governance Guidelines, the Board monitors the sustainability activities of the company, covering variety of environmental and social matters, and it periodically reviews the company's related targets and performance. The Group Leadership Team decides on the environmental and social approach and key targets, and the key targets are incorporated into the ongoing performance management and related monthly business reviews of the business groups by the Group Leadership Team. In addition, the Board Committees monitor environmental and social developments in their respective areas of responsibilities, which in 2020 included for the Audit Committee the implementation planning of climate related financial reporting and reviewing the use of conflict minerals in the company's products, Personnel Committee the incorporation of environmental and social targets in the incentive structures, and Corporate Governance and Nomination Committee the assessment of the environmental, social and governance (ESG) related governance trends. The business groups and other units are responsible for the implementation of the ESG policies and instructions to their operations.

The Board has the responsibility for appointing and discharging the President, the Chief Executive Officer, Chief Financial Officer and Chief Legal Officer. Since August 2020, Pekka Lundmark has served as the President and CEO. His rights and responsibilities include those allotted to the President under Finnish law and he also chairs the Group Leadership Team.

The Board approves and the independent directors of the Board confirm the compensation and terms of employment of the President and CEO, subject to the requirements of Finnish law, upon the recommendation of the Personnel Committee of the Board. The compensation and employment conditions of the other members of the Group Leadership Team are approved by the Personnel Committee upon the recommendation of the President and CEO.

Board evaluation

In line with our Corporate Governance Guidelines, the Board conducts an annual performance evaluation, which also includes evaluation of the Board Committees' work, the Board and Committee Chairs and individual Board members. The Board evaluation is conducted as a self-evaluation while an external evaluator is periodically engaged. In 2020, the evaluation process included both numeric assessments and the possibility to provide more detailed written and verbal comments. Feedback is also requested from selected members of management as part of the Board evaluation process. Each year, the results of the evaluation are discussed and analyzed by the entire Board and improvement actions are agreed based on such discussion.

Meetings of the Board of Directors

The Board held 20 meetings excluding Committee meetings during 2020, of which approximately 60% were meetings in person/by video. In 2020, these meetings were mainly conducted by access via video as a consequence of travel restrictions in place due to the COVID-19 pandemic. The other meetings were held in writing.

	Meetings in person/ by video	Meetings in writing	Attendance in all meetings %
Full Board	12	8	100
Audit Committee	6	0	93
Corporate Governance and Nomination Committee	3	1	100
Personnel Committee	6	2	98
Technology Committee	4	0	100

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Directors' attendance at the Board and Committee meetings in 2020 is set forth in the table below:

	Board meetings %	Audit Committee meetings %	Corporate Governance and Nomination Committee meetings %	Personnel Committee meetings %	Technology Committee meetings %
Sari Baldauf (Board Chair)	100		100	100	100
Kari Stadigh (Board Vice Chair)	100		100	100	
Bruce Brown	100		100	100	100
Thomas Dannenfeldt (from May 27, 2020)	100	100			100
Jeanette Horan	100	100			100
Edward Kozel	100	83			100
Elizabeth Nelson	100	100		88	
Olivier Piou (until May 27, 2020)	100	67			100
Risto Siilasmaa (until May 27, 2020)	100		100		100
Søren Skou	100			100	
Carla Smits-Nusteling	100	100	100		

Additionally, many of the directors attended, as non-voting observers, meetings of a Committee of which they were not a member.

Directors meet without management in connection with each regularly scheduled meeting. According to Board practices, meetings without management present would only be attended by non-executive directors and be chaired by the non-executive Chair of the Board. If the non-executive Chair of the Board is unable to chair these meetings, the non-executive Vice Chair of the Board chairs the meeting. Additionally, the independent directors would meet separately at least once annually. In 2020, all members of the Board were non-executive and determined to be independent from Nokia and significant shareholders under the Finnish corporate governance standards and the rules of the NYSE.

In order to prevent the spread of the COVID-19 pandemic, the Board of Directors resolved pursuant to the temporary legislation approved by the Finnish Parliament on April 24, 2020 to hold the Annual General Meeting 2020 without the presence of shareholders, their proxy advisors, the Board and the management. Only the Chair of the Board Risto Siilasmaa was present in person to open the meeting.

Committees of the Board of Directors

The Board of Directors has four committees that assist the Board in its duties pursuant to their respective committee charters. The Board may also establish ad hoc committees for detailed reviews or consideration of particular topics to be proposed for the approval of the Board. Any director who so wishes may attend, as a non-voting observer, meetings of committees of which they are not members.

Board of Directors			
Audit Committee	Corporate Governance and Nomination Committee	Personnel Committee	Technology Committee
Oversees the accounting and financial reporting processes of Nokia and the audits of its financial statements as well as the internal controls and compliance program.	Prepares the proposals for the general meetings in respect of the composition of the Board and the director remuneration to be approved by the shareholders, and monitors issues and practices related to corporate governance and proposes necessary actions in respect thereof.	Oversees the personnel-related policies and practices at Nokia. Assists the Board in discharging its responsibilities in relation to all compensation, including equity compensation, of the company's executives and their terms of employment.	Engages in a dialogue with and provides opinions and advice to management with respect to significant innovation and technology strategies of the company which are formulated and executed by the management of the company.

The Audit Committee

The Committee consists of a minimum of three members of the Board who meet all applicable independence, financial literacy and other requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 27, 2020, the Audit Committee has consisted of the following five members of the Board: Carla Smits-Nusteling (Chair), Thomas Dannenfeldt, Jeanette Horan, Edward Kozel and Elizabeth Nelson.

The Committee is responsible for assisting the Board in the oversight of:

- the quality and integrity of the company's financial statements and related disclosures;
- the statutory audit of the company's financial statements;
- the external auditor's qualifications and independence;
- the performance of the external auditor subject to the requirements of Finnish law;
- the performance of the company's internal controls and risk management and assurance function;
- the performance of the internal audit function;
- the Company's compliance with legal and regulatory requirements, including the performance of its ethics and compliance program; and
- the pension liabilities, taxation and cybersecurity of the company.

In discharging its oversight role, the Audit Committee has full access to all company books, records, facilities and personnel. The Audit Committee also maintains procedures for the receipt, retention and treatment of complaints received by the company regarding accounting, internal controls, or auditing matters and for the confidential, anonymous submission by our employees of concerns relating to accounting or auditing matters. Nokia's

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disclosure controls and procedures, which are reviewed by the Audit Committee and approved by the President and CEO and the Chief Financial Officer, as well as the internal controls over financial reporting, are designed to provide reasonable assurance regarding the quality and integrity of the company's financial statements and related disclosures. For further information on internal control over financial reporting, refer to "Risk management, internal control and internal audit functions at Nokia—Description of internal control procedures in relation to the financial reporting process" below.

Under Finnish law, an external auditor is elected by a simple majority vote of the shareholders at the Annual General Meeting for one year at a time. The Audit Committee prepares the proposal to the shareholders, upon its evaluation of the qualifications and independence of the external auditor, of the nominee for election or re-election. Under Finnish law, the fees of the external auditor are also approved by the shareholders by a simple majority vote at the Annual General Meeting. The Committee prepares the proposal to the shareholders in respect of the fees of the external auditor, and approves the external auditor's annual audit fees under the guidance given by the Annual General Meeting. For information about the fees paid to Nokia's external auditor, Deloitte Oy, during 2020, refer to "Auditor fees and services" below.

The Board has determined that all members of the Audit Committee, including its Chair, Carla Smits-Nusteling, are "audit committee financial experts" as defined in the requirements of Item 16A of the Annual Report on Form 20-F filed with the U.S. Securities and Exchange Commission (SEC). Ms. Smits-Nusteling and each of the other members of the Audit Committee are "independent directors" as defined by Finnish law and Finnish Corporate Governance Code and in Section 303A.02 of the NYSE Listed Company Manual.

The Audit Committee meets a minimum of four times a year based on a schedule established at the first meeting following the appointment of the Committee. The Committee meets separately with the representatives of Nokia's management, heads of the internal audit, and ethics and compliance functions, and the external auditor in connection with each regularly scheduled meeting. The head of the internal audit function has, at all times, direct access to the Audit Committee, without the involvement of management.

Audit Committee pre-approval policies and procedures

The Audit Committee of the Board is responsible, among other matters, for oversight of the external auditor's independence, subject to the requirements of applicable legislation. The Audit Committee has adopted a policy regarding an approval procedure of audit services performed by the external auditors of Nokia Group and permissible non-audit services performed by the principal external auditor of the Nokia Group (the "Pre-approval Policy").

Under the Pre-approval Policy, proposed services either: (i) may be pre-approved by the Audit Committee in accordance with certain service categories described in the Pre-approval Policy (general pre-approval); or (ii) require the specific pre-approval of the Audit Committee (specific pre-approval). The Pre-approval Policy sets out the audit, audit-related, tax and other services that have received the general pre-approval of the Audit Committee. All other audit, audit-related (including services related to internal controls and significant mergers and acquisitions projects), tax and other services are subject to specific pre-approval by the Audit Committee. All service requests concerning generally pre-approved services will be submitted to an appointed Audit Committee delegate within management, who will determine whether the services are within the services generally pre-approved. The Pre-approval Policy is subject to annual review by the Audit Committee.

The Audit Committee establishes budgeted fee levels annually for each of the categories of audit and non-audit services that are pre-approved under the Pre-approval Policy, namely, audit, audit-related, tax and other services. At each regular meeting of the Audit Committee, the auditor provides a report in order for the Audit Committee to review the services that the auditor is providing, as well as the cost of those services.

The Corporate Governance and Nomination Committee

The Committee consists of three to five members of the Board who meet all applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 27, 2020 the Corporate Governance and Nomination Committee has consisted of the following four members of the Board: Kari Stadigh (Chair), Sari Baldauf, Bruce Brown and Carla Smits-Nusteling.

The Committee fulfills its responsibilities by:

- actively identifying individuals qualified to be elected members of the Board as well as considering and evaluating the appropriate level and structure of director remuneration;
- preparing and evaluating the principles regarding Board diversity;
- preparing proposals to the shareholders on the director nominees for election at the general meetings as well as director remuneration;
- monitoring significant developments in the law and practice of corporate governance and of the duties and responsibilities of directors of public companies;
- assisting the Board and each Committee of the Board in its annual performance evaluations, including establishing criteria to be applied in connection with such evaluations;
- developing and recommending to the Board and administering Nokia's Corporate Governance Guidelines; and
- reviewing Nokia's disclosure in the corporate governance statement.

The Committee has the power and practice to appoint a recruitment firm to identify appropriate new director candidates.

The Personnel Committee

The Committee consists of a minimum of three members of the Board who meet all applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 27, 2020 the Personnel Committee has consisted of the following four members of the Board: Bruce Brown (Chair), Elizabeth Nelson, Søren Skou and Kari Stadigh.

The Committee has overall responsibility for evaluating, resolving and making recommendations to the Board regarding:

- compensation of the company's top executives and their terms of employment;
- all equity-based plans;
- incentive compensation plans, policies and programs of the company affecting executives; and
- other significant incentive plans.

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The Committee is responsible for overseeing compensation philosophy and principles and ensuring the Company's compensation programs are performance-based, and designed to contribute to long-term shareholder value creation and alignment to shareholders' interests, properly motivate management, and support overall corporate strategies.

The Technology Committee

The Committee consists of a minimum of three members of the Board who meet applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE and have such skills in innovation, technology and science matters as the Board determines adequate from time to time. From May 27, 2020 the Technology Committee has consisted of the following five members of the Board: Edward Kozel (Chair), Sari Baldauf, Bruce Brown, Thomas Dannenfeldt and Jeanette Horan.

In its dialogue with and provision of opinions and advice to the management, the Committee will periodically review:

- the company's approach to major technological innovations;
- key technology trends that may result in disruptive threats or opportunities;
- high-level risks and opportunities associated with the company's Research and Development Programs; and
- the company's technological competitiveness and new strategic technology initiatives.

Group Leadership Team and the President and CEO

We have a Group Leadership Team that is responsible for the operative management of Nokia. The Board appoints the Chair of the Group Leadership team. The Group Leadership Team is chaired by the President and CEO. The President and CEO's rights and responsibilities include those allotted to the President under Finnish law.

On December 31, 2020, the Group Leadership Team consisted of 17 members representing nine different nationalities and 24% of the members were female. On October 29, 2020, we announced changes to our operating model and resulting appointments to the Group Leadership Team taking effect on January 1, 2021. At present, our Group Leadership Team consists of 10 members, including the President and CEO, representing seven different nationalities and 20% of the members are female.

Name	Position	Gender	Year of birth	Nationality	On GLT since	On GLT on January 1, 2021
Pekka Lundmark	President and CEO	Male	1963	Finnish	2020	Yes
Nassib Abou-Khalil	Chief Legal Officer	Male	1972	Dutch	2019	Yes
Basil Alwan	Co-president of IP/Optical Networks	Male	1962	American	2016	-
Nishant Batra	Chief Strategy and Technology Officer	Male	1978	Indian	2021	-
Ricky Corker	President of Customer Operations, Americas ⁽¹⁾	Male	1967	Australian	2019	Yes
Barry French	Chief Marketing Officer	Male	1963	American	2016	-
Sanjay Goel	President of Global Services	Male	1967	Indian	2018	-
Bhaskar Gorti	President of Nokia Software	Male	1966	American	2016	-
Federico Guillén	President of Customer Operations Officer, EMEA & APAC ⁽²⁾	Male	1963	Spanish	2016	Yes
Jenni Lukander	President of Nokia Technologies	Female	1974	Finnish	2019	Yes
Sandra Motley	President of Fixed Networks	Female	1959	American	2019	-
Sri Reddy	Co-president of IP/Optical Networks	Male	1964	American	2018	-
Raghav Sahgal	President of Nokia Enterprise ⁽³⁾	Male	1962	American	2020	Yes
Gabriela Styf Sjöman	Chief Strategy Officer	Female	1969	Swedish	2019	-
Tommi Uitto	President of Mobile Networks	Male	1969	Finnish	2019	Yes
Marcus Weldon	Chief Technology Officer and President of Bell Labs	Male	1968	British	2017	-
Stephanie Werner-Dietz	Chief Human Resources Officer	Female	1972	German	2020	Yes
Marco Wirén	Chief Financial Officer	Male	1966	Finnish	2020	Yes

(1) As of January 1, 2021 Chief Customer Experience Officer.

(2) As of January 1, 2021 President of Network Infrastructure.

(3) As of January 1, 2021 President of Cloud and Networks Services.

Biographical details of the current members of the Nokia Group Leadership Team

Pekka Lundmark

b. 1963

President and Chief Executive Officer of Nokia Corporation as of August 1, 2020.

Master of Science, Department of Technical Physics, Helsinki University of Technology, Finland.

President and CEO, Fortum Corporation 2015–2020. President and CEO, Konecranes Plc 2005–2015 and Group Executive Vice President 2004–2005. President and CEO, Hackman Oyj Abp 2002–2004. Managing Partner, Startupfactory 2000–2002. Various executive positions at Nokia 1990–2000.

Commissioner, Broadband Commission for Sustainable Development. Member of the Board, Climate Leadership Council. Member of the Board, Research Institute of the Finnish Economy (ETLA) and Finnish Business and Policy Forum (EVA). International Member of the Academy, Royal Swedish Academy of Engineering Sciences (IVA). Member of the Board, Finnish Athletics Federation.

Chairman of the Board, Confederation of Finnish Industries, 2019–2020. Member of the Board, East Office of Finnish Industries, 2009–2020. Chairman of the Board, Finnish Energy, 2016–2018.

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Nassib Abou-Khalil

b. 1972

Chief Legal Officer (CLO). Group Leadership Team member since 2019. Joined Nokia in 2014.

Bachelor of Arts (Political Sciences), Civil Law (LL.L.), Common Law (LL.B.) and Master of Law (LL.M), University of Ottawa, Canada.

Deputy Chief Legal Officer, Business, Nokia 2019. General Counsel, Customer Operations, Nokia 2016–2019. Head of Legal & compliance, MEA, Nokia 2014–2015. Head of Public Policy, Europe, Middle East & Africa, and General Counsel, Middle East & Africa, Yahoo!, 2010–2014. Regional Counsel, Middle East & Africa and India, GE Oil & Gas, 2007–2010. Regulatory Counsel, Etisalat, 2006–2007. Various legal counsel roles, TMF Netherlands 2002–2006. Legal articling, Fasken Martineau 1999–2001.

Nishant Batra

b. 1978

Chief Strategy and Technology Officer (CSTO). Group Leadership Team member since 2021. Joined Nokia in 2021.

MBA from INSEAD. Master's degree in Telecommunications and a master's degree in Computer Science, Southern Methodist University, Dallas, US
Bachelor's degree in Computer Applications, Devi Ahilya University, India.

Previously Executive Vice President and Chief Technology Officer, Veoneer, Inc. 2018–2021. Prior to Veoneer Inc. held several senior positions at Ericsson for 12 years in the US, Sweden and India.

Independent member of the Board of Directors, Sensys Gatso Group.

Ricky Corker

b. 1967

Chief Customer Experience Officer (CCXO). Group Leadership Team member since 2019. Joined Nokia in 1993.

Bachelor in Communications and Electronic Engineering from the Royal Melbourne Institute of Technology, Australia.

President of Customer Operations, Americas, Nokia, 2019–2020. Executive Vice President and President of North America, Nokia, 2011–2018. Head of Asia Pacific, Nokia Siemens Networks, 2009–2011. Head of Asia North Region, Nokia Siemens Networks, 2008–2009. Head of Hutchison Global Customer Business Team, Nokia Siemens Networks, 2007–2008. Vice President Asia Pacific, Nokia Networks, 2005–2007. Lead Sales Director Asia Pacific, Nokia Networks, 2004–2005. Account Director Telstra, Nokia Networks, 2002–2003. Account Director Vodafone Australia and New Zealand, and Sales Director Vodafone Asia Pacific Customer Business Team, Nokia Networks, 2001–2002. Commercial Director Global Accounts British Telecom, Nokia Networks, 2001. Senior sales and marketing positions at Nokia, 1993–2001.

Federico Guillén

b. 1963

President of Network Infrastructure. Group Leadership Team member since 2016. Joined Nokia in 2016.

Degree in Telecommunications Engineering, ETSIT at Universidad Politécnica de Madrid, Spain. Master's degree in Switching & Communication Architectures, ETSIT at Universidad Politécnica de Madrid, Spain. Master's Degree in International Management, ESC Lyon and Alcatel, France.

President of Customer Operations, Europe, Middle East & Africa and Asia Pacific, Nokia, 2018–2020. President of Fixed Networks, Nokia, 2016–2018. President of Fixed Networks, Alcatel-Lucent, 2013–2016. President and Chief Senior Officer of Alcatel-Lucent Spain and Global Account Manager Telefónica, Alcatel-Lucent, 2009–2013. Vice President Sales of Vertical Market Sales in Western Europe, Alcatel-Lucent, 2009. Head of Regional Support Center, Fixed Access Division for South Europe, Middle East & Africa, India and Caribbean & Latin America, Alcatel-Lucent, 2007–2009. President and Chief Senior Officer, Alcatel Mexico and Global Account Manager, Telmex, 2003–2007. Various R&D, portfolio and sales management positions with Telettra in Spain, and then with Alcatel in Spain, Belgium and the United States 1989–2003.

Jenni Lukander

b. 1974

President of Nokia Technologies. Group Leadership Team member since 2019. Joined Nokia in 2007.

Master of Laws, University of Helsinki, Finland.

Senior Vice President, Head of Patent Business, Nokia 2018–2019. Vice President, Head of Patent Licensing, Nokia 2018. Vice President, Head of Litigation and Competition Law, Nokia 2016–2018. Director, Head of Regulatory and Competition Law, Nokia 2015–2016. Director, Head of Competition Law, Nokia 2011–2015. Senior Legal Counsel, Nokia 2007–2011. Visiting lawyer, Nokia, 2001. Lawyer, Roschier Ltd. 1999–2007.

Raghav Sahgal

b. 1962

President of Cloud and Network Services. Group Leadership Team member since 2020. Joined Nokia in 2017.

Master of Science in Computer Systems Management, University of Maryland, United States. Bachelor of Science in Computer Engineering, Tulane University, New Orleans, United States. Executive Business Certificate in General Management, Harvard University, United States.

President of Nokia Enterprise, 2020. Senior Vice President, Nokia Software, 2017–2020. President, NICE Ltd. Asia Pacific and the Middle East, 2010–2017. Advisory Board Member, Orga Systems, 2010–2014. Vice President, Communications Business Unit, Asia Pacific & Japan, Oracle, 2008–2010. Chief Business Officer, Comverse, 2005–2006. Executive Vice President, Asia Pacific, CSG, 2002–2005. Vice President, Software Products Group Asia Pacific, Lucent Technologies, 2000–2002.

Tommi Uitto

b. 1969

President of Mobile Networks. Group Leadership Team member since 2019. Joined Nokia in 1996.

Master's degree in industrial management, Helsinki University of Technology, Finland. Master's degree in operations management, Michigan Technological University, the United States.

Senior Vice President, Global Product Sales, Mobile Networks, Nokia 2016–2018. Senior Vice President, Global Mobile Broadband Sales, Customer Operations, Nokia Networks, 2015–2016. Senior Vice President, West Europe, Customer Operations, Nokia Networks, 2013–2015. Head of Radio Cluster (Senior Vice President), Mobile Broadband, Nokia Siemens Networks, 2012–2013. Head of Global LTE Radio Access Business Line (Vice President) and Quality, Mobile Broadband, Nokia Siemens Networks, 2011–2012. Head of Product Management, Network

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Systems, Nokia Siemens Networks, 2010. Head of Product Management, Radio Access, Nokia Siemens Networks, 2009. Head of WCDMA/HSPA and Radio Platforms Product Management, Nokia Siemens Networks, 2008. Head of WCDMA/HSPA Product Line Management, Nokia Siemens Networks, 2007. General Manager, Radio Controller Product Management, Nokia Networks, 2005–2007. Director, Sales & Marketing (Lead Sales Director), France Telecom/Orange Nokia Networks, 2002–2005. Operations Director, Northeast Europe, Central & Eastern Europe and Middle East, Nokia Networks, 1999–2002.

Stephanie Werner-Dietz

b. 1972

Chief People Officer (CPO). Group Leadership Team member since 2020. Joined Nokia in 1998.

Diploma in Applied business languages (Chinese) and International business studies, University of Applied Sciences, Bremen, Germany.

Vice President, Global HR Center of Expertise, Nokia, 2018–2019. Vice President, Business HR Head for Nokia Corporate Functions, Nokia, 2016–2018. Head of Business HR for Chief Finance and Operations Officer/Organization, Nokia, 2012–2015. Head of Nokia Siemens Networks Business Talent, Leadership & Organization Development, Nokia Siemens Networks, 2011–2012. Head of Business HR, Nokia Radio Access, 2007–2011. Head of HR Emerging Markets, Romania, Nokia, 2007. Senior HR Manager, Strategic Projects, US, Nokia, 2004–2006. HR Manager Global Platforms, Nokia, 2001–2004. HR Country Manager for the Philippines, Nokia, 1999–2001. HR Manager, Nokia Networks for Switzerland, Nokia, 1998–1999.

Marco Wirén

b. 1966

Chief Financial Officer (CFO). Group Leadership Team member since 2020. Joined Nokia in 2020.

Master's degree in Business Administration, University of Uppsala. Studies in management and strategic leadership, including at Duke Business School, IMD, and Stockholm School of Economics.

President, Wärtsilä Energy and Executive Vice President, Wärtsilä Group, 2018–2020. Executive Vice President and CFO, Wärtsilä Group, 2013–2018. Executive Vice President and CFO, SSAB Group, 2008–2013. Vice President, Business Control, SSAB Group, 2007–2008. CFO, Eltel Networks, 2006–2007. Vice President of Business development, Eltel Networks, 2004–2005. Head of Service Division, Eltel Networks, 2003–2004. Vice President, Corporate Development, Eltel Networks, 2002–2003. Vice President, Strategy & Business Development, NCC Group, 1999–2002. Head of Strategic Planning, NCC Group, 1998–1999. Group Controller, NCC Group, 1996–1998.

Vice Chair of the Board of Directors and Chair of the Audit Committee, Neste Corporation.

Summary of changes in the Group Leadership Team in 2020 and thereafter

During 2020 and thereafter, the following new appointments were made to the Group Leadership Team:

- Stephanie Werner-Dietz, Chief Human Resources Officer, as of January 1, 2020;
- Raghav Sahgal, President of Nokia Enterprise, as of June 1, 2020;
- Pekka Lundmark, President and CEO and Chair of the Group Leadership Team, as of August 1, 2020;
- Marco Wirén, Chief Financial Officer, as of September 1, 2020;
- Nishant Batra, Chief Strategy and Technology Officer, as of January 18, 2021.

During 2020, the following members of the Group Leadership Team stepped down from the Group Leadership Team:

- Kathrin Buvac, President of Nokia Enterprise, as of May 31, 2020;
- Rajeev Suri, President and CEO and the Chair of the Group Leadership Team, as of July 31, 2020;
- Kristian Pullola, Chief Financial Officer, as of August 31, 2020;
- Basil Alwan, Co-president of IP/Optical Networks, as of December 31, 2020;
- Barry French, Chief Marketing Officer, as of December 31, 2020;
- Sanjay Goel, President of Global Services, as of December 31, 2020;
- Bhaskar Gorti, President of Nokia Software, as of December 31, 2020;
- Sandra Motley, President of Fixed Networks, as of December 31, 2020;
- Sri Reddy, Co-president of IP/Optical Networks, as of December 31, 2020;
- Gabriela Styf Sjöman, Chief Strategy Officer, as of December 31, 2020; and
- Marcus Weldon, Chief Technology Officer and President of Bell Labs, as of December 31, 2020.

Furthermore, the following changes took place within the Group Leadership Team:

- Ricky Corker, President of Customer Operations, Americas, was appointed Chief Customer Experience Officer as of January 1, 2021;
- Federico Guillén, President of Customer Operations, EMEA & APAC, was appointed President of Network Infrastructure as of January 1, 2021; and
- Raghav Sahgal, President of Nokia Enterprise, was appointed President of Cloud and Network Services as of January 1, 2021.

Risk management, internal control and internal audit functions at Nokia

Main features of risk management systems

We have a systematic and structured approach to risk management. Key risks and opportunities are primarily identified against business targets either in business operations or as an integral part of strategy and financial planning. Risk management covers strategic, operational, financial, compliance and hazard risks. Key risks and opportunities are analyzed, managed and monitored as part of business performance management with the support of risk management personnel and the centralized Enterprise Risk Management function.

The principles documented in the Nokia Enterprise Risk Management Policy, which is approved by the Audit Committee of the Board, require risk management and its elements to be integrated into key processes. One of the core principles is that the business or function head is also the risk owner, although all employees are responsible for identifying, analyzing and managing risks, as appropriate, given their roles and duties. Our overall risk management concept is based on managing the key risks that would prevent us from meeting our objectives, rather than solely focusing on eliminating risks. In addition to the principles defined in the Nokia Enterprise Risk Management Policy, other key policies reflect implementation of specific aspects of risk management.

Key risks and opportunities are reviewed by the Group Leadership Team and the Board in order to create visibility on business risks as well as to enable prioritization of risk management activities. Overseeing risk is an integral part of the Board's deliberations. The Board's Audit Committee is responsible for, among other matters, risk management relating to the financial reporting process and assisting the Board's oversight of the risk management function. The Board's role in overseeing risk includes risk analysis and assessment in connection with financial, strategy and business reviews, updates and decision-making proposals.

Description of internal control procedures in relation to the financial reporting process

The management is responsible for establishing and maintaining adequate internal control over financial reporting for Nokia. Our internal control over financial reporting is designed to provide reasonable assurance to the management and the Board regarding the reliability of financial reporting and the preparation and fair presentation of published financial statements.

The management conducts a yearly assessment of Nokia's internal controls over financial reporting in accordance with the Committee of Sponsoring Organizations framework (the "COSO framework", 2013) and the Control Objectives for Information and Related Technology (COBIT) framework of internal controls. The assessment is performed based on a top-down risk assessment of our financial statements covering significant accounts, processes and locations, corporate-level controls and information systems' general controls.

As part of its assessment, the management has documented:

- the corporate-level controls, which create the "tone from the top" containing the Nokia values and Code of Conduct and which provide discipline and structure to decision-making processes and ways of working. Selected items from our operational mode and governance principles are separately documented as corporate-level controls;
- the significant processes: (i) give a complete end-to-end view of all financial processes; (ii) identify key control points; (iii) identify involved organizations; (iv) ensure coverage for important accounts and financial statement assertions; and (v) enable internal control management within Nokia;
- the control activities, which consist of policies and procedures to ensure the management's directives are carried out and the related documentation is stored according to our document retention practices and local statutory requirements; and
- the information systems' general controls to ensure that sufficient IT general controls, including change management, system development and computer operations, as well as access and authorizations, are in place.

Further, the management has also:

- assessed the design of the controls in place aimed at mitigating the financial reporting risks;
- tested operating effectiveness of all key controls; and
- evaluated all noted deficiencies in internal controls over financial reporting in the interim and as of year-end.

In 2020, Nokia has followed the procedures as described above and has reported on the progress and assessments to the management and to the Audit Committee of the Board on a quarterly basis.

Description of the organization of the internal audit function

We also have an internal audit function that acts as an independent appraisal function by examining and evaluating the adequacy and effectiveness of our system of internal control. Internal audit reports to the Audit Committee of the Board. The head of the internal audit function has direct access to the Audit Committee, without involvement of the management. The internal audit staffing levels and annual budget are approved by the Audit Committee. All authority of the internal audit function is derived from the Board. The internal audit aligns to the business regionally and by business and function.

Annually, an internal audit plan is developed with input from the management, including key business risks and external factors. This plan is approved by the Audit Committee. Audits are completed across the business focused on site level, customer level, business project level, IT system implementation, IT security, operations activities or at a Group function level. The results of each audit are reported to the management identifying issues, financial impact, if any, and the correcting actions to be completed. Quarterly, the internal audit function communicates the progress of the internal audit plan completion, including the results of the closed audits, to the Audit Committee.

Internal audit also works closely with our Ethics and Compliance office to review any financial concerns brought to light from various channels and, where relevant, works with Enterprise Risk Management to ensure priority risk areas are reviewed through audits.

In 2020, the internal audit plan was completed and all results of these reviews were reported to the management and to the Audit Committee.

Related party transactions

We determine and monitor related parties in accordance with the International Accounting Standards (IAS 24) and other applicable regulations. We maintain information of our related parties as well as monitor and assess related party transactions. As a main principle, all transactions are conducted at arm's-length and are considered to be part of the ordinary course of business. In an exceptional case where these principles would be deviated from, the company would set up a separate process to determine related parties and seek relevant approvals in accordance with internal guidelines and applicable regulations.

Main procedures relating to insider administration

Our insider administration is organized according to the applicable European Union and Finnish laws and regulations. In addition, the Board of Directors has approved the Nokia Insider Policy, which sets out Nokia-wide rules and practices to ensure full compliance with applicable rules and that inside information is recognized and treated in an appropriate manner and with the highest integrity. The Nokia Insider Policy is applicable to all directors, executives and employees of the company.

Persons discharging managerial responsibilities

Nokia has identified members of the Board of Directors and the Group Leadership Team as persons discharging managerial responsibilities who, along with persons closely associated with them, are required to notify Nokia and the Finnish Financial Supervisory Authority of their transactions with Nokia's financial instruments. Nokia publishes the transaction notifications.

In addition, under the Nokia Insider Policy, persons discharging managerial responsibilities are obligated to clear with the Deputy Chief Legal Officer, Corporate, a planned transaction in Nokia's financial instruments in advance. It is also recommended that trading and other transactions in Nokia's financial instruments are carried out in times when the information available to the market is as complete as possible.

Closed window

Persons discharging managerial responsibilities are subject to a closed window period of 30 calendar days preceding the disclosure of Nokia's quarterly or annual result announcements, as well as the day of the disclosure. During the closed window period, persons discharging managerial responsibilities are prohibited from dealing in Nokia's financial instruments.

Nokia has imposed this closed window period also on separately designated financial reporting persons who are recurrently involved with the preparation of Nokia's quarterly and annual results announcements. These persons are separately notified of their status as designated financial reporting persons.

Insider registers

Nokia does not maintain a permanent insider register. Insiders are identified on a case-by-case basis for specific projects and are notified of their insider status. Persons included in a project-specific insider register are prohibited from dealing in Nokia's financial instruments until the project ends or is made public.

Supervision

Our insider administration's responsibilities include internal communications related to insider matters and trading restrictions, setting up and maintaining our insider registers, arranging related trainings as well as organizing and overseeing compliance with the insider rules.

Violations of the Nokia Insider Policy must be reported to the Deputy Chief Legal Officer, Corporate. Nokia employees may also use channels stated in the Nokia Code of Conduct for reporting incidents involving alleged violations of the Nokia Insider Policy.

Share ownership of the Board of Directors and the Nokia Group Leadership Team

The following table sets forth the number of shares and American Depositary Shares (ADS) held by the members of the Board at December 31, 2020 when they held a total of 1 033 100 shares and ADSs in Nokia, which represented approximately 0.02% of our total shares and voting rights excluding shares held by Nokia Group.

Name	Shares ⁽¹⁾	ADSs ⁽¹⁾
Sari Baldauf (Board Chair)	163 220	
Kari Stadigh (Board Vice Chair)	308 190	
Bruce Brown		165 788
Thomas Dannenfeldt	30 299	
Jeanette Horan	60 630	
Edward Kozel		86 698
Elizabeth Nelson		107 860
Søren Skou	31 707	
Carla Smits-Nusteling	78 708	

(1) The number of shares or ADSs includes shares and ADSs received as director compensation as well as shares and ADSs acquired through other means. Stock options or other equity awards that are deemed as being beneficially owned under the applicable SEC rules are not included.

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The following table sets forth the number of shares and ADSs held by the President and CEO and the other members of the Group Leadership Team in office at December 31, 2020 when they held a total of 3 446 939 shares and ADSs in Nokia, which represented approximately 0.06% of our total shares and voting rights excluding shares held by Nokia Group.

Name	Position in 2020	Shares ⁽¹⁾	ADSs ⁽¹⁾
Pekka Lundmark	President and CEO	788 850	
Nassib Abou-Khalil	Chief Legal Officer	40 204	
Basil Alwan	Co-president of IP/Optical Networks	206 333	81 000
Ricky Corker	President of Customer Operations, Americas	193 021	
Barry French	Chief Marketing Officer	319 006	
Sanjay Goel	President of Global Services	130 784	
Bhaskar Gorti	President of Nokia Software	472 273	
Federico Guillén	President of Customer Operations Officer, EMEA & APAC	214 201	
Jenni Lukander	President of Nokia Technologies	9 767	
Sandra Motley	President of Fixed Networks	23 092	
Sri Reddy	Co-president of IP/Optical Networks	398 814	100 000
Raghav Sahgal	President of Nokia Enterprise	245 357	
Gabriela Styf Sjöman	Chief Strategy Officer	4 000	
Tommi Uitto	President of Mobile Networks	47 451	
Marcus Weldon	Chief Technology Officer and President of Bell Labs	77 482	
Stephanie Werner-Dietz	Chief Human Resources Officer	17 304	
Marco Wirén	Chief Financial Officer	78 000	

(1) The number of shares or ADSs includes shares and ADSs received as compensation as well as shares and ADSs acquired through other means. Stock options or other equity awards that are deemed as being beneficially owned under the applicable SEC rules are not included.

Auditor fees and services

Deloitte Oy served as our auditor for the period ending December 31, 2020 and PricewaterhouseCoopers Oy for the period from January 1 to December 31, 2019. The auditor is elected annually by our shareholders at the Annual General Meeting for the financial year commencing next after the election. The Audit Committee of the Board prepares the proposal to the shareholders in respect of the appointment of the auditor based upon its evaluation of the qualifications and independence of the auditor to be proposed for election or re-election on an annual basis.

The following table presents fees by type paid to Deloitte's (2020) and PricewaterhouseCoopers' (2019) network of firms for the years ended December 31:

EURm	2020	2019
Audit fees ⁽¹⁾	22.3	22.7
Audit-related fees ⁽²⁾	0.4	1.2
Tax fees ⁽³⁾	0.6	1.9
All other fees ⁽⁴⁾	1.6	—
Total	24.9	25.8

(1) Audit fees consist of fees incurred for the annual audit of the Group's consolidated financial statements and the statutory financial statements of the Group's subsidiaries.

(2) Audit-related fees consist of fees billed for assurance and related services that are reasonably related to the performance of the audit or review of the Group's financial statements or that are traditionally performed by the independent auditor, and include consultations concerning financial accounting and reporting standards; advice and assistance in connection with local statutory accounting requirements; due diligence related to mergers and acquisitions; and audit procedures in connection with investigations in the pre-litigation phase and compliance programs. They also include fees billed for other audit services, which are those services that only the independent auditor can reasonably provide, and include the provision of comfort letters and consents in connection with statutory and regulatory filings and the review of documents filed with the SEC and other capital markets or local financial reporting regulatory bodies.

(3) Tax fees include fees billed for: (i) services related to tax compliance including preparation and/or review of tax returns, preparation, review and/or filing of various certificates and forms and consultation regarding tax returns and assistance with revenue authority queries; compliance reviews, advice and assistance on other indirect taxes; and transaction cost analysis; (ii) service related to tax audits; (iii) services related to individual compliance (preparation of individual tax returns and registrations for employees (non-executives), assistance with applying visa, residency, work permits and tax status for expatriates); (iv) services related to technical guidance on tax matters; (v) services related to transfer pricing advice and assistance with tax clearances; and (vi) tax consultation and planning (advice on stock-based remuneration, local employer tax laws, social security laws, employment laws and compensation programs and tax implications on short-term international transfers).

(4) Other fees include fees billed for company establishments; liquidations; forensic accounting, data security, other consulting services and reference materials and services.

Auditor rotation

The Board of Directors is responsible for proposing the external auditor for election by the shareholders, upon recommendation from the Audit Committee of the Board of Directors. Under applicable auditor rotation rules, Nokia needed to change auditors no later than during the financial year 2020.

Accordingly, PricewaterhouseCoopers Oy declined to stand for re-election for the financial year 2020. Therefore in 2018, Nokia initiated a tendering process, overseen by the Audit Committee, for appointment of Nokia Corporation's auditor for the financial year 2020. To give the elected auditor time to prepare for the new audit engagement, the Board of Directors decided to propose the appointment of auditor for the financial year 2020 already at the 2019 Annual General Meeting of shareholders. Based on the recommendation of the Audit Committee, the Board of Directors proposed to the AGM that Deloitte Oy be elected as the company's auditor for the financial year 2020. On May 21, 2019, the AGM resolved to appoint PwC as auditors of Nokia Corporation for the financial year 2019 and Deloitte Oy for the financial year 2020.

Compensation

This section sets out our remuneration governance, policies and how they have been implemented within Nokia and includes our Remuneration Report where we provide disclosure of the compensation of our Board members and the President and CEO for 2020.

The content of the Remuneration Report, which will be presented to an advisory vote at the 2021 Annual General Meeting, is clearly indicated below and also exists as a standalone version published on a stock exchange release. Other compensation-related information provided before and after the Remuneration Report for 2020 is not subject to a vote at the 2021 Annual General Meeting, but provides further information on the compensation policies applied within Nokia as well as on the compensation of the rest of the Group Leadership Team.

We report information applicable to executive compensation in accordance with Finnish regulatory requirements and with requirements set forth by the U.S. Securities and Exchange Commission that are applicable to us.

Highlights

- 2020 was a year of significant change with the Chair of the Board of Directors, President and CEO, and Chief Financial Officer all changing. This was then followed by a restructure of the Group Leadership Team, effective January 1, 2021.
- Mr. Lundmark joined Nokia as President and CEO on the same target compensation arrangement as his predecessor.
- Mr. Lundmark purchased EUR 2.6 million of shares in the market prior to joining the company, of which the majority were eligible for the agreed co-invest based long-term incentive arrangement available to him on joining. Mr. Lundmark's interests and the interests of Nokia's shareholders are intended to be fully aligned through such ownership.
- Business performance for 2020 was mixed, with free cash flow exceeding target, but profit and revenue falling short of the incentive targets. This was reflected in Mr. Lundmark's short-term incentive, which was at 84% of target, pro-rated for his time in role.
- Our pay policies and practices continue to ensure that there is no gender pay gap in Nokia.

Word from the Chair of the Personnel Committee of the Board

Dear Fellow Shareholder,

2020 has been a year of significant change and challenges. Shortly after the appointment of Mr. Pekka Lundmark as President and CEO, the world saw significant levels of disruption with the arrival of COVID-19. All Nokia employees are to be commended for the important role they played in keeping our operations going in a safe manner, and working with our customers to ensure critical performance of networks around the world to support the major changes in how people lived and worked. I also want to recognize and thank our former President and CEO, Rajeev Suri, for his continued commitment through 2020 as he supported Pekka Lundmark in taking over the leadership of the company and engaging with our largest customers and stakeholders during this period of transition.

On the regulatory front, I am pleased to report that shareholders supported Nokia's Remuneration Policy with 86% of the votes in favor of the proposed policy. The policy will remain in place for four years and we will report each year on the outcomes of the policy in our Remuneration Report, where our shareholders will be asked to vote in support of the compensation paid. The Remuneration Report, and all elements of the compensation delivered in 2020, are fully consistent with the approved policy.

Business context

While 2020 was a challenging year for Nokia with the significant leadership changes, and global disruption caused by the COVID-19 pandemic, Nokia's employees delivered for our customers when it counted most, ensuring that they had the equipment and services to operate networks around the world. This was achieved despite disruption in supply chains and restrictions in movement in many of our markets. As a result, we saw our operating profit in line with guidance, while below the incentive target, and free cash flow being positive at EUR 1 356 million. This is reflected in the outcome of our incentive arrangements.

Strategy and compensation

At the core of Nokia's philosophy lie two principles:

- pay for performance and aligning the interests of employees with shareholders; and
- ensuring that compensation programs and policies support the delivery of the corporate strategy and create long-term sustainable shareholder value.

For 2021, which will be a year of transition with the announced organization and strategy changes, we have taken the decision to simplify our annual short-term incentive plan (STI plan) and to focus the annual incentive on operating profit (70%), a strategic objective (20%), along with an environment, social and governance (ESG) related metric (10%). While we have always believed that ESG is core to how we run our business and our role in society, 2020 has demonstrated clearly the importance of our role in society and the Personnel Committee decided that it would now be appropriate to formalize this as part of our incentive structure.

Shareholder outreach

Having met with many of our shareholders throughout 2018 and 2019 to get their input on our compensation policies and programs, we had a more limited outreach in 2020. One comment we did hear in 2020 was to formally incent ESG as part of our incentive framework. In addition, we were pleased with the support our shareholders demonstrated with the support to our Remuneration Policy in the 2020 Annual General Meeting.

New CEO compensation

Pekka Lundmark's base salary and target incentives are at the same level as his predecessor.

- Mr. Lundmark received his base compensation for the period from August 1, 2020 to the end of the financial year together with a pro rata bonus for the last five months of 2020, based on the performance of the company. His bonus for 2020 totaled EUR 573 068.

In addition, Mr. Lundmark received an award of EUR 1.3 million of restricted shares on joining to buy out the awards he forfeited on leaving his previous employer. Mr. Lundmark was invited to join the co-investment based long-term incentive arrangement (eLTI) targeted to engage senior leaders with the long-term nature of our business and share price, and purchased EUR 2.6 million of Nokia shares against which he was given a matching award of EUR 5.2 million of Nokia 2020 performance shares. This investment by Mr. Lundmark aligns him with shareholders from the start and is a sign of his commitment and engagement with the company. Delivery of actual Nokia shares would take place in 2023 subject to performance conditions.

Former CEO compensation

Mr. Suri continued to lead Nokia until July 31, 2020 and remained employed during 2020 to support the transition of leadership and relationships with our key customers and stakeholders, remaining active with our customers and helping us close contracts with them up to and after stepping down as President and CEO. His leadership was critical during the disruptions caused by COVID-19.

- Mr. Suri received his base salary and incentives throughout 2020. The balance of his notice period was paid out in cash in accordance with his contract and his annual incentive and benefits were similarly handled in accordance with the rules of the incentive plan and his contract. Facing a period of up to six months before Mr. Lundmark would be able to join, and an increasingly uncertain global economy due to COVID-19, retaining Mr. Suri's ongoing commitment was essential to ensure stability of the company until Mr. Lundmark was able to join.

Mr. Suri received a payment of EUR 2 028 666 on departure in accordance with amounts due under his contract.

2020 remuneration outcomes

In a year of challenge and change, our incentive plan payments reflect the performance of the company. The structure of the President and CEO's compensation arrangements, with the emphasis on results based variable pay, and the 2020 above-target free cash flow achievement and the below-target revenue and profit achievement, have led to an overall payment of 84% of target short-term incentive for Mr. Lundmark as President and CEO.

2020 was also the year in which Mr. Suri's 2018 long-term award vested. The outcome of this, at 56.82% of target vesting, is reflective of the performance achievement during the period.

Share ownership requirement

The President and CEO is required to own three times his base salary in Nokia. Mr. Lundmark starts his tenure with Nokia with a significant purchase of EUR 2.6 million of shares under the eLTI co-investment arrangement under which he was given a matching award of EUR 5.2 million of Nokia 2020 performance shares. He also received an award of EUR 1.3 million of Nokia 2020 restricted shares to buy out awards forfeited on leaving his former employer.

Short and long-term incentives in 2021

Our 2021 incentive plans follow this structure:

Delivering sustainable value – Long-term incentive		
Absolute Total Shareholder Return 100%		
Focus on increase in share price and restoration of the dividend		
Delivering the next year's step in the strategic plan – Short-term incentive		
Operating profit 70%	Strategic objective 20%	Environmental, social and governance aspects (ESG) 10%
Deliver operating profit	Deliver meaningful strategic actions	Deliver on our responsibilities to reduce carbon emissions and become a more diverse employer

The 2021 long-term incentive is based on performance over the life of the three-year plan from the date of the award. The metric is absolute total shareholder return. By using this metric, we will incentivize executives to deliver the desired business results and support the restoration of the dividend and the transparency for participants to see how the plan is performing.

In summary, we believe that our compensation policies have facilitated an orderly transition in leadership in an exceptionally disrupted year and that the policy and plans set the company up well to support the strategy announced by Mr. Lundmark in October 2020.

In the Remuneration Report, we also show a comparison of the development of compensation for the Board members and the President and CEO, against average employee remuneration and Nokia's financial development over the last five years. The comparison shows a clear link between President and CEO pay and company performance, with President and CEO realized pay falling nearly 8% between 2019 and 2020 in line with company performance. We will continue to monitor this alignment.

Bruce Brown, Chair of the Personnel Committee

Remuneration Policy 2020

Our Remuneration Policy was supported by 86% of the vote at the 2020 Annual General Meeting. The information below is provided as a summary for ease of reference.

In addition to applying the Remuneration Policy to our President and CEO, the principles of our policy extend to the Group Leadership Team. This includes caps to equity award amounts and provisions related to clawback.

The Board regularly monitors the effectiveness of the measures used in our incentive plans to ensure that they align with and drive the strategy of the company.

Remuneration summary for the President and CEO

Year ending December 31, 2021, subject to and in accordance with the separately published Remuneration Policy supported by the Annual General Meeting 2020						
Element	Year ended December 31, 2020	Year ended December 31, 2020	Purpose	Operation	Opportunity	
Name	Pekka Lundmark	Pekka Lundmark (from 1 August)	Rajeev Suri (to 31 July)			
Base salary	EUR 1 300 000	EUR 1 300 000 (full-year equivalent)	EUR 1 300 000 (full-year equivalent)	Provide competitive base salary to attract and retain individual with the requisite level of knowledge, skills and experience to lead our businesses	Base pay is normally reviewed annually taking into consideration a variety of factors, including, for example, the following: <ul style="list-style-type: none"> performance of the company and the individual; remuneration of our external comparator group; changes in individual responsibilities; and employee salary increases across Nokia and in the local market. 	Pay reviews are set within the context of employee increases and changes within the Nokia peer group. Changes reflect not only improving performance but also improving competence and skills as would be applied to any other employee in Nokia.
Short-term incentives	Target award: 125% of base salary Minimum 0% of base salary Maximum 281.25% of base salary Measures: 100% Nokia scorecard - 70% operating profit - 20% strategic objectives - 10% Environment, social and governance	Target award: 125% of base salary Minimum 0% of base salary Maximum 281.25% of base salary Measures: 100% Nokia scorecard - 20% revenue - 40% operating profit - 40% free cash flow Achievement against measures is multiplied by the business results multiplier (operating profit), the overriding affordability measure.	Target award: 125% of base salary Minimum 0% of base salary Maximum 281.25% of base salary Measures: 100% Nokia scorecard - 20% revenue - 40% operating profit - 40% free cash flow Achievement against measures is multiplied by the business results multiplier (operating profit), the overriding affordability measure.	To incentivize and reward performance against delivery of the annual business plan	Short-term incentives are based on performance against single-year targets and normally paid in cash. Targets for the short-term incentives are set at the start of the year, in the context of analyst expectations and the annual plan, selecting measures that align to the delivery of Nokia's strategy. Achievement is assessed at the end of the year. Short-term incentives are subject to the clawback policy (see below).	Target award: 125% of base salary Minimum 0% of base salary Maximum 281.25% of base salary
Long-term incentives (Performance Shares)	Target award: 200% of base salary (EUR 2 600 000) Minimum 0% of base salary Maximum 400% of base salary ⁽¹⁾ Metric: Absolute Total Shareholder Return	Target award: 200% of base salary (EUR 2 600 000 full-year equivalent) Minimum 0% of base salary Maximum 400% of base salary ⁽¹⁾ Metric: Absolute Total Shareholder Return	No 2020 LTI award granted to Mr. Suri	To reward for delivery of sustainable long-term performance, align the President and CEO's interests with those of shareholders and aid retention.	Long-term incentive awards are normally made in performance shares and paid for performance against longer-term targets. Targets are set in the context of the Nokia long-term plans and analyst forecasts ensuring that they are considered both demanding and motivational. Long-term incentives are subject to the clawback policy (see below).	Target award: 200% of base salary Minimum 0% of base salary Maximum 400% of base salary ⁽¹⁾ . The Board's Personnel Committee retains discretion to make awards up to twice that level in exceptional circumstances such as for example upon recruitment, significant change in responsibilities, significant strategic change or other similar events. The use of discretion would be explained at the time.
Pension	Contribution to the mandatory TyEL pension plan in Finland.	Contribution to the mandatory TyEL pension plan in Finland.	Contribution to the mandatory TyEL pension plan in Finland.	To provide for retirement with a level of certainty.	Retirement age is defined and pensions are provided in line with local country arrangements; in Finland this is the statutory Finnish pension system (Finnish TyEL). Under the TyEL arrangements, base salary, incentives and other taxable benefits are included in the definition of earnings while gains from equity-related plans are not. No supplemental pension arrangements are provided in Finland.	Pursuant to Finnish legislation, Nokia is required to make contributions to the Finnish TyEL pension arrangements in respect of the President and CEO. Such payments can be characterized as defined contribution payments. The amount is disclosed in the Remuneration Report.

Element	Year ending December 31, 2021, subject to and in accordance with the separately published Remuneration Policy supported by the Annual General Meeting 2020	Year ended December 31, 2020	Year ended December 31, 2020	Purpose	Operation	Opportunity
Benefits & mobility	Life and critical illness insurance, private medical insurance and company car.	Life and critical illness insurance, private medical insurance and company car.	Life and critical illness insurance, private medical insurance and company car. In addition Mr. Suri received mobility related benefits during his tenure for the first seven months of the year.	To attract, retain and protect the President and CEO.	Benefits are made available as part of the same policy that applies to employees more broadly in the relevant country, with additional security provisions, as appropriate.	The value will be the cost to the company.
Total Target Remuneration	EUR 5 525 000	EUR 5 525 000 ⁽²⁾ (full year equivalent)	N/A ⁽³⁾			
Share ownership requirement	Target: 3 times base salary Target (amount): EUR 3 900 000	Target: 3 times base salary Target (amount): EUR 3 900 000	Target: 3 times base salary Target (amount): EUR 3 900 000			

(1) Excluding share price growth

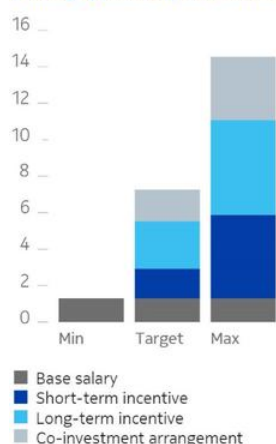
(2) Excluding 2020 matching performance share award under the eLTI co-investment arrangement

(3) Mr. Suri was President and CEO until July 31, 2020

Illustration of the earning opportunity for the President and CEO

The illustration below shows the pay components of the President and CEO at minimum, target and maximum payout. This also includes an annualized amount representing the matching performance share award for the 2020 eLTI co-investment arrangement.

Earning opportunity of the President and CEO (EURm)



Share ownership requirement

Nokia believes that it is desirable for its executives to own shares in Nokia to align their interests with those of shareholders and to ensure that their decisions are in the long-term interest of the company. The President and CEO is required to own three times his or her base salary in Nokia shares and is given a period of five years from appointment to achieve the required level of share ownership.

Remuneration on recruitment

Our policy on recruitment is to offer a compensation package that is sufficient to attract, retain and motivate the individual with the right skills for the required role.

On occasion, we may offer compensation to buy out awards or other lost compensation which the candidate held prior to joining Nokia, but which lapsed upon the candidate leaving their previous employer. Due consideration is given to the potential value and timing of such awards, taking into account any conditions attached to the awards and the likely performance against such conditions.

Clawback

The President and CEO is subject to a clawback policy where any restatement of financial results may result in the reclaiming of amounts previously paid, which had been based on numbers that have since been materially restated. Any such reclaimed amount, and the period over which payments can be reclaimed, will take into account the circumstances and duration of any misstatement. In the case of unintentional misstatement, payments made within the last three years may be subject to the policy at the discretion of the Personnel Committee.

Termination provisions

In the event of a termination of employment, any payable compensation is determined in line with legal advice regarding local legislation, country policies, contractual obligations and the rules of the applicable incentive and benefit plans. Current termination provisions of the President and CEO's service agreement are described in the Remuneration Report.

Change of control arrangements, if any, are based on a double trigger structure, which means that both a specified change of control event and termination of the individual's employment must take place for any change of control-based severance payment to materialize.

Remuneration summary for the Board of Directors

The Board's Corporate Governance and Nomination Committee periodically reviews the remuneration for the Chair and members of the Board against companies of similar size and complexity to ensure Nokia is able to attract a suitably diverse and relevant mix of skills, experience and other personal qualities in order to maximize the value creation for shareholders.

The Annual General Meeting resolves annually on the remuneration to the Chair and members of the Board. The Chair of the Board's remuneration was last changed in 2008. The Board members' annual fees were last changed in 2016 with the previous change in 2007. The structure of the Board remuneration for the current term of the Board is set out in the table below.

Fees	<p>Fees consist of annual fees and meeting fees.</p> <p>Approximately 40% of the annual fee is paid in Nokia shares purchased from the market on behalf of the Board members or alternatively delivered as treasury shares held by the company. The balance is paid in cash, most of which is typically used to cover taxes arising from the paid remuneration.</p> <p>Meeting fees are paid in cash.</p> <p>Meeting fees are not paid to the Chair of the Board.</p>
Incentives	Non-executive directors are not eligible to participate in any Nokia incentive plans and do not receive performance shares, restricted shares or any other equity-based or other form of variable compensation for their duties as members of the Board.
Pensions	Non-executive directors do not participate in any Nokia pension plans.
Share ownership requirement	Members of the Board shall normally retain until the end of their directorship such number of shares that corresponds to the number of shares they have received as Board remuneration during their first three years of service in the Board (the net amount received after deducting those shares needed to offset any costs relating to the acquisition of the shares, including taxes).
Other	Directors are compensated for travel and accommodation expenses as well as other costs directly related to Board and Committee work. The compensation is paid in cash.

Remuneration for the term that began at the Annual General Meeting held on May 27, 2020 and ends at the close of the Annual General Meeting in 2021 consists of the following fees:

Annual fee	EUR
Chair	440 000
Vice Chair	185 000
Member	160 000
Chair of Audit Committee	30 000
Member of Audit Committee	15 000
Chair of Personnel Committee	30 000
Chair of Technology Committee	20 000
Meeting fee ⁽¹⁾	EUR
Meeting requiring intercontinental travel	5 000
Meeting requiring continental travel	2 000

(1) Paid for a maximum of seven meetings per term. Not paid to the Chair of the Board.

Proposals of the Board of Directors to the Annual General Meeting 2021 were published on February 4, 2021. The Board proposes on the recommendation of the Board's Corporate Governance and Nomination Committee to introduce additional annual fees to be paid to the members of the Personnel Committee and Technology Committee in addition to the Committee Chairs. Other remuneration payable to the Board members would remain unchanged and no additional annual fee is proposed to be paid to the members of the Corporate Governance and Nomination Committee or the Chair of the Board for her service in any of the Board Committees.

Consequently, on the recommendation of the Board's Corporate Governance and Nomination Committee, in line with the company's Remuneration Policy presented to and supported by the Annual General Meeting 2020, the Board of Directors proposes to the Annual General Meeting that the annual fee payable for a term ending at the close of the next Annual General Meeting be as follows: EUR 440 000 for the Chair of the Board, EUR 185 000 for the Vice Chair of the Board, EUR 160 000 for each member of the Board, EUR 30 000 each for the Chairs of the Audit Committee and the Personnel Committee and EUR 20 000 for the Chair of the Technology Committee as an additional annual fee and EUR 15 000 for each member of the Audit Committee and Personnel Committee and EUR 10 000 for each member of the Technology Committee as an additional annual fee. Meeting fees would remain at current level. Furthermore, the Board also proposes that members of the Board of Directors shall be compensated for travel and accommodation expenses as well as other costs directly related to Board and Board Committee work.

It is proposed that approximately 40% of the annual fee be paid in Nokia shares purchased from the market, or alternatively by using treasury shares held by the company. The meeting fee, travel expenses and other expenses would be paid in cash.

Please note that the Remuneration Report, applicable to the President and CEO and the Board, subject to an advisory vote at the 2021 Annual General Meeting, starts below and is also published on a stock exchange release. Other compensation-related information provided before and after the Remuneration Report is not subject to a vote at the 2021 Annual General Meeting, but provides further information on the compensation policies applied within Nokia and the compensation of the Group Leadership Team.

Remuneration Report 2020

Introduction

This Remuneration Report of Nokia Corporation (the Report) has been approved by the company's Board of Directors (the Board) to be presented to the 2021 Annual General Meeting. The resolution of the Annual General Meeting on the Report is advisory. The Report presents the remuneration of the President and CEO and the members of the Board for the financial year 2020 in accordance with the Finnish Decree of the Ministry of Finance 608/2019, the Finnish Corporate Governance Code of 2020 as well as other applicable Finnish laws and regulations. The Annual General Meeting held on May 27, 2020 resolved to support Nokia Corporation's Remuneration Policy (the Policy) with 86.37% of the votes in favor of the Policy. Both persons who have acted as the President and CEO as well as the members of the Board have been remunerated in accordance with this Policy during the financial year 2020. No temporary or other deviations from the Policy have been made and no clawback provisions have been exercised during the financial year 2020.

In 2020 our remuneration structure promoted the company's long-term financial success by setting the performance criteria for short- and long-term incentives to support the company's short- and long-term goals, as well through shareholding requirements set for the President and CEO and the Board members. Aligned with Nokia's pay-for-performance remuneration principle, performance-based compensation was emphasized over fixed base salary. The setting and application of the performance criteria for incentive programs executed the philosophy of pay-for-performance and supported the delivery of the corporate strategy as well as the creation of long-term sustainable shareholder value.

The table below compares the development of the remuneration of our Board of Directors, President and CEO, average employee pay and company performance.

Year	Aggregate remuneration of the Board of Directors (EUR) ⁽¹⁾	President and CEO actual remuneration (EUR)	Average Salaries and Wages (EUR) ⁽²⁾	Revenue (EURm)	Total Shareholder Return (Rebased to 100 at 31 Dec 2015) ⁽³⁾
2016	2,050,902	9,508,156	61,108	23 614	73.29
2017	2,138,000	6,423,559	63,461	23 147	64.05
2018	2,203,000	4,651,009	63,220	22 563	85.92
2019	2,219,000	3,897,625	61,980	23 315	57.48
2020	2,016,000	3,587,781	65,787	21 852	54.95

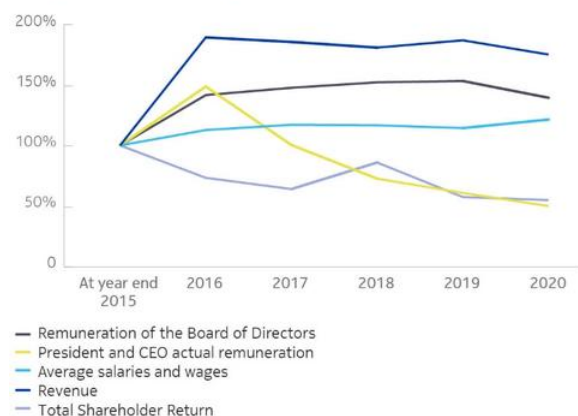
(1) Aggregate total remuneration paid to the members of the Board during the financial year as annual fee and meeting fee, as applicable, and as approved by general meetings of shareholders. The value depends on the number of members elected to the Board for each term as well as on the composition of the Board committees and travel required. Meeting fees were introduced in 2016 and the Board's Technology Committee was established in 2018 after which the Board has had four Committees.

(2) Average salaries and wages are reported in the company's financial statements based on average employee numbers and total salaries and wages.

(3) Total shareholder return on last trading day of the previous year.

We also present this data graphically:

Comparative data (rebased year end 2015 = 100)



While the graph reflects the euro values paid during each financial year, in practice the Board members' remuneration closely aligns with the performance of the company and the total shareholder return. Approximately 40% of the Board members' annual fees were paid in Nokia shares purchased from the market on their behalf and the directors shall retain until the end of their directorship such number of shares that corresponds to the number of shares they have received as Board remuneration during their first three years of service in the Board. The rest of the annual fee was paid in cash, most of which is typically used to cover taxes arising from the remuneration. It is the company's policy that the non-executive members of the Board do not participate in any of the company's equity programs and do not receive performance shares, restricted shares, or any other equity-based or other variable compensation for their duties as Board members. All members of the Board were non-executive during the financial years 2016-2020.

The pay-for-performance remuneration principle applied to the President and CEO as well as the shareholding requirement of the President and CEO and the Board members, as applicable, contribute to an alignment of interests with shareholders, while also promoting and incentivizing decisions that are in the long-term interest of the company.

We look forward to our shareholders' support and confirmation that the Report is aligned with the Remuneration Policy.

The President and CEO

The following table shows the actual remuneration received by the two persons who have acted as the company's President and CEO in 2020 and 2019. As our CEO changed in the financial year 2020, both individual and aggregate figures are presented in respect of service as President and CEO for comparison purposes. The long-term incentive payments reflect actual payments in the respective years attributable to the vesting of the 2017 Nokia performance share plan in 2020 (comparative figures show the payment of the 2016 Nokia performance share plan in 2019).

EUR	2020 (Combined)	Pay mix ⁽¹⁾	2020 (Lundmark)	Pay mix ⁽¹⁾	2020 (Suri) ⁽²⁾	Pay mix ⁽¹⁾	2019	Pay mix ⁽¹⁾
Salary	1 301 032	37%	541 667	49%	759 365	32%	1 300 000	34%
Short-term incentive ⁽³⁾	1 518 765	43%	573 068	51%	945 697	40%	637 163	17%
Long-term incentive ⁽⁴⁾	687 740	20%	N/A	N/A	687 740	29%	1 841 843	49%
Other compensation ⁽⁵⁾	80 244		14 712		65 512		118 619	
Total	3 587 781		1 129 447		2 458 314		3 897 625	

(1) Paymix reflects the proportions of base salary, short-term incentive and long-term incentive of total compensation, excluding other compensation.

(2) Mr. Suri's compensation is shown in respect of his service as President and CEO to July 31, 2020. In addition, in respect of his services as an advisor on stepping down as President and CEO on July 31, 2020 and his last day of work on January 1, 2021 he received EUR 540 635 salary, EUR 679 303 bonus and EUR 32 047 in benefits. After his departure, in accordance with his contract, Mr. Suri received payment in lieu of the balance of his notice period of EUR 866 667 in respect of salary, EUR 1 083 333 in respect of bonus and EUR 78 666 in respect of benefits.

(3) Short-term incentives represent amounts earned in respect of the financial year, but that are paid in April of the following year.

(4) The long-term incentive payment to Mr. Suri represents the vesting of his 2017 performance share award.

(5) Other compensation includes for Mr. Suri's housing equaling EUR 23 804 (2019: EUR 48 049); travel assistance equaling EUR 2 798 (2019: EUR 16 813); tax services equaling EUR 16 350 (2019: EUR 16 826); and other benefits including mobile phone, driver and supplemental medical and disability insurance equaling EUR 22 561 (2019: EUR 36 931). For Mr. Lundmark other compensation includes mobile phone, driver and disability insurance equaling EUR 14 712.

Pursuant to Finnish legislation, Nokia is required to make contributions to the Finnish TyEL pension arrangements in respect of the President and CEO. Such payments can be characterized as defined contribution payments. In 2020, payments to the Finnish state pension system equaled EUR 259 952 for Mr. Suri in respect of his service as President and CEO (EUR 353 846 in 2019) and EUR 103 256 for Mr. Lundmark. No supplementary pension arrangements were offered.

Hire and 2020 arrangements for Mr. Lundmark

Mr. Lundmark was appointed as President and CEO from August 1, 2020, which was a month earlier than initially announced on March 2, 2020. His hire arrangements are summarized below and are in accordance with the Remuneration Policy:

Item	Action	Amount	Note
Salary	Pro-rated from August 1, 2020	EUR 1.3 million per annum, pro-rated	In line with Policy and contract
Short-term incentive 2020	Paid at actual for 2020	EUR 573 068	In line with Policy and STI plan rules
Long-term incentive 2020	Performance share award vests in 2023 subject to TSR performance	Target EUR 2.6 million	In line with Policy, contract and 2020 LTI plan rules
eLTI co-investment arrangement	In return for a purchase and continued holding of 2.6m EUR worth of Nokia shares, a 2:1 award of Nokia 2020 performance shares was made. These vest in 2023 subject to TSR performance and continued holding of the purchased shares.	Target EUR 5.2 million	In line with Policy and eLTI arrangement rules and in common with the arrangement provided to Mr. Suri. Mr. Lundmark was invited to participate in the eLTI co-investment arrangement. This required him to make a substantial personal investment in Nokia shares aligning his personal interests with those of shareholders from the start.
Restricted shares	Award in recognition of forfeiting previous employer awards. In determining the value of this restricted share award, the Board took due account of the structure, time horizons, value and performance targets of his forfeited awards. Will vest in three equal tranches in 2021, 2022 and 2023.	EUR 1.3 million	In line with Policy, 2020 restricted share plan rules and in recognition of forfeited awards from Mr. Lundmark's previous employer.
Benefits	Pro-rated from August 1, 2020	Standard Finnish benefits plus tax compliance support. No housing or relocation paid.	In line with Policy and contract

Short-term incentive

The 2020 short-term incentive framework for the President and CEO was based on three core metrics: revenue, operating profit and free cash flow. Achievement against the 2020 targets was as follows:

Metric	Weight	Target EURm	Achievement
Revenue	20%	23 070	82.23 %
Operating profit	40%	2 234	74.16 %
Free cash flow	40%	849	135.80 %

Performance against these key financial targets was then multiplied by a business results multiplier (BRM), which acts as a funding factor (based on operating profit) for the short-term incentive plan for most employees, to determine the final payment. The BRM for 2020 was 84%. Accordingly, the short-term incentive of Mr. Lundmark as the President and CEO equaled EUR 573 068 or 84% of the pro-rated target award.

Long-term incentives

In 2020, Mr. Lundmark was awarded the following equity awards under the Nokia equity program. The performance condition for the 2020 performance shares is based on absolute total shareholder return and the actual achievement will be detailed following the end of the three-year performance period. See the more detailed hire arrangements for Mr. Lundmark above for further information. Mr. Suri was not awarded any performance shares or restricted shares under the 2020 long-term incentive plans.

Performance share awards ⁽¹⁾	Units awarded	Grant date fair value (EUR)	Grant date	Vesting
Awarded as regular performance share award	671 800	1 753 398	November 6, 2020	Q4 2023
Awarded as eLTI performance share award	1 390 894	4 923 765	August 10, 2020	Q3 2023
Restricted share awards ⁽²⁾				
Awarded as recruitment award	352 400	1 471 975	August 10, 2020	Q4 2021, 2022 and 2023

(1) The 2020 performance share plan has a three-year performance period based on absolute total shareholder return. The maximum payout is 200% subject to maximum performance against the performance criterion. Vesting is subject to continued employment.

(2) Award in recognition of forfeiting previous employer awards. Vesting of the tranches of the 2020 restricted share award is conditional on continued employment.

The restriction period of Mr. Suri's 2018 performance share award ended on December 31, 2020 and the award vested at 56.82% of target and was worth EUR 1 347 542. In addition, the restriction period for Mr. Suri's 2018 performance share award, resulting from his 2018 co-investment, also ended on December 31, 2020 at 56.82%, worth EUR 2 288 234. Achievement against the 2018 targets was:

Performance Share Award 2018	Units awarded	Target	Achievement	Units vesting
2018 annual award	677 600	market share, earnings per share, free cash flow	56.82%	385 012
2018 eLTI matching performance share award	1 150 618	market share, earnings per share, free cash flow	56.82%	653 781

Share ownership

Our share ownership policy requires that the President and CEO holds a minimum of three times his or her base salary in Nokia shares in order to ensure alignment with shareholder interests over the long term. This requirement was met by Mr. Suri. Mr. Lundmark is within the five-year time limit to achieve this shareholding and has made a significant investment in Nokia shares.

Mr. Lundmark	Units	Value ⁽¹⁾ (EUR)
Beneficially owned shares as of December 31, 2020	788 850	2 484 878
Unvested shares under outstanding Nokia equity plans ⁽²⁾	2 415 094	7 607 546
Total	3 203 944	10 092 424

(1) The values are based on the closing price of a Nokia share of EUR 3.15 on Nasdaq Helsinki on December 31, 2020.

(2) The number of units represents the number of unvested awards as of December 31, 2020

Mr. Lundmark's termination provisions are as follows:

Termination by	Reason	Notice	Compensation
Nokia	Cause	None	The President and CEO is entitled to no additional compensation and all unvested equity awards would be forfeited after termination.
Nokia	Reasons other than cause	Up to 12 months	The President and CEO is entitled to a severance payment equaling up to 12 months of compensation (including annual base salary, benefits, and target incentive) and unvested equity awards would be forfeited after termination.
President and CEO	Any reason	12 months	The President and CEO may terminate his service agreement at any time with 12 months' prior notice. The President and CEO would either continue to receive salary and benefits during the notice period or, at Nokia's discretion, a lump sum of equivalent value. Additionally, the President and CEO would be entitled to any short or long-term incentives that would normally vest during the notice period. Any unvested equity awards would be forfeited after termination.
President and CEO	Nokia's material breach of the service agreement	Up to 12 months	In the event that the President and CEO terminates his service agreement based on a final arbitration award demonstrating Nokia's material breach of the service agreement, he is entitled to a severance payment equaling up to 12 months of compensation (including annual base salary, benefits and target incentive). Any unvested equity awards would be forfeited after termination.

The President and CEO is subject to a 12-month non-competition and non-solicit obligation that applies after the termination of the service agreement or the date when he is released from his obligations and responsibilities, whichever occurs earlier.

Board of Directors

The shareholders resolve annually on director remuneration based on a proposal made by the Board of Directors on the recommendation of the Board's Corporate Governance and Nomination Committee.

At the Annual General Meeting held on May 27, 2020, Risto Siilasmaa and Olivier Piou stepped down from the Board and the Annual General Meeting resolved to elect nine members to the Board. The following Board members were re-elected for a term ending at the close of the Annual General Meeting 2021: Sari Baldauf, Bruce Brown, Jeanette Horan, Edward Kozel, Elizabeth Nelson, Søren Skou, Carla Smits-Nusteling and Kari Stadigh. Thomas Dannenfeldt was elected as a new member of the Board for the same term.

The aggregate amount of compensation paid to Board members in 2020 equaled EUR 2 016 000 of which EUR 1 885 000 consisted of annual fees and the rest of meeting fees. In accordance with the resolution by the Annual General Meeting 2020, approximately 40% of the annual fee from Board and Board Committee work was paid in Nokia shares purchased from the market on behalf of the Board members following the Annual General Meeting. The directors shall retain until the end of their directorship such number of shares that corresponds to the number of shares they

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have received as Board remuneration during their first three years of service in the Board. The rest of the annual fee was paid in cash, most of which is typically used to cover taxes arising from the remuneration. All meeting fees were paid in cash.

It is the company's policy that the non-executive members of the Board do not participate in any of the company's equity programs and do not receive performance shares, restricted shares, or any other equity-based or other variable compensation for their duties as Board members. No such variable compensation was paid since all persons acting as Board members during the financial year 2020 were non-executive.

The following table outlines the total annual compensation paid in 2020 to the members of the Board for their services, as resolved by the shareholders at the Annual General Meeting.

	Annual fee (EUR)	Meeting fees (EUR) ⁽¹⁾	Total remuneration paid (EUR)	40% of annual fees paid in shares (EUR)	60% of annual fees and all meeting fees paid in cash (EUR)	Number of Shares Approximately 40% of the annual fee
Sari Baldauf (Board Chair) ⁽²⁾	440 000	5 000	445 000	176 000	269 000	48 523
Kari Stadigh (Board Vice Chair)	185 000	11 000	196 000	74 000	122 000	20 401
Bruce Brown	190 000	22 000	212 000	76 000	136 000	20 953
Thomas Dannenfeldt (from May 27, 2020)	175 000	—	175 000	70 000	105 000	19 299
Jeanette Horan	175 000	20 000	195 000	70 000	125 000	19 299
Edward Kozel	195 000	17 000	212 000	78 000	134 000	21 504
Elizabeth Nelson	175 000	17 000	192 000	70 000	122 000	19 299
Olivier Piou (until May 27, 2020) ⁽³⁾	—	11 000	11 000	—	11 000	—
Risto Siilasmaa (until May 27, 2020) ⁽³⁾	—	—	—	—	—	—
Søren Skou	160 000	11 000	171 000	64 000	107 000	17 644
Carla Smits-Nusteling	190 000	17 000	207 000	76 000	131 000	20 953
Total	1 885 000	131 000	2 016 000	754 000	1 262 000	207 875

(1) Meeting fees include all meeting fees paid for the term that ended at the Annual General Meeting held on May 27, 2020 and meeting fees accrued and paid in 2020 for the term that began at the same meeting.

(2) Meeting fee paid for the term that ended at the Annual General Meeting on May 27, 2020. Sari Baldauf was elected Chair of the Board on May 27, 2020. Meeting fees are not paid to the Chair of the Board.

(3) Stepped down at the Annual General Meeting on May 27, 2020 and thus did not receive any annual fee in 2020.

Remuneration governance

We manage our remuneration through clearly defined processes, with well-defined governance principles, ensuring that no individual is involved in the decision-making related to their own remuneration and that there is appropriate oversight of any compensation decision. Remuneration of the Board is annually presented to shareholders for approval at the Annual General Meeting and the remuneration of the President and CEO is approved by the Board.

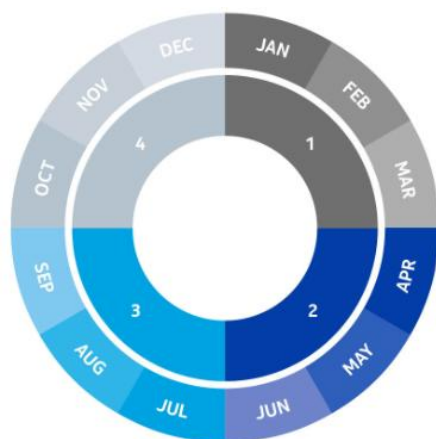
Remuneration of the Board is annually presented to shareholders for approval at the Annual General Meeting. The Board submits its proposal to the Annual General Meeting on the recommendation of the Board's Corporate Governance and Nomination Committee, which actively considers and evaluates the appropriate level and structure of directors' remuneration. Shareholders also authorize the Board to resolve to issue shares, for example to settle the company's equity-based incentive plans based on the proposal of the Board.

The Board of Directors approves, and the independent members of the Board confirm, the compensation of the President and CEO, upon recommendation of the Personnel Committee. The Personnel Committee consults regularly with the President and CEO and the Chief People Officer though they are not present when their own compensation is reviewed or discussed. This enables the Personnel Committee to be mindful of employee pay and conditions across the broader employee population. The Committee has the power, in its sole discretion, to retain compensation consultants to assist the Personnel Committee in evaluating director and executive compensation.

The Personnel Committee Chair regularly engages with shareholders on pay and broader matters to hear their views on our compensation policies, programs and associated disclosures and reflect on their feedback. For example, we had increased the performance period to three years in response to shareholders' feedback.

Work of the Personnel Committee

The Personnel Committee convened six times during 2020 with a general theme for each meeting. All meetings were held in accordance with COVID-19 restrictions.



- 1 Approvals & reporting
- 2 Philosophy & structure
- 3 Long-term direction & market review
- 4 Planning

January

- Incentive targets and objectives
- Nokia Equity Program
- Investor feedback on remuneration practices

March

- President and CEO remuneration
- Remuneration policy review

May

- Long-term incentive nominations for the Group Leadership Team
- Investor feedback from Remuneration Policy voting in the Annual General Meeting

July

- Annual General Meeting update
- Personnel Committee advisor update
- Review of Share Ownership and Clawback Policies

October

- Alignment on long-term incentive approach
- Risk review

December

- 2021 incentive program framework
- Culture
- Remuneration Report for 2020

The President and CEO

The President and CEO has an active role in the compensation governance and performance management processes for the Group Leadership Team and the wider employee population at Nokia.

The President and CEO is not a member of the Personnel Committee and does not vote at Personnel Committee meetings, nor does he participate in any conversations regarding his own compensation.

Advisors

The Personnel Committee engaged Willis Towers Watson, an independent external consultant, to assist in the review and determination of executive compensation and program design and provide insight into market trends and regulatory developments.

Nokia Group Leadership Team remuneration

At the end of 2020, the Group Leadership Team consisted of 17 persons split between Finland, other European countries and the United States. For information regarding the current Group Leadership Team composition refer to the Corporate Governance Statement.

Name	Position in 2020	Appointment date
Pekka Lundmark	President and CEO (from Aug 1, 2020)	August 1, 2020
Rajeev Suri	President and CEO (until July 31, 2020)	May 1, 2014
Nassib Abou-Khalil	Chief Legal Officer	August 1, 2019
Basil Alwan	Co-president of IP/Optical Networks	January 8, 2016
Ricky Corker	President of Customer Operations, Americas	January 1, 2019
Barry French	Chief Marketing Officer	January 8, 2016
Sanjay Goel	President of Global Services	April 1, 2018
Bhaskar Gorti	President of Nokia Software	January 8, 2016
Federico Guillén	President of Customer Operations Officer, EMEA & APAC	January 8, 2016
Jenni Lukander	President of Nokia Technologies	August 1, 2019
Sandra Motley	President of Fixed Networks	January 31, 2019
Sri Reddy	Co-president of IP/Optical Networks	May 15, 2018
Raghav Sahgal	President of Nokia Enterprise (from Jun 1, 2020)	June 1, 2020
Kathrin Buvac	President of Nokia Enterprise (until May 30, 2020)	January 8, 2016
Gabriela Styf Sjöman	Chief Strategy Officer	December 1, 2019
Tommi Uitto	President of Mobile Networks	January 31, 2019
Marcus Weldon	Chief Technology Officer and President of Bell Labs	April 1, 2017
Stephanie Werner-Dietz	Chief Human Resources Officer	January 1, 2020
Marco Wirén	Chief Financial Officer (from Sep 1, 2020)	September 1, 2020
Kristian Pullola	Chief Financial Officer (until Aug 31, 2020)	January 1, 2017

The remuneration of the members of the Group Leadership Team (excluding the President and CEO) consists of base salary, fringe benefits and short- and long-term incentives. Short-term incentive plans are based on rewarding the delivery of business performance utilizing certain, or all, of the following metrics as appropriate to the member's role: revenue, operating profit, free cash flow and defined strategic objectives.

Executives on the Group Leadership Team are subject to the same remuneration policy framework as the President and CEO. This includes being subject to clawback and shareholding requirements. The shareholding requirement for members of the Group Leadership Team is two times their base salary.

Remuneration of the Group Leadership Team in 2020

Remuneration of the Group Leadership Team (excluding the President and CEO) in 2020 and 2019, in the aggregate, was as follows:

	2020 EURm ⁽¹⁾	2019 EURm ⁽¹⁾
Salary, short-term incentives and other compensation ⁽²⁾	24.4	21.7
Long-term incentives ⁽³⁾	3.7	4.4
Total	28.1	26.1

(1) The values represent each member's time on the Group Leadership Team.

(2) Short-term incentives represent amounts earned in respect of 2020 performance. Other compensation includes mobility related payments, local benefits and pension costs.

(3) The amounts represent the value of equity awards that vested in 2020.

The members of the Group Leadership Team (excluding the President and CEO) were awarded the following equity awards under the Nokia equity program in 2020:

Award	Units awarded ⁽¹⁾	Grant date fair value (EUR)	Grant date	Vesting
Performance shares ⁽²⁾	1 575 900	4 132 482	November 6, 2020 and December 16, 2020	Q4 2023
Restricted shares ⁽³⁾	1 902 100	4 931 049	March 18, 2020, May 7, 2020 and July 1, 2020	Q3, 2020; Q1, Q3 and Q4 in 2021, 2022 and 2023

(1) Includes units awarded to persons who were Group Leadership Team members during 2020.

(2) The 2020 performance share plan has a three-year performance period based on absolute total shareholder return. The maximum payout is 200% subject to maximum performance against the performance criterion. Vesting is subject to continued employment.

(3) Vesting of the tranches of the 2020 restricted share award is conditional to continued employment.

Unvested equity awards held by the Nokia Group Leadership Team, including the President and CEO

The following table sets forth the potential aggregate ownership interest through the holding of equity-based incentives of the Group Leadership Team in office, including the President and CEO, as of December 31, 2020:

	Shares receivable through performance shares at grant	Shares receivable through performance shares at maximum ⁽⁴⁾	Shares receivable through restricted shares
Number of equity awards held by the Group Leadership Team ⁽¹⁾	7 380 503	14 761 006	1 897 548
% of the outstanding shares ⁽²⁾	0.13 %	0.26 %	0.03 %
% of the total outstanding equity incentives (per instrument) ⁽³⁾	7.42 %	7.42 %	41.91 %

(1) Includes the 17 members of the Group Leadership Team in office as of December 31, 2020.

(2) The percentages are calculated in relation to the outstanding number of shares and total voting rights of Nokia as of December 31, 2020, excluding shares held by Nokia Group. No member of the Group Leadership Team owns more than 1% of the outstanding Nokia shares.

(3) The percentages are calculated in relation to the total outstanding equity incentives per instrument.

(4) At maximum performance, under the performance share plans outstanding as of December 31, 2020, the payout would be 200% and the table reflects this potential maximum payout. The restriction period for the performance share plan 2018 ended on December 31, 2020 and Nokia's performance against the performance criteria set out in the plan rules, was above the threshold performance. The settlement to the participants under the performance share 2018 plan took place in February 2021.

Review of our incentive plans

Each year we monitor the performance of our incentive plans against the targets for the plan, total shareholder return and the impact that the plans have on total compensation compared with market peers.

Target setting

Targets for the short-term incentives are set annually at or before the start of the year, balancing the need to deliver value with the need to motivate and drive performance of the Group Leadership Team. Targets are selected from a set of strategic metrics that align with driving sustainable value for shareholders and are set in the context of market expectations and analyst consensus forecasts. Targets for our long-term incentive plans are set in a similar context. The long-term incentive targets are set at the start of the performance period and locked in for the life of the plan.

Short-term incentives

In 2020 short-term incentive targets and achievements were based on a mix of revenue, operating profit and cash flow as well as personal targets. Targets were measured either at a Nokia Group level or, alternatively, a mix of Nokia Group and business group level for business group presidents. For 2021 the incentive structure will be simplified to focus on four metrics:

- Operating profit of Nokia
- Operating profit for the relevant business group
- Role related strategic objectives
- ESG (carbon emissions and diversity)

Those Group Leadership Team members not leading a business group will have the equivalent proportion of their incentive based on Nokia's operating profit.

Long-term incentives

We annually review compensation against key metrics such as total shareholder return and share price to validate the effectiveness of our equity plans.

The 2017 performance share plan vested on January 1, 2020 with 28.9% of the target award vesting based on the achievement against the revenue and earnings per share targets during the performance period (financial years 2017 and 2018).

The 2018 performance share plan vested on January 1, 2021 with 56.82% of the target award vesting based on the achievement against the market share, earnings per share and free cash flow targets during the performance period (financial years 2018 and 2019).

The 2019 performance share plan was the first to be based on a three-year performance period and its performance will be assessed after the financial year 2021 has ended.

The Personnel Committee of the Board determined that the metric for the 2020 performance share plan should be based on total shareholder return. This reflects our commitment to driving the best direct, long-term results and fully aligns plan participants with the interests of shareholders. The global pandemic necessitated a delay to the award date for our main long-term incentive award from July to November. The performance period was adjusted accordingly to ensure that a three-year performance period was maintained and the November 2020 awards will not vest until a corresponding date three years later in 2023. The performance conditions were not adjusted.

Nokia long-term incentive plan and employee share purchase plan 2021-2023

The long-term incentive plan (LTI Plan) intends to effectively contribute to the long-term value creation and sustainability of the Company and align the interests of the executives and employees with those of Nokia's shareholders. Nokia's long-term incentive plan for 2021-2023 is a key tool which supports these objectives. Under the LTI Plan the company may grant eligible executives and other employees awards in the form of both performance shares and restricted shares.

Awards under the LTI Plan may be granted between the date the plan is approved and December 31, 2023 subject to applicable performance metrics as well as performance and/or restriction periods of up to 36 months depending on the award. Consequently, the restriction periods for the last awards granted under the LTI Plan would end in 2026. Performance metrics as well as weightings and targets for the selected metrics for performance shares are set by the Board of Directors annually to ensure they continue to support Nokia's long-term business strategy and financial success.

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The potential maximum aggregate number of Nokia shares that may be issued based on awards granted under the LTI plan in 2021, 2022 and 2023 is 350 million. Until the Nokia shares are delivered, the participants will not have any shareholder rights, such as voting or dividend rights associated with the performance or restricted shares. If the participant's employment with Nokia terminates before the vesting date of the award or a part of an award, the individual is not, as a main rule, entitled to settlement based on the plan.

For the awards made in 2021, the majority of long-term incentive plan participants will receive restricted shares rather than performance shares although the executives, including the President and CEO, will continue to receive performance shares as the main form of long-term incentives. The performance shares will be subject to performance criterion which will continue to be absolute total shareholder return and the plan vests no earlier than three years from the grant. The regular restricted share awards will have a three-year vesting period with cliff vesting but, in limited cases predominantly related to retention, the company may introduce different vesting periods with tranche vesting. This will simplify plan participation for the employees.

The purpose of the employee share purchase plan (ESPP) is to encourage share ownership within the Nokia employee population, increasing engagement and sense of ownership in the company. Under the ESPP 2021-2023, subject to the Board commencing annual plan cycles, the eligible employees may elect to make contributions from their monthly net salary to purchase Nokia shares at market value on pre-determined dates on a quarterly basis during the applicable plan period. Nokia would deliver one matching share for every two purchased shares that the participant still holds at the end of applicable plan cycle. In addition, the participants may be offered free shares subject to meeting certain conditions related to participation as determined by the Board.

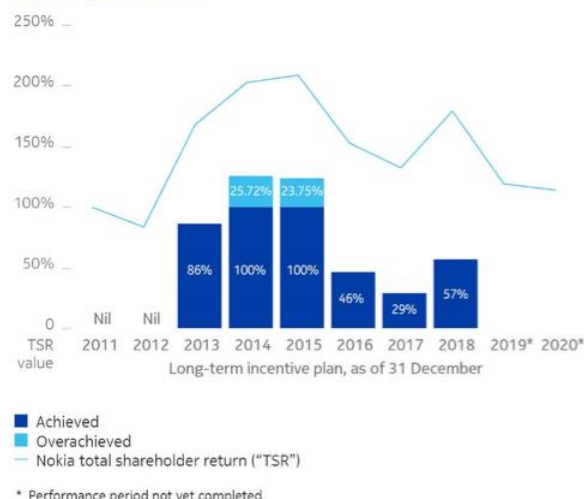
The maximum number of shares that can be issued under all plan cycles commencing under the ESPP in 2021, 2022 and 2023 is 35 million. Participants have immediate shareholder rights over all shares purchased from the market. Until the matching or free Nokia shares are delivered, the participants will not have any shareholder rights, such as voting or dividend rights associated with the matching or free shares.

Pay for performance

Core to our compensation philosophy is a desire to pay for performance.

Each year we review overall total shareholder return compared with long-term incentive payouts mapping the performance of the plans against the total shareholder return curve.

Share price and total shareholder return vs long-term incentive performance



Looking at the performance of our long-term incentive plans against total shareholder return, there is a reasonable alignment with the performance of the plans declining as total shareholder return declines and the trend lines are reasonably aligned.

The Board continues to actively monitor the performance of our long-term incentive plans to ensure that they deliver value for shareholders.

Our peers

In looking for suitable comparators, we have considered ourselves a European technology company and looked at businesses of similar size, global scale and complexity, such as:

ABB	Deutsche Telekom
ASML	Ericsson
Airbus	Infineon
Atos	Kone
BAe Systems	Phillips
BT	SAP
Cap Gemini	Vodafone

Operating and financial review and prospects

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Selected financial data

Five-year consolidated financial information

The selected financial data set forth below as of and for each of the years in the five-year period ended December 31, 2020 has been derived from, and should be read in conjunction with, our consolidated financial statements prepared in accordance with IFRS. The consolidated financial statements as of December 31, 2020 and 2019 and for the years ended December 31, 2020, 2019 and 2018 are included in this Annual Report on Form 20-F.

In 2019, the Group applied IFRS 16, Leases, for the first time. In 2018, the Group applied IFRS 9, Financial Instruments, and IFRS 15, Revenue from Contracts with Customers, for the first time. As the new standards were not adopted retrospectively, the financial information for the comparative periods has not been restated for the effects of the new standards.

	2020	2020	2019	2018	2017	2016
For the year ended December 31	USDm ⁽¹⁾	EURm				
From the consolidated income statement						
Net sales	24 959	21 852	23 315	22 563	23 147	23 641
Operating profit/(loss)	1 011	885	485	(59)	16	(1 100)
Profit/(loss) before tax	849	743	156	(360)	(510)	(1 369)
(Loss)/profit for the year from continuing operations	(2 870)	(2 513)	18	(549)	(1 437)	(912)
(Loss)/profit for the year from discontinued operations	(3)	(3)	(7)	214	(21)	(15)
(Loss)/profit for the year	(2 874)	(2 516)	11	(335)	(1 458)	(927)
(Loss)/profit from continuing operations attributable to equity holders of the parent	(2 878)	(2 520)	14	(554)	(1 473)	(751)
(Loss)/profit attributable to equity holders of the parent	(2 882)	(2 523)	7	(340)	(1 494)	(766)
Earnings per share attributable to equity holders of the parent						
Basic earnings per share, EUR						
Continuing operations	(0.51)	(0.45)	0.00	(0.10)	(0.26)	(0.13)
(Loss)/profit for the year	(0.51)	(0.45)	0.00	(0.06)	(0.26)	(0.13)
Diluted earnings per share, EUR						
Continuing operations	(0.51)	(0.45)	0.00	(0.10)	(0.26)	(0.13)
(Loss)/profit for the year	(0.51)	(0.45)	0.00	(0.06)	(0.26)	(0.13)
Cash dividends per share, EUR ⁽²⁾	0.00	0.00	0.00	0.10	0.19	0.17
Average number of shares (millions of shares)						
Basic	5 612	5 612	5 600	5 588	5 652	5 732
Diluted						
Continuing operations	5 612	5 612	5 626	5 588	5 652	5 741
(Loss)/profit for the year	5 612	5 612	5 626	5 588	5 652	5 741

(1) In 2020, average rate of USD per EUR 1.1422 has been used to translate the consolidated income statement items.

(2) No dividend is proposed by the Board of Directors of the Parent Company related to the financial year 2020.

	2020	2020	2019	2018	2017	2016
As of December 31	USDm ⁽¹⁾	EURm				
From the consolidated statement of financial position						
Non-current assets ⁽²⁾	22 058	17 976	22 320	21 246	21 160	24 182
Total cash and current financial investments ⁽³⁾⁽⁴⁾	9 892	8 061	6 007	6 873	8 280	9 326
Other current assets	12 460	10 154	10 801	11 393	11 561	11 349
Assets held for sale	–	–	–	5	23	44
Total assets	44 410	36 191	39 128	39 517	41 024	44 901
Capital and reserves attributable to equity holders of the parent	15 296	12 465	15 325	15 289	16 138	20 094
Non-controlling interests	98	80	76	82	80	881
Long-term interest-bearing liabilities ⁽⁵⁾	6 154	5 015	3 985	2 826	3 454	3 647
Other non-current liabilities ⁽²⁾⁽⁵⁾	8 430	6 870	7 687	7 216	8 608	7 674
Short-term interest-bearing liabilities	688	561	292	994	309	370
Other current liabilities ⁽²⁾	13 744	11 200	11 763	13 110	12 435	12 235
Total shareholders' equity and liabilities	44 410	36 191	39 128	39 517	41 024	44 901
Net cash and current financial investments ⁽⁴⁾⁽⁵⁾⁽⁶⁾	3 049	2 485	1 730	3 053	4 517	5 309
Share capital	302	246	246	246	246	246

(1) In 2020, end of period rate of USD per EUR 1.2271 has been used to translate the consolidated statement of financial position items.

(2) In 2020 and 2019, non-current assets, other non-current liabilities and other current liabilities reflect the impact of adoption of IFRS 16, Leases on January 1, 2019.

(3) Total cash and current financial investments consist of the following line items from our consolidated statement of financial position: cash and cash equivalents and current financial investments.

(4) Related to the adoption of IFRS 9, Financial Instruments on January 1, 2018, financial instruments previously presented within "Available for sale investments" are now presented within "Non-current financial investments", and financial instruments previously presented within "Available for sale investments, liquid assets" and "Investments at fair value through profit and loss, liquid assets" are now presented within "Current financial investments". Despite the changes in the presentation of comparatives, IFRS 9 has not been adopted retrospectively.

(5) Lease liabilities recognized in accordance with IAS 17, Leases, for the years ended December 31, 2018, 2017 and 2016 have been reclassified from long-term interest-bearing liabilities to other non-current liabilities to ensure comparability with the presentation of interest-bearing liabilities and lease liabilities following the adoption of IFRS 16, Leases on January 1, 2019. Consequently, net cash and current financial investments for the years ended December 31, 2018, 2017 and 2016 has been recast to exclude lease liabilities. Despite the changes in the presentation of comparatives, IFRS 16 has not been adopted retrospectively.

(6) Net cash and current financial investments equal total cash and current financial investments less long-term and short-term interest-bearing liabilities.

Operating and financial review

The financial information included in this “Operating and financial review” section as of December 31, 2020 and 2019, and for the years ended December 31, 2020, 2019 and 2018 has been derived from our audited consolidated financial statements included in this Annual Report on Form 20-F. The financial information should be read in conjunction with, and is qualified in its entirety by reference to, our audited consolidated financial statements.

Impact of COVID-19 on our operations

In 2020, the global economy and financial markets have been severely affected by the COVID-19 pandemic. The impact of COVID-19 on our financial performance and financial position during the year has been primarily related to temporary factory closures in the first half of the year. The factory closures related primarily to Alcatel Submarine Networks in Group Common and Other and had a negative impact on net sales, with the majority of these net sales expected to be shifted to future periods, rather than being lost. In addition, COVID-19 has affected our operational costs and cash flows, for example as a result of temporarily lower travel, temporary delays in capital expenditure and lower cash outflows related to income taxes due to tax reliefs.

As of December 31, 2020, potential risks and uncertainties continue to exist related to the scope and duration of the COVID-19 impact and the pace and shape of the economic recovery following the pandemic and it is impossible to predict with accuracy the precise impact of such risks on us, our operations and our business.

Results of operations

This “Results of operations” section discusses the results of our continuing and discontinued operations.

In 2020, we reviewed the presentation of income and expenses related to our restructuring plans, pension plan curtailments and amendments as well as certain asset impairments. As a result, we reclassified the restructuring and associated charges, pension curtailment and plan amendment income and expenses as well as certain impairment charges that were previously presented in other operating income and expenses to the functional line items to enhance the relevance of information provided in our consolidated income statement. The comparative amounts for 2019 and 2018 have been reclassified accordingly. For more information, refer to Note 2, Significant accounting policies, in the consolidated financial statements included in this Annual Report on Form 20-F.

Continuing operations

For the year ended December 31, 2020 compared to the year ended December 31, 2019

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2020 EURm	% of net sales	2019 EURm	% of net sales	Year-on-year change %
Net sales	21 852	100.0	23 315	100.0	(6)
Cost of sales ⁽¹⁾	(13 659)	(62.5)	(15 051)	(64.6)	(9)
Gross profit⁽¹⁾	8 193	37.5	8 264	35.4	(1)
Research and development expenses ⁽¹⁾	(4 087)	(18.7)	(4 532)	(19.4)	(10)
Selling, general and administrative expenses ⁽¹⁾	(2 898)	(13.3)	(3 219)	(13.8)	(10)
Other operating income and expenses ⁽¹⁾	(323)	(1.5)	(28)	(0.1)	–
Operating profit	885	4.0	485	2.1	82
Share of results of associated companies and joint ventures	22	0.1	12	0.1	83
Financial income and expenses	(164)	(0.8)	(341)	(1.5)	(52)
Profit before tax	743	3.4	156	0.7	–
Income tax expense	(3 256)	(14.9)	(138)	(0.6)	–
(Loss)/profit for the year	(2 513)	(11.5)	18	0.1	–
Attributable to:					
Equity holders of the parent	(2 520)	(11.5)	14	0.1	–
Non-controlling interests	7	–	4	–	75

(1) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2019 have been recast accordingly. Refer to note 2, Significant accounting policies, in the consolidated financial statements included in this Annual Report on Form 20-F.

Net sales

Net sales in 2020 were EUR 21 852 million, a decrease of EUR 1 463 million, or 6%, compared to EUR 23 315 million in 2019. The decrease in net sales was primarily due to a decrease in Networks net sales, and, to a lesser extent, a decrease in Nokia Software and Nokia Technologies net sales. This was partially offset by an increase in Group Common and Other.

The following tables set forth distribution of net sales by geographical area and net sales by customer type for the years indicated.

For the year ended December 31	2020 EURm	2019 EURm	Year-on-year change %
Asia Pacific	3 847	4 556	(16)
Europe ⁽¹⁾	6 620	6 620	–
Greater China	1 376	1 843	(25)
Latin America	995	1 472	(32)
Middle East & Africa	1 893	1 876	1
North America	7 121	6 948	2
Total	21 852	23 315	(6)

(1) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

For the year ended December 31	2020 EURm	2019 EURm	Year-on-year change %
Communication service providers	17 954	19 558	(8)
Enterprise	1 571	1 409	11
Licensees	1 402	1 487	(6)
Other ⁽¹⁾	925	861	7
Total	21 852	23 315	(6)

(1) Includes net sales of Alcatel Submarine Networks and Radio Frequency Systems, both of which are being managed as separate entities, and certain other items, such as eliminations of inter-segment revenues and certain items related to purchase price allocation. Alcatel Submarine Networks and Radio Frequency Systems net sales include also revenue from communication service providers and enterprise customers.

Gross profit

Gross profit in 2020 was EUR 8 193 million, a decrease of EUR 71 million, or 1%, compared to EUR 8 264 million in 2019. The decrease in gross profit was primarily due to higher restructuring and associated charges, a lower gain related to defined benefit plan amendments, and lower gross profit in Nokia Software, Nokia Technologies and Group Common and Other. These were partially offset by higher gross profit in Networks and the absence of product portfolio strategy costs. Gross margin in 2020 was 37.5%, compared to 35.4% in 2019. In 2020, gross profit did not include any product portfolio strategy costs, compared to EUR 123 million of such costs in 2019. In 2020, gross profit included restructuring and associated charges of EUR 393 million, compared to EUR 287 million in 2019. In 2020, gross profit included a gain related to defined benefit plan amendments of EUR 90 million, compared to a gain of EUR 168 million in 2019.

Operating expenses

Our research and development expenses in 2020 were EUR 4 087 million, a decrease of EUR 445 million, or 10%, compared to EUR 4 532 million in 2019. Research and development expenses represented 18.7% of our net sales in 2020 compared to 19.4% in 2019. The decrease in research and development expenses was primarily due to lower amortization of acquired intangible assets, a decrease in Networks research and development expenses and the absence of product portfolio strategy costs. This was partially offset by higher restructuring and associated charges and an increase in Nokia Technologies research and development expenses. In 2020, research and development expenses included EUR 57 million of amortization of acquired intangible assets, compared to EUR 571 million in 2019. In 2020, research and development expenses did not include any product portfolio strategy costs, compared to EUR 22 million in 2019. In 2020, research and development expenses included restructuring and associated charges of EUR 190 million, compared to EUR 98 million in 2019.

Our selling, general and administrative expenses in 2020 were EUR 2 898 million, a decrease of EUR 321 million compared to EUR 3 219 million in 2019. Selling, general and administrative expenses represented 13.3% of our net sales in 2020 compared to 13.8% in 2019. The decrease in selling, general and administrative expenses was primarily due to a decrease in Networks selling, general and administrative expenses, lower transaction and integration-related costs, lower restructuring and associated charges and, to a lesser extent, lower Nokia Technologies selling, general and administrative expenses. The decrease in Networks selling, general and administrative expenses, reflected continued progress related to Nokia's cost savings program and lower travel and personnel-related expenses due to COVID-19. In 2020, selling, general and administrative expenses included transaction and integration-related credits of EUR 11 million, compared to costs of EUR 50 million in 2019. In 2020, selling, general and administrative expenses included restructuring and associated charges of EUR 68 million, compared to EUR 117 million in 2019.

Other operating income and expenses in 2020 was a net expense of EUR 323 million, an increase of EUR 295 million, compared to a net expense of EUR 28 million in 2019. The net negative fluctuation in our other operating income and expenses was primarily due to a non-cash impairment charge and a net negative fluctuation in Networks other operating income and expenses. In 2020, we recorded a non-cash impairment loss on goodwill to other operating income and expenses of EUR 200 million, compared to no charge in 2019.

Operating profit

Our operating profit in 2020 was EUR 885 million, an increase of EUR 400 million, compared to an operating profit of EUR 485 million in 2019. The increase in operating profit was primarily due to lower research and development expenses and lower selling, general and administrative expenses, partially offset by a net negative fluctuation in other operating income and expenses and lower gross profit. Our operating margin in 2020 was 4.0%, compared to 2.1% in 2019.

Financial income and expenses

Financial income and expenses were a net expense of EUR 164 million in 2020, a decrease of EUR 177 million, or 52%, compared to a net expense of EUR 341 million in 2019. The net positive fluctuation in financial income and expenses was primarily due to a decrease in the costs related to the sale of receivables and a net benefit related to foreign exchange results arising from the impact of foreign exchange volatility. We sell trade receivables to various financial institutions without recourse in the normal course of business, in order to manage our credit risk and working capital cycle.

Profit before tax

Our profit before tax in 2020 was EUR 743 million, an increase of EUR 587 million compared to EUR 156 million in 2019.

Income tax

Income taxes were a net expense of EUR 3 256 million in 2020, an increase of EUR 3 118 million compared to a net expense of EUR 138 million in 2019. The increase in net income taxes was primarily attributable to a EUR 3.0 billion charge related to the derecognition of Finnish deferred tax assets and, to a lesser extent, higher income taxes due to increased profitability in 2020 compared to 2019. The derecognition was required due to a regular assessment of our ability to utilize the tax assets in Finland in the foreseeable future that is done primarily based on our historical performance. These tax assets are not lost, and the derecognition can be reversed. They can still be utilized in the taxation and the derecognition is not expected to affect the overall taxation of the Nokia Group or its cash taxes. For further details on the derecognition of Finnish deferred tax assets, please refer to Note 12, Income taxes, of our consolidated financial statements included in this Annual Report on Form 20-F.

Profit/loss attributable to equity holders of the parent and earnings per share

The loss attributable to equity holders of the parent in 2020 was EUR 2 520 million, a decrease of EUR 2 534 million, compared to a profit of EUR 14 million in 2019. The change in profit attributable to equity holders of the parent was primarily due to higher income tax expenses, partially offset by an improvement in operating profit, and net positive fluctuation in financial income and expenses.

Our EPS from continuing operations in 2020 was negative EUR 0.45 (basic) and negative EUR 0.45 (diluted) compared to EUR 0.00 (basic) and EUR 0.00 (diluted) in 2019.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2019		2018		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	23 315	100.0	22 563	100.0	3
Cost of sales ⁽¹⁾	(15 051)	(64.6)	(14 251)	(63.2)	6
Gross profit⁽¹⁾	8 264	35.4	8 312	36.8	(1)
Research and development expenses ⁽¹⁾	(4 532)	(19.4)	(4 777)	(21.2)	(5)
Selling, general and administrative expenses ⁽¹⁾	(3 219)	(13.8)	(3 549)	(15.7)	(9)
Other operating income and expenses ⁽¹⁾	(28)	(0.1)	(45)	(0.2)	–
Operating profit/(loss)	485	2.1	(59)	(0.3)	–
Share of results of associated companies and joint ventures	12	0.1	12	0.1	–
Financial income and expenses	(341)	(1.5)	(313)	(1.4)	9
Loss before tax	156	0.7	(360)	(1.6)	–
Income tax expense	(138)	(0.6)	(189)	(0.8)	(27)
Loss for the year	18	0.1	(549)	(2.4)	–
Attributable to:					
Equity holders of the parent	14	0.1	(554)	(2.5)	–
Non-controlling interests	4	–	5	–	(20)

(1) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2019 and 2018 have been recast accordingly. Refer to note 2, Significant accounting policies, in the consolidated financial statements included in this Annual Report on Form 20-F.

Net sales

Net sales in 2019 were EUR 23 315 million, an increase of EUR 752 million, or 3%, compared to EUR 22 563 million in 2018. The increase in net sales was primarily due to an increase in Networks net sales, and, to a lesser extent, Nokia Software net sales. This was partially offset by a decrease in Group Common and Other and Nokia Technologies net sales.

The following tables set forth distribution of net sales by geographical area and net sales by customer type for the years indicated.

For the year ended December 31	2019	2018	Year-on-year change %
	EURm	EURm	
Asia Pacific	4 556	4 081	12
Europe ⁽¹⁾	6 620	6 489	2
Greater China	1 843	2 165	(15)
Latin America	1 472	1 380	7
Middle East & Africa	1 876	1 874	–
North America	6 948	6 574	6
Total	23 315	22 563	3

(1) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

For the year ended December 31	2019	2018	Year-on-year change %
	EURm	EURm	
Communication service providers	19 558	18 955	3
Enterprise	1 409	1 167	21
Licensees	1 487	1 476	1
Other ⁽¹⁾	861	965	(11)
Total	23 315	22 563	3

(1) Includes net sales of Alcatel Submarine Networks and Radio Frequency Systems, both of which are being managed as separate entities, and certain other items, such as eliminations of inter-segment revenues and certain items related to purchase price allocation. Alcatel Submarine Networks and Radio Frequency Systems net sales include also revenue from communication service providers and enterprise customers.

Gross profit

Gross profit in 2019 was EUR 8 264 million, a decrease of EUR 48 million, or 1%, compared to EUR 8 312 million in 2018. The decrease in gross profit was primarily due to lower gross profit in Networks, higher restructuring and associated charges, lower gross profit in Group Common and Other, and to lesser extent lower gross profit in Nokia Technologies. These were partially offset by lower product portfolio integration-related costs, gain on defined benefit plan amendment and higher gross profit in Nokia Software. Gross margin in 2019 was 35.4%, compared to 36.8% in 2018. In 2019, gross profit included restructuring and associated charges of EUR 287 million, compared to EUR 118 million in 2018. In 2019, gross profit included product portfolio integration-related costs of EUR 123 million, compared to EUR 548 million in 2018. In 2019, gross profit included a gain related to defined benefit plan amendments of EUR 168 million, compared to zero in 2018.

Operating expenses

Our research and development expenses in 2019 were EUR 4 532 million, a decrease of EUR 245 million, or 5%, compared to EUR 4 777 million in 2018. Research and development expenses represented 19.4% of our net sales in 2019 compared to 21.2% in 2018. The decrease in research and development expenses was due to a decrease in Networks, and, to a lesser extent, Nokia Technologies and Nokia Software research and development expenses as well as decrease in restructuring and associated charges. This was partially offset by an increase in Group Common and Other research and development expenses. In 2019, research and development expenses included EUR 571 million of amortization of acquired intangible assets, compared to EUR 576 million in 2018. In 2019, research and development expenses included restructuring and associated charges of EUR 98 million, compared to EUR 122 million in 2018. In 2019, research and development expenses included EUR 22 million of product portfolio strategy costs, compared to EUR 28 million in 2018. In 2019, research and development expenses included impairments of assets of EUR 17 million, compared to EUR 29 million in 2018.

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Our selling, general and administrative expenses in 2019 were EUR 3 219 million, a decrease of EUR 330 million, or 9%, compared to EUR 3 549 million in 2018. Selling, general and administrative expenses represented 13.8% of our net sales in 2019 compared to 15.7% in 2018. The decrease in selling, general and administrative expenses was primarily due to a decrease in Networks selling, general and administrative expenses, lower transaction and integration-related costs and, to a lesser extent, lower Nokia Software and Nokia Technologies selling, general and administrative expenses. This was partially offset by higher Group Common and Other selling, general and administrative expenses and higher restructuring and associated charges. In 2019, selling, general and administrative expenses included EUR 352 million of amortization of acquired intangible assets, compared to EUR 358 million in 2018. In 2019, selling, general and administrative expenses included restructuring and associated charges of EUR 117 million, compared to EUR 80 million in 2018. In 2019, selling, general and administrative expenses included transaction and integration-related costs of EUR 50 million, compared to EUR 207 million in 2018.

Other operating income and expenses in 2019 was a net expense of EUR 28 million, a decrease of EUR 17 million, compared to a net expense of EUR 45 million in 2018. The net positive fluctuation in our other operating income and expenses was primarily due to the absence of charges related to fair value changes of a legacy IPR fund and lower charges related to divestments of businesses. This was partially offset by a net negative fluctuation in Group Common and Other operating income and expenses.

Operating profit/loss

Our operating profit in 2019 was EUR 485 million, a change of EUR 544 million, compared to an operating loss of EUR 59 million in 2018. The change in operating result was primarily due to lower selling, general and administrative expenses, research and development expenses and a net positive fluctuation in other operating income and expenses, partially offset by lower gross profit. Our operating margin in 2019 was 2.1%, compared to approximately breakeven in 2018.

Financial income and expenses

Financial income and expenses was a net expense of EUR 341 million in 2019, an increase of EUR 28 million, or 9%, compared to a net expense of EUR 313 million in 2018. The net negative fluctuation in financial income and expenses was primarily due to an impairment charge related to loans extended to a certain emerging market customer, a recognition of interest expenses on lease liabilities within financial expenses, following the adoption of IFRS 16, Leases, in 2019, as well as an increase in the costs related to the sale of receivables in 2019 compared to 2018. We sell trade receivables to various financial institutions without recourse in the normal course of business, in order to manage our credit risk and working capital cycle. The negative fluctuation was partially offset by income due to a change in the fair value of the financial liability related to Nokia Shanghai Bell, which positively impacted other financial income.

Profit/loss before tax

Our profit before tax in 2019 was EUR 156 million, an increase of EUR 516 million compared to a loss of EUR 360 million in 2018.

Income tax

Income taxes was a net expense of EUR 138 million in 2019, a decrease of EUR 51 million compared to a net expense of EUR 189 million in 2018. The change in net income taxes was primarily attributable to the deferred tax expense recorded in 2018 resulting from the write-off of certain deferred tax assets, primarily related to foreign withholding tax credits in Finland. This was partially offset by higher income taxes due to increased profitability and our regional profit mix in 2019 compared to 2018.

Profit/loss attributable to equity holders of the parent and earnings per share

The profit attributable to equity holders of the parent in 2019 was EUR 14 million, an increase of EUR 568 million, compared to a loss of EUR 554 million in 2018. The change in profit attributable to equity holders of the parent was primarily due to the improvement in operating profit, and, to a lesser extent, lower income tax expenses. This was partially offset by a net negative fluctuation in financial income and expenses.

Our EPS from continuing operations in 2019 was EUR 0.00 (basic) and EUR 0.00 (diluted) compared to negative EUR 0.10 (basic) and negative EUR 0.10 (diluted) in 2018.

Discontinued operations

Discontinued operations include the continuing financial effects of the HERE business and the D&S business. The Group sold its HERE digital mapping and location services business to a German automotive industry consortium comprised of AUDI AG, BMW Group and Daimler AG in a transaction that was completed on December 4, 2015. The Group sold substantially all of its Devices & Services business to Microsoft in a transaction that was completed on April 25, 2014. The timing and amount of financial effects are largely dependent upon external factors such as final outcomes of uncertain tax positions. Refer to Note 6, Discontinued operations, of our consolidated financial statements included in this Annual Report on Form 20-F.

For the year ended December 31, 2020 compared to the year ended December 31, 2019

Discontinued operations loss for the year was EUR 3 million in 2020 compared to a loss of EUR 7 million in 2019. In 2019, the loss for the year included an addition of EUR 7 million to, and a deduction of EUR 1 million from, gain on the sale related to D&S business and HERE business, respectively, due to tax indemnification.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

Discontinued operations loss for the year was EUR 7 million in 2019 compared to a profit of EUR 214 million in 2018. In 2019, the loss for the year included an addition of EUR 7 million to and a deduction of EUR 1 million from gain on the sale related to D&S business and HERE business, respectively, due to tax indemnification. Profit for the year in 2018 mostly related to a resolution reached in the tax dispute concerning the applicability of withholding tax in respect of payments by Nokia India Private Limited to Nokia Corporation for the supply of operating software in D&S business as well as a release of uncertain tax positions related to HERE business.

Results of segments

In 2020, we had three reportable segments for financial reporting purposes: (1) Networks, (2) Nokia Software and (3) Nokia Technologies. We also present certain segment-level information for Group Common and Other. The amounts presented in this "Results of segments" section for each reportable segment and Group Common and Other represent the amounts reported to the management. Certain costs and revenue adjustments are not allocated to the segments for the management reporting purposes. For more information on our operational and reporting structure as well as the reconciliation of reportable segment measures to those of the Nokia Group, refer to Note 5, Segment information, in the consolidated financial statements included in this Annual Report on Form 20-F.

In 2020, we reviewed the presentation of income and expenses related to our restructuring plans, pension plan curtailments and amendments as well as certain asset impairments. As a result, we reclassified the restructuring and associated charges, pension curtailment and plan amendment income and expenses as well as certain impairment charges that were previously presented in other operating income and expenses to the functional line items to enhance the relevance of information provided in our consolidated income statement. The comparative amounts for 2019 and 2018 have been reclassified accordingly, however, the change in presentation mostly related to items that are not allocated to segments, and therefore the results of segments were not affected except for results of Networks for 2018 which have been recast below. For more information, refer to Note 2, Significant accounting policies, in the consolidated financial statements included in this Annual Report on Form 20-F.

Networks

For the year ended December 31, 2020 compared to the year ended December 31, 2019

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2020		2019		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales⁽¹⁾	16 852	100.0	18 209	100.0	(7)
Cost of sales	(11 108)	(65.9)	(12 632)	(69.4)	(12)
Gross profit	5 744	34.1	5 577	30.6	3
Research and development expenses	(2 908)	(17.3)	(2 943)	(16.2)	(1)
Selling, general and administrative expenses	(1 745)	(10.4)	(1 929)	(10.6)	(10)
Other operating income and expenses	(156)	(0.9)	(40)	(0.2)	—
Operating profit	935	5.5	665	3.7	41

(1) In 2020, net sales include Mobile Access net sales of EUR 10 630 million, Fixed Access net sales of EUR 1 759 million, IP Routing net sales of EUR 2 768 million and Optical Networks net sales of EUR 1 695 million. In 2019, net sales include Mobile Access net sales of EUR 11 655 million, Fixed Access net sales of EUR 1 881 million, IP Routing net sales of EUR 2 921 million and Optical Networks net sales of EUR 1 752 million.

Net sales

Networks net sales in 2020 were EUR 16 852 million, a decrease of EUR 1 357 million, or 7%, compared to EUR 18 209 million in 2019. The decrease in Networks net sales was primarily due to Mobile Access and, to a lesser extent, IP Routing, Fixed Access and Optical Networks. Mobile Access net sales were EUR 10 630 million in 2020, a decrease of EUR 1 025 million, or 9%, compared to EUR 11 655 million in 2019. IP Routing net sales were EUR 2 768 million in 2020, a decrease of EUR 153 million, or 5%, compared to EUR 2 921 million in 2019. Fixed Access net sales were EUR 1 759 million in 2020, a decrease of EUR 122 million, or 6%, compared to EUR 1 881 million in 2019. Optical Networks net sales were EUR 1 695 million in 2020, a decrease of EUR 57 million, or 3%, compared to EUR 1 752 million in 2019.

The decrease in Mobile Access net sales was primarily due to network deployment and planning services and legacy radio technologies, partially offset by strong growth in 5G.

The decrease in IP Routing net sales was in comparison to a particularly strong 2019, which benefited from pent-up demand for some of its newly introduced FP4 products.

The decrease in Fixed Access net sales was primarily due to declines in copper access technologies, services and digital home, partially offset by growth in fiber access technologies.

The decrease in Optical Networks net sales was in comparison to a particularly strong 2019 and was also driven by temporary supply chain constraints as a result of COVID-19, which impacted the first half of 2020.

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Gross profit

Networks gross profit in 2020 was EUR 5 744 million, an increase of EUR 167 million, or 3%, compared to EUR 5 577 million in 2019. Networks gross margin in 2020 was 34.1%, compared to 30.6% in 2019. The increase in Networks gross profit was primarily due to Mobile Access, partially offset by IP Routing and Fixed Access. The increase in Mobile Access gross profit was primarily due to higher gross margin, partially offset by lower net sales. The higher gross margin in Mobile Access was primarily due to improved 5G gross margin and, to a lesser extent, favorable mix, partially offset by project-related loss provisions. The favorable mix was primarily due to a lower proportion of network deployment net sales. The decrease in both IP Routing and Fixed Access gross profit was primarily due to lower net sales. In 2020, annual variable compensation within Networks cost of sales was higher, compared to 2019.

Operating expenses

Networks research and development expenses were EUR 2 908 million in 2020, a decrease of EUR 35 million, or 1%, compared to EUR 2 943 million in 2019. The decrease in Networks research and development expenses was primarily due to Mobile Access, partially offset by Optical Networks. The lower research and development expenses in Mobile Access was primarily due to progress related to Nokia's cost savings program, partially offset by higher investments in 5G R&D to accelerate our product roadmaps and cost competitiveness. The higher research and development expenses in Optical Networks was primarily due to increased investments related to our Elenion acquisition. In 2020, annual variable compensation within Networks research and development expenses was higher, compared to 2019.

Networks selling, general and administrative expenses were EUR 1 745 million in 2020, a decrease of EUR 184 million, or 10%, compared to EUR 1 929 million in 2019. The decrease in Networks selling, general and administrative expenses was primarily due to Mobile Access, reflecting continued progress related to Nokia's cost savings program and lower travel and personnel-related expenses due to COVID-19. In 2020, annual variable compensation within Networks selling, general and administrative expenses was higher, compared to 2019.

Networks other operating income and expenses was an expense of EUR 156 million in 2020, a change of EUR 116 million compared to an expense of EUR 40 million in 2019. The change in other operating income and expenses was primarily due to the net effect of loss allowances on certain trade receivables.

Operating profit

Networks operating profit was EUR 935 million in 2020, an increase of EUR 270 million, or 41%, compared to EUR 665 million in 2019. Networks operating margin was 5.5% in 2020, compared to 3.7% in 2019. The increase in operating margin was primarily attributable to Mobile Access and, to a lesser extent, Fixed Access, partially offset by IP Routing and Optical Networks.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2019 EURm	% of net sales	2018 EURm	% of net sales	Year-on-year change %
Net sales⁽¹⁾	18 209	100.0	17 404	100.0	5
Cost of sales ⁽²⁾	(12 632)	(69.4)	(11 372)	(65.3)	11
Gross profit⁽²⁾	5 577	30.6	6 032	34.7	(8)
Research and development expenses ⁽²⁾	(2 943)	(16.2)	(3 097)	(17.8)	(5)
Selling, general and administrative expenses ⁽²⁾	(1 929)	(10.6)	(2 142)	(12.3)	(10)
Other operating income and expenses ⁽²⁾	(40)	(0.2)	(20)	(0.1)	—
Operating profit	665	3.7	773	4.4	(14)

(1) In 2019, net sales include Mobile Access net sales of EUR 11 655 million, Fixed Access net sales of EUR 1 881 million, IP Routing net sales of EUR 2 921 million and Optical Networks net sales of EUR 1 752 million. In 2018, net sales include Mobile Access net sales of EUR 11 273 million, Fixed Access net sales of EUR 1 980 million, IP Routing net sales of EUR 2 545 million and Optical Networks net sales of EUR 1 606 million.

(2) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2018 have been recast accordingly. Refer to note 2, Significant accounting policies, in the consolidated financial statements included in this Annual Report on Form 20-F.

Net sales

Networks net sales in 2019 were EUR 18 209 million, an increase of EUR 805 million, or 5%, compared to EUR 17 404 million in 2018. The increase in Networks net sales was primarily due to Mobile Access, IP Routing and, to a lesser extent, Optical Networks, partially offset by Fixed Access. Mobile Access net sales were EUR 11 655 million in 2019, an increase of EUR 382 million, or 3%, compared to EUR 11 273 million in 2018. IP Routing net sales were EUR 2 921 million in 2019, an increase of EUR 376 million, or 15%, compared to EUR 2 545 million in 2018. Optical Networks net sales were EUR 1 752 million in 2019, an increase of EUR 146 million, or 9%, compared to EUR 1 606 million in 2018. Fixed Access net sales were EUR 1 881 million in 2019, a decrease of EUR 99 million, or 5%, compared to EUR 1 980 million in 2018.

The increase in Mobile Access net sales was primarily due to 5G radio technologies and network deployment services, partially offset by decreases in legacy radio technologies.

The increase in IP Routing net sales was primarily driven by our market-leading portfolio, as well as improved supply chain execution.

The increase in Optical Networks net sales was primarily related to our market-leading portfolio.

The decrease in Fixed Access net sales was primarily due to broadband access, digital home and services.

Gross profit

Networks gross profit in 2019 was EUR 5 577 million, a decrease of EUR 455 million, or 8%, compared to EUR 6 032 million in 2018. Networks gross margin in 2019 was 30.6%, compared to 34.7% in 2018. The decrease in Networks gross profit was primarily due to Mobile Access and, to a lesser extent, Fixed Access, partially offset by IP Routing and Optical Networks. The decrease in Mobile Access gross profit was primarily due to lower gross margin, partially offset by higher net sales. The lower gross margin in Mobile Access was primarily due to relatively high 5G product costs, as well as elevated levels of deployment services, consistent with being in the initial phase of 5G. The decrease in Fixed Access gross profit was primarily due to lower gross margin and lower net sales. The increase in IP Routing gross profit was primarily due to higher net sales and higher gross margin. The increase in Optical Networks gross profit was primarily due to higher net sales and higher gross margin. In 2019, Networks gross profit also benefitted from lower incentive accruals, compared to 2018.

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Operating expenses

Networks research and development expenses were EUR 2 943 million in 2019, a decrease of EUR 154 million, or 5%, compared to EUR 3 097 million in 2018. The decrease in Networks research and development expenses was primarily due to Mobile Access. The lower research and development expenses in Mobile Access was primarily due to continued progress related to Nokia's cost savings program, partially offset by higher 5G investments. In 2019, Networks research and development expenses also benefitted from lower incentive accruals, compared to 2018.

Networks selling, general and administrative expenses were EUR 1 929 million in 2019, a decrease of EUR 213 million, or 10%, compared to EUR 2 142 million in 2018. The decrease in Networks selling, general and administrative expenses was primarily due to Mobile Access. The decrease in Mobile Access selling, general and administrative expenses was primarily due to progress related to Nokia's cost savings program. In 2019, Networks selling, general and administrative expenses also benefitted from lower incentive accruals, compared to 2018.

Networks other operating income and expenses was an expense of EUR 40 million in 2019, a change of EUR 20 million compared to an expense of EUR 20 million in 2018.

Operating profit

Networks operating profit was EUR 665 million in 2019, a decrease of EUR 108 million, or 14%, compared to EUR 773 million in 2018. Networks operating margin in 2019 was 3.7% compared to 4.4% in 2018. The decrease in operating margin was primarily attributable to the decrease in Mobile Access and to a lesser extent, Fixed Access, partially offset by higher IP Routing and Optical Networks operating margin.

Nokia Software

For the year ended December 31, 2020 compared to the year ended December 31, 2019

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2020		2019		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	2 656	100.0	2 767	100.0	(4)
Cost of sales	(1 274)	(48.0)	(1 314)	(47.5)	(3)
Gross profit	1 382	52.0	1 453	52.5	(5)
Research and development expenses	(459)	(17.3)	(458)	(16.6)	—
Selling, general and administrative expenses	(397)	(14.9)	(395)	(14.3)	1
Other operating income and expenses	(19)	(0.7)	(11)	(0.4)	—
Operating profit	507	19.1	589	21.3	(14)

Net sales

Nokia Software net sales in 2020 were EUR 2 656 million, a decrease of EUR 111 million, or 4%, compared to EUR 2 767 million in 2019. The decrease in Nokia Software net sales was primarily due to core networks and applications.

Gross profit

Nokia Software gross profit in 2020 was EUR 1 382 million, a decrease of EUR 71 million, or 5%, compared to EUR 1 453 million in 2019. Nokia Software gross margin in 2020 was 52.0%, compared to 52.5% in 2019. The decrease in Nokia Software gross profit was primarily due to lower net sales. In 2020, annual variable compensation within Nokia Software cost of sales was higher, compared to 2019.

Operating expenses

Nokia Software research and development expenses were EUR 459 million in 2020, an increase of EUR 1 million, compared to EUR 458 million in 2019.

Nokia Software selling, general and administrative expenses were EUR 397 million in 2020, an increase of EUR 2 million, or 1%, compared to EUR 395 million in 2019.

Nokia Software other operating income and expenses was an expense of EUR 19 million in 2020, a change of EUR 8 million compared to an expense of EUR 11 million in 2019.

Operating profit

Nokia Software operating profit was EUR 507 million in 2020, a decrease of EUR 82 million, or 14%, compared to EUR 589 million in 2019. Nokia Software operating margin in 2020 was 19.1% compared to 21.3% in 2019. The decrease in Nokia Software operating margin in 2020 was primarily due to lower gross profit.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2019		2018		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	2 767	100.0	2 713	100.0	2
Cost of sales	(1 314)	(47.5)	(1 346)	(49.6)	(2)
Gross profit	1 453	52.5	1 367	50.4	6
Research and development expenses	(458)	(16.6)	(485)	(17.9)	(6)
Selling, general and administrative expenses	(395)	(14.3)	(429)	(15.8)	(8)
Other operating income and expenses	(11)	(0.4)	(3)	(0.1)	—
Operating profit	589	21.3	450	16.6	31

Net sales

Nokia Software net sales in 2019 were EUR 2 767 million, an increase of EUR 54 million, or 2%, compared to EUR 2 713 million in 2018. The increase in Nokia Software net sales was primarily due to applications, and, to a lesser extent, core networks. In applications, growth was driven by digital intelligence, self-organizing networks and services.

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Gross profit

Nokia Software gross profit in 2019 was EUR 1 453 million, an increase of EUR 86 million, or 6%, compared to EUR 1 367 million in 2018. Nokia Software gross margin in 2019 was 52.5%, compared to 50.4% in 2018. The increase in Nokia Software gross profit was primarily due to higher net sales in applications, higher gross margin and higher net sales in core networks, as well as lower incentive accruals in 2019, compared to 2018.

Operating expenses

Nokia Software research and development expenses were EUR 458 million in 2019, a decrease of EUR 27 million, or 6%, compared to EUR 485 million in 2018. The decrease in Nokia Software research and development expenses was primarily due to an increase in R&D productivity achieved through our investments in a Common Software Foundation and the further optimization of resources, as well as lower incentive accruals in 2019, compared to 2018.

Nokia Software selling, general and administrative expenses were EUR 395 million in 2019, a decrease of EUR 34 million, or 8%, compared to EUR 429 million in 2018. The decrease in Nokia Software selling, general and administrative expenses was primarily due to the integration and streamlining of core networks into our existing specialized software salesforce, as well as lower incentive accruals in 2019, compared to 2018.

Nokia Software other operating income and expenses was an expense of EUR 11 million in 2019, a change of EUR 8 million compared to an expense of EUR 3 million in 2018.

Operating profit

Nokia Software operating profit was EUR 589 million in 2019, an increase of EUR 139 million, or 31%, compared to EUR 450 million in 2018. Nokia Software operating margin in 2019 was 21.3% compared to 16.6% in 2018. The increase in Nokia Software operating margin in 2019 was primarily due to higher gross profit, as well as lower research and development and selling, general and administrative expenses.

Nokia Technologies

For the year ended December 31, 2020 compared to the year ended December 31, 2019

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2020		2019		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	1 402	100.0	1 487	100.0	(6)
Cost of sales	(9)	(0.6)	(28)	(1.9)	(68)
Gross profit	1 393	99.4	1 459	98.1	(5)
Research and development expenses	(149)	(10.6)	(111)	(7.5)	34
Selling, general and administrative expenses	(81)	(5.8)	(101)	(6.8)	(20)
Other operating income and expenses	1	0.1	(8)	(0.5)	—
Operating profit	1 164	83.0	1 239	83.3	(6)

Net sales

Nokia Technologies net sales in 2020 were EUR 1 402 million, a decrease of EUR 85 million, or 6%, compared to EUR 1 487 million in 2019. The decrease in Nokia Technologies net sales was primarily due to lower brand licensing net sales and lower catch-up net sales.

Gross profit

Nokia Technologies gross profit in 2020 was EUR 1 393 million, a decrease of EUR 66 million, or 5%, compared to EUR 1 459 million in 2019. The lower gross profit in Nokia Technologies was primarily due to lower net sales, partially offset by higher gross margin. The higher gross margin reflects costs associated with a one-time sale of patent assets that negatively impacted 2019.

Operating expenses

Nokia Technologies research and development expenses in 2020 were EUR 149 million, an increase of EUR 38 million, or 34%, compared to EUR 111 million in 2019. The increase in Nokia Technologies research and development expenses was primarily due to higher investments to drive creation of intellectual property and higher costs to maintain our patent portfolio.

Nokia Technologies selling, general and administrative expenses in 2020 were EUR 81 million, a decrease of EUR 20 million, or 20%, compared to EUR 101 million in 2019. The decrease in Nokia Technologies selling, general and administrative expenses was primarily due to lower licensing-related costs.

Nokia Technologies other operating income and expenses in 2020 was a net income of EUR 1 million, a change of EUR 9 million compared to a net expense of EUR 8 million in 2019.

Operating profit

Nokia Technologies operating profit in 2020 was EUR 1 164 million, a decrease of EUR 75 million, or 6%, compared to an operating profit of EUR 1 239 million in 2019. The decrease in Nokia Technologies operating profit was primarily due to lower gross profit and higher research and development expenses, partially offset by lower selling, general and administrative expenses and a net positive fluctuation in other operating income and expenses. Nokia Technologies operating margin in 2020 was 83.0% compared to 83.3% in 2019.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2019		2018		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	1 487	100.0	1 501	100.0	(1)
Cost of sales	(28)	(1.9)	(22)	(1.5)	27
Gross profit	1 459	98.1	1 479	98.5	(1)
Research and development expenses	(111)	(7.5)	(145)	(9.7)	(23)
Selling, general and administrative expenses	(101)	(6.8)	(127)	(8.5)	(20)
Other operating income and expenses	(8)	(0.5)	(4)	(0.3)	—
Operating profit	1 239	83.3	1 203	80.1	3

Net sales

Nokia Technologies net sales in 2019 were EUR 1 487 million, a decrease of EUR 14 million, or 1%, compared to EUR 1 501 million in 2018. In 2019, the EUR 1 487 million of net sales related entirely to patent and brand licensing. In 2018, EUR 1 476 million of net sales related to patent and brand licensing and EUR 25 million of net sales related to digital health and digital media. The decrease in Nokia Technologies net sales was primarily due to the sale of our digital health business in 2018, partially offset by higher one-time catch-up net sales related to a new license agreement and the sale of certain patents.

Gross profit

Nokia Technologies gross profit in 2019 was EUR 1 459 million, a decrease of EUR 20 million, or 1%, compared to EUR 1 479 million in 2018. The lower gross profit in Nokia Technologies was primarily due to lower net sales and lower gross margin. The lower gross margin reflects costs associated with a one-time sale of patent assets, partially offset by the absence of costs related to digital health, following the sale of our digital health business in 2018.

Operating expenses

Nokia Technologies research and development expenses in 2019 were EUR 111 million, a decrease of EUR 34 million, or 23%, compared to EUR 145 million in 2018. The decrease in Nokia Technologies research and development expenses was primarily due to the absence of costs related to digital health, following the sale of our digital health business in 2018, as well as lower patent portfolio costs.

Nokia Technologies selling, general and administrative expenses in 2019 were EUR 101 million, a decrease of EUR 26 million, or 20%, compared to EUR 127 million in 2018. The decrease in Nokia Technologies selling, general and administrative expenses was primarily due to the absence of costs related to digital health, following the sale of our digital health business in 2018, lower licensing-related litigation costs and lower business support costs.

Nokia Technologies other operating income and expenses in 2019 was a net expense of EUR 8 million, a change of EUR 4 million compared to a net expense of EUR 4 million in 2018.

Operating profit

Nokia Technologies operating profit in 2019 was EUR 1 239 million, an increase of EUR 36 million, or 3%, compared to an operating profit of EUR 1 203 million in 2018. The increase in Nokia Technologies operating profit was primarily due to lower research and development and selling, general and administrative and expenses, partially offset by lower gross profit. Nokia Technologies operating margin in 2019 was 83.3% compared to 80.1% in 2018.

Group Common and Other

For the year ended December 31, 2020 compared to the year ended December 31, 2019

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2020		2019		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	982	100.0	952	100.0	3
Cost of sales	(992)	(101.0)	(918)	(96.4)	8
Gross profit	(10)	(1.0)	34	3.6	—
Research and development expenses	(301)	(30.7)	(312)	(32.8)	(4)
Selling, general and administrative expenses	(266)	(27.1)	(269)	(28.3)	(1)
Other operating income and expenses	52	5.3	57	6.0	—
Operating loss	(525)	(53.5)	(490)	(51.5)	7

Net sales

Group Common and Other net sales in 2020 were EUR 982 million, an increase of EUR 30 million, or 3%, compared to EUR 952 million in 2019. The increase in Group Common and Other net sales was primarily due to Alcatel Submarine Networks, partially offset by Radio Frequency Systems.

Gross profit

Group Common and Other gross profit in 2020 was negative EUR 10 million, a decrease of EUR 44 million, compared to positive EUR 34 million in 2019. The lower gross profit was primarily due to lower gross margin in Alcatel Submarine Networks. Group Common and Other gross margin in 2020 was negative 1.0% compared to positive 3.6% in 2019.

Operating expenses

Group Common and Other research and development expenses in 2020 were EUR 301 million, a decrease of EUR 11 million, or 4%, compared to EUR 312 million in 2019.

Group Common and Other selling, general and administrative expenses in 2020 were EUR 266 million, a decrease of EUR 3 million, or 1%, compared to EUR 269 million in 2019.

Group Common and Other other operating income and expense in 2020 was a net income of EUR 52 million, a change of EUR 5 million compared to a net income of EUR 57 million in 2019.

Operating loss

Group Common and Other operating loss in 2020 was EUR 525 million, an increase of EUR 35 million, compared to an operating loss of EUR 490 million in 2019. The change in Group Common and Other operating loss was primarily attributable to lower gross profit, partially offset by lower research and development expenses.

For the year ended December 31, 2019 compared to the year ended December 31, 2018

The following table sets forth selective line items for the years indicated.

For the year ended December 31	2019		2018		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	952	100.0	1 025	100.0	(7)
Cost of sales	(918)	(96.4)	(871)	(85.0)	5
Gross profit	34	3.6	154	15.0	(78)
Research and development expenses	(312)	(32.8)	(293)	(28.6)	6
Selling, general and administrative expenses	(269)	(28.3)	(200)	(19.5)	35
Other operating income and expenses	57	6.0	93	9.1	—
Operating loss	(490)	(51.5)	(246)	(24.0)	99

Net sales

Group Common and Other net sales in 2019 were EUR 952 million, a decrease of EUR 73 million, or 7%, compared to EUR 1 025 million in 2018. The decrease in Group Common and Other net sales was primarily due to Radio Frequency Systems, partially offset by Alcatel Submarine Networks.

Gross profit

Group Common and Other gross profit in 2019 was EUR 34 million, a decrease of EUR 120 million, or 78%, compared to EUR 154 million in 2018. The lower gross profit was primarily due to Radio Frequency Systems, Alcatel Submarine Networks, as well as investments to drive digitalization of internal processes. Group Common and Other gross margin in 2019 was 3.6% compared to 15.0% in 2018.

Operating expenses

Group Common and Other research and development expenses in 2019 were EUR 312 million, an increase of EUR 19 million, or 6%, compared to EUR 293 million in 2018. The increase in Group Common and Other research and development expenses was primarily due to investments to drive digitalization of internal processes, partially offset by lower incentive accruals in 2019, compared to 2018.

Group Common and Other selling, general and administrative expenses in 2019 were EUR 269 million, an increase of EUR 69 million, or 35%, compared to EUR 200 million in 2018. The increase in Group Common and Other selling, general and administrative expenses was primarily due to investments to drive digitalization of internal processes, partially offset by lower incentive accruals in 2019, compared to 2018.

Group Common and Other other operating income and expense in 2019 was a net income of EUR 57 million, a change of EUR 36 million compared to a net income of EUR 93 million in 2018. The net negative fluctuation in other operating income and expenses was primarily due to lower gains in venture fund investments.

Operating loss

Group Common and Other operating loss in 2019 was EUR 490 million, an increase of EUR 244 million, compared to an operating loss of EUR 246 million in 2018. The change in Group Common and Other operating loss was primarily attributable to lower gross profit, higher selling, general and administrative expenses, a negative fluctuation in other operating income and expense, and higher research and development expenses.

Liquidity and capital resources

Financial position

As of December 31, 2020, our total cash and current financial investments (defined as cash and cash equivalents and current financial investments) equaled EUR 8 061 million, an increase of EUR 2 054 million, compared to EUR 6 007 million as of December 31, 2019. The increase was primarily attributable to net cash inflow from operating activities of EUR 1 759 million and proceeds from long-term borrowings of EUR 1 595 million, partially offset by capital expenditure of EUR 479 million, repayment of long-term borrowings of EUR 246 million, and payment of principal portion of lease liabilities of EUR 234 million. As of December 31, 2018, our total cash and current financial investments equaled EUR 6 873 million.

As of December 31, 2020, our net cash and current financial investments (defined as total cash and current financial investments less long-term and short-term interest-bearing liabilities) equaled EUR 2 485 million, an increase of EUR 755 million, compared to EUR 1 730 million as of December 31, 2019. The increase was mainly attributable to net cash inflow from operating activities of EUR 1 759 million, partially offset by capital expenditure of EUR 479 million, and payment of the principal portion of the lease liabilities of EUR 234 million. As of December 31, 2018, our net cash and current financial investments equaled EUR 3 053 million.

As of December 31, 2020, our cash and cash equivalents equaled EUR 6 940 million, an increase of EUR 1 030 million compared to EUR 5 910 million as of December 31, 2019. As of December 31, 2018, our cash and cash equivalents equaled EUR 6 261 million.

Cash flow

2020

Our cash inflow from operating activities in 2020 was EUR 1 759 million, an increase of EUR 1 369 million compared to a cash inflow of EUR 390 million in 2019. The increase was primarily attributable to a decrease in cash tied-up to net working capital of EUR 710 million in 2020 compared to EUR 1 788 million cash tied-up in 2019, and net profit, adjusted for non-cash items, of EUR 2 751 million, an increase of EUR 113 million compared to EUR 2 638 million in 2019. The primary driver for the decrease in net working capital tied-up was related to a decrease in liabilities of EUR 845 million compared to a decrease of EUR 2 232 million in 2019, and a decrease in inventories of EUR 553 million compared to a decrease of EUR 285 million in 2019. The decrease in liabilities was primarily attributable to a decrease in trade payables, driven by lower inventory levels, a decrease in deferred revenue and restructuring and associated cash outflows, partially offset by an increase in provisions and an increase in liabilities related to employee benefits. The decrease in inventories was attributable to improved inventory management and temporary dynamics related to COVID-19. In 2020, the increase in receivables was EUR 418 million compared to a decrease of EUR 159 million in 2019.

In 2020, cash inflow from operating activities included paid taxes of EUR 280 million, a decrease of EUR 236 million compared to EUR 516 million in 2019; interest received of EUR 33 million compared to EUR 57 million in 2019; and interest paid of EUR 35 million, compared to EUR 1 million in 2019.

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The cash outflow from investing activities equaled EUR 1 517 million in 2020, an increase of EUR 1 350 million compared to EUR 167 million cash outflow in 2019. Cash outflow from investing activities was primarily driven by cash outflow of EUR 1 154 million due to purchase of current financial investments in 2020, compared to EUR 473 million in 2019, and cash outflow due to the capital expenditure of EUR 479 million in 2020 compared to EUR 690 million in 2019.

Major items of capital expenditure in 2020 included investments in R&D equipment, test equipment, hardware for telecommunication and cloud environment, plants, buildings and construction for transformation projects, and repair or improvements of sites.

In 2020, our cash inflow from financing activities was EUR 883 million, compared to EUR 479 million cash used in 2019. The cash inflow was primarily driven by cash inflow from long-term borrowings of EUR 1 349 million, partially offset by paid dividends of EUR 148 million, paid by subsidiaries of the Group to non-controlling interest, compared to EUR 570 million in 2019, primarily relating to dividends to equity holders of the parent. The payments of the principal portion of lease liabilities were EUR 234 million in 2020 compared to EUR 221 million in 2019.

2019

Our cash inflow from operating activities in 2019 was EUR 390 million, an increase of EUR 30 million compared to a cash inflow of EUR 360 million in 2018. The increase was primarily attributable to net profit, adjusted for non-cash items, of EUR 2 638 million, an increase of EUR 880 million compared to EUR 1 758 million in 2018, partially offset by EUR 1 788 million cash tied-up to net working capital in 2019 compared to EUR 943 million cash tied-up in 2018. The primary driver for the increase in net working capital tied-up was related to a decrease in liabilities of EUR 2 232 million compared to a decrease of EUR 645 million in 2018, and a decrease in inventories of EUR 285 million compared to an increase of EUR 544 million in 2018. The decrease in liabilities was primarily attributable to a decrease in trade payables, restructuring and associated cash outflows, a decrease in liabilities related to employee benefits and a decrease in deferred revenue. The decrease in inventories was attributable to improved inventory management. The decrease in receivables was EUR 159 million compared to a decrease of EUR 246 million in 2018.

In 2019, cash flow from operating activities included paid taxes of EUR 516 million, an increase of EUR 152 million compared to EUR 364 million in 2018; interest received of EUR 57 million, a decrease of EUR 11 million compared to EUR 68 million in 2018; and interest paid of EUR 1 million, a decrease of EUR 158 million compared to EUR 159 million in 2018.

The cash outflow from investing activities equaled EUR 167 million in 2019, a decrease of EUR 148 million compared to EUR 315 million cash outflow in 2018. Cash outflow from investing activities was primarily driven by cash outflow due to the capital expenditure of EUR 690 million partially offset by net cash inflow of EUR 518 million resulting from proceeds from maturities and sale of current financial investments of EUR 991 million and purchase of current financial investments of EUR 473 million.

Major items of capital expenditure in 2019 included investments in R&D equipment, test equipment, hardware for telecommunication and cloud environment, plants, buildings and construction for transformation projects, and repair or improvements of sites.

In 2019, our cash outflow from financing activities was EUR 479 million a decrease of EUR 490 million in comparison to EUR 969 million cash outflow in 2018. The decrease in cash outflow was primarily driven by paid dividends of EUR 570 million compared to EUR 1 081 million in 2018, partially offset by net cash from long-term borrowings of 273 million and by payments of the principal portion of lease liabilities of EUR 221 million.

Financial assets and debt

As of December 31, 2020, our net cash and current financial investments equaled EUR 2 485 million consisting of EUR 8 061 million in total cash and current financial investments, and EUR 5 576 million of long-term and short-term interest-bearing liabilities.

We hold our total cash and current financial investments predominantly in euro. Our current financial investments mainly include high-quality money market and fixed income instruments with strict maturity limits. We also have a EUR 1 500 million revolving credit facility available for liquidity purposes. The facility has no financial covenants and remains undrawn.

As of December 31, 2020, our interest-bearing liabilities consisted of EUR 350 million notes due in 2021, USD 500 million notes due in 2022, EUR 750 million notes due in 2024, EUR 500 million notes due in 2025, a EUR 500 million R&D loan from the European Investment Bank maturing in 2025, a EUR 250 million R&D loan from the Nordic Investment Bank with final maturity in 2025, EUR 750 million notes due in 2026, USD 500 million notes due in 2027, EUR 500 million notes due in 2028, USD 74 million notes due in 2028, USD 206 million notes due in 2029, USD 500 million notes due in 2039, and EUR 322 million of other liabilities. The EUR notes maturing in 2021, 2024, 2025, 2026, and 2028 as well as the USD notes maturing in 2022, 2027, and 2039 are issued by Nokia Corporation, while the USD notes maturing in 2028 and 2029 are issued by Lucent Technologies Inc., a predecessor to Nokia of America Corporation (Nokia's wholly-owned subsidiary, formerly known as Alcatel-Lucent USA Inc.). The loans from the Nordic Investment Bank and from the European Investment Bank are drawn by Nokia Corporation. Refer to Note 23, Interest-bearing liabilities, of our consolidated financial statements included in this Annual Report on Form-20 for further information regarding our interest-bearing liabilities.

In February 2020, we drew a EUR 500 million R&D loan from the European Investment Bank. The loan facility agreement was signed in August 2018 and the loan will mature in February 2025.

In May 2020, we executed capital markets transactions, including issuances of EUR 500 million notes due in 2025 and EUR 500 million notes due in 2028 and, pursuant to a cash tender offer, a purchase of EUR 150 million of notes due in 2021. The notes were issued under our EUR 5 billion Euro Medium-Term Note Programme.

In June 2020, we exercised our option to extend the maturity date of the EUR 1 500 million revolving credit facility. Subsequent to the extension, EUR 1 412 million of the facility has its maturity in June 2025 with a one-year extension option remaining, and EUR 88 million of the facility has its maturity in June 2024.

We consider that with EUR 8 061 million of total cash and current financial investments, and with our undrawn revolving credit facility, we have sufficient funds to satisfy our future working capital needs, capital expenditure, R&D investments, structured finance, venture fund commitments, acquisitions and debt service requirements, at least through 2021. We further consider that with our current credit ratings of BB+ by Standard & Poor's, Ba2 by Moody's, and BBB- by Fitch, we have access to the capital markets should any funding needs arise in 2021.

We aim to re-establish investment grade credit ratings.

Off-balance sheet arrangements

There are no material off-balance sheet arrangements that have, or are reasonably likely to have, a current or future effect on our financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that are material to investors, except for the purchase obligations and lease commitments, as well as guarantees and financing commitments disclosed in Note 30, Commitments, contingencies and legal proceedings, and in Note 36, Financial risk management, of our consolidated financial statements included in this Annual Report on Form 20-F.

Venture fund investments and commitments

We make financing commitments to a number of unlisted venture funds that make technology-related investments. The majority of the investments are managed by NGP Capital, a global venture capital firm backing companies that are creating the connected world through sensors, 5G mobile, hybrid cloud and intelligent technology.

As of December 31, 2020, our venture fund investments equaled EUR 745 million, compared to EUR 740 million as of December 31, 2019. Refer to Note 24, Fair value of financial instruments, and Note 36, Financial risk management, of our consolidated financial statements included in this Annual Report on Form 20-F for further information regarding fair value of our venture fund investments.

As of December 31, 2020, our venture fund commitments equaled EUR 189 million, compared to EUR 244 million as of December 31, 2019. As a limited partner in venture funds, we are committed to capital contributions and entitled to cash distributions according to the respective partnership agreements and underlying fund activities. Refer to Note 30, Commitments, contingencies and legal proceedings, of our consolidated financial statements included in this Annual Report on Form 20-F for further information regarding commitments and contingencies.

Treasury policy

Treasury activities are governed by the Nokia Treasury Policy approved by the President and CEO and supplemented by operating procedures approved by the CFO, covering specific areas such as foreign exchange risk, interest rate risk, credit risk and liquidity risk. The objective of treasury's liquidity and capital structure management activities is to ensure that we have sufficient liquidity to go through unfavorable periods without being severely constrained by the availability of funds to execute Nokia's business plans and implement Nokia's long-term business strategy. We are risk-averse in our treasury activities.

Foreign exchange impact

We are a company with global operations and net sales derived from various countries, invoiced in various currencies. Therefore, our business and results from operations are exposed to changes in exchange rates between the euro, our reporting currency, and other currencies, such as the US dollar and the Chinese yuan. The magnitude of foreign exchange exposures changes over time as a function of our net sales and costs in different markets, as well as the prevalent currencies used for transactions in those markets. Significant changes in exchange rates may also impact our competitive position and related price pressures through their impact on our competitors.

To mitigate the impact of changes in exchange rates on our results, we hedge material net foreign exchange exposures (net sales less costs in a currency) typically with a hedging horizon of approximately 12 months. For the majority of these hedges, hedge accounting is applied to reduce income statement volatility.

In 2020, approximately 25% of Group net sales and total costs were denominated in euro, and approximately 50% of Group net sales and total costs were denominated in US dollars. In 2020, approximately 5% of Group net sales and total costs were denominated in Chinese yuan.

The average currency mix for Group net sales and total costs:

Currency	2020		2019	
	Net sales	Total costs	Net sales	Total costs
EUR	~25 %	~25 %	~25 %	~25 %
USD	~50 %	~50 %	~50 %	~45 %
CNY	~5 %	~5 %	~5 %	~10 %
Other	~20 %	~20 %	~20 %	~20 %
Total	~100 %	~100 %	~100 %	~100 %

For the full year 2020 compared to the previous year, the US dollar was weaker against the euro. The weaker US dollar in 2020 on a year-on-year basis had a negative impact on our net sales reported in euros. However, the weaker US dollar also contributed to slightly lower costs of sales and operating expenses on a year-on-year basis. In total, before hedging, the weaker US dollar on a year-on-year basis had a slightly negative effect on our operating profit in 2020.

During 2020, the Chinese yuan depreciated against the euro on a year-on-year basis and this had a slightly negative impact on our net sales reported in euros. However, the weaker Chinese yuan also contributed to slightly lower cost of sales and operating expenses on a year-on-year basis. In total, before hedging, the slightly weaker Chinese yuan on a year-on-year basis had an approximately neutral impact on our operating profit in 2020.

For a discussion of the instruments used by us in connection with our hedging activities, refer to Note 36, Financial risk management, of our consolidated financial statements included in this Annual Report on Form 20-F. Refer also to "Operating and financial review and prospects – Risk factors".

Our response to COVID-19

The COVID-19 pandemic changed the world in ways we didn't anticipate or expect. Together, we faced a once-in-a-generation struggle that called governments, regulators, businesses, NGOs, groups and individuals to do everything they could to keep themselves and communities safe, and economies resilient and connected. In this section we focus on the impact of COVID-19 on our employees, communities and the industry. For the impact of COVID-19 on our operations and financial performance, refer to "Operating and financial review" section.

The health of our employees and their families is our first priority

The pandemic is of course first and foremost a health emergency. While Nokia was in a strong position to support the vital networks that enabled the world to keep working, learning and communicating, protecting the health of our employees and their families was our highest priority.

We took, and continue to take, several measures to protect our employees, their families, and our customers while keeping our work and networks going. We provide more details about this in the "Sustainability and corporate responsibility" section.

As the pandemic spread, internet traffic surged

The pandemic had a fundamental impact on network traffic volumes. As people started spending more time at home, working, watching TV, and gaming, it put an unexpected strain on networks around the world.

In 2020, global internet traffic and traffic in service provider networks experienced a year's worth of growth in just a few weeks. Statistics show:

- 30–50% increase in network traffic;
- 50–100% increase in video streaming traffic;
- 350% increase in videoconferencing traffic;
- 100–150% increase in gaming traffic; and
- 40–50% increase in Distributed Denial of Service (DDoS) traffic that renders websites or online services inoperable.

Over time, networks became more critical in all aspects of life. The virtually uninterrupted network performance during the pandemic's early days was a testament to the performance and resilience of service provider networks around the world.

We enabled networks to stay online

The unwavering commitment of Nokia team members and the extraordinary efforts of all our customers – service providers, webscales and large digital enterprises – were key for keeping networks running and people online.

Almost all business decisions in 2020 were affected by the pandemic to some degree, but some deployments were more directly COVID-19 influenced. In the earliest days of 2020, our team assisted in opening the first 5G base station at one of the key epidemic hospitals in Wuhan in just two days. In rural California, we met a customer's goal of providing a wireless solution that can deliver high-speed broadband to people who did not have access previously and address traffic needs driven by COVID-19. In Pennsylvania, we enabled a large medical center to connect ventilators and inpatient beds for real-time patient monitoring. In India, we completed the world's largest Dynamic Spectrum Refarming deployment to improve network coverage and enhance connectivity to meet growing data demand driven by COVID-19. In Algeria, we implemented ultra-high network capacity technology to meet growing mobile traffic demand. In Sri Lanka and the Philippines, we deployed next generation fiber networks to bring ultra-fast broadband access to homes during the unprecedented events of 2020. And in Chile, the pandemic has increased the value of our IMPACT Connected Device Platform, which enables remote management of networks and IoT devices.

Beyond our existing portfolio, we applied our technical expertise to create new ways of connecting and working to ease the strain of the pandemic. We created a camera that takes the temperature of 20 people every 30 milliseconds and incorporated it into a solution that allows real-time health monitoring and tracking, providing organizations with an automated, simple and scalable approach to identify COVID-19 symptoms and monitor mask compliance for facilities with thousands of people.

We introduced artificial intelligence technology to optimize our supply chain. This enabled our customers to receive their orders in the shortest amount of time and keep local households online and connected.

Re-establishing the new normal

By September, traffic levels settled down to 20–30% above the pre-pandemic level, albeit with expected seasonal growth. We believe that these elevated traffic levels could be the "new normal" for the near future. Many believe that the level of usage seen in 2020 was an acceleration of trends already underway before the pandemic.

Having experienced a once-in-a-lifetime pandemic, all operators are in a position to reconsider past assumptions and take a fresh look at their future investment strategies. We have captured additional insight into the global 2020 network usage and how service providers can effectively prepare for the new normal in the Nokia Deepfield Network Intelligence Report 2020.

Working together to fight the pandemic around the world

Nokia team members came together in myriad ways to provide support to those directly affected by the pandemic:

One example was our US-based “Apart Together” campaign that sold t-shirts to raise funds.

In Finland, we participated in the “lunch for children” campaign and donated goods to local organizations to ensure quality food was available to underprivileged families.

Across India, we worked to provide food to those most in need in local communities.

In Belgium and Greece, we 3-D printed special touch-free door handles for the office doors to help fight the virus’ spread.

In Hungary, we donated laptops to foundations and developed a help-desk to support local schools and remote education. We also organized training for parents working from home with children.

In Ireland, we 3-D printed and donated mask strips.

In Romania, we 3-D printed and donated face shields.

In Singapore, we helped improve internet connectivity for dormitories and community care facilities to ensure that they stay connected with robust and stable internet access.

All Nokia colleagues were encouraged to vote for how the Nokia Coronavirus Global Donation Fund of USD 500 000 should be shared in their respective regions.

Sustainability and corporate responsibility

We believe the positive impact of the technology we create and deliver far outweighs the potential negative impacts and provides our greatest positive contribution to the United Nations Sustainable Development Goals (SDGs). Communications technologies provide access to better healthcare, education and greater economic opportunity, enable more efficient industrial, agricultural and resource use, and contribute to a more equitable, secure society, and a cleaner, safer planet.

Our products and solutions are designed to drive social, environmental, and economic progress. Furthermore, we continue to develop processes, policies and programs that align with globally recognized ethical and responsible business practices and frameworks.

Sustainability governance

Sustainability issues are reviewed by the Board of Directors as part of an annual sustainability review, which includes a review of the sustainability strategy, key targets and actions, and performance. Nokia Group Leadership Team and its members are responsible for the management and implementation of sustainability-related activities within their individual organizations when relevant to their responsibility area. In 2020, the Chief Marketing Officer had overall responsibility for sustainability in the Group Leadership Team.

The alignment of sustainability strategy, priorities, and the implementation of sustainability activities across Nokia is steered by our Sustainability Council. The Council consists of senior leaders, including management representatives with climate-related responsibilities, from units such as product development, real estate, and procurement. Responsibilities of the Council include the assessment and monitoring of climate-related topics, review of the materiality, targets and overall performance of various sustainability-related matters and giving additional exposure to sustainability risks and opportunities. In 2020, the Council was managed by our Head of Sustainability who reported to the Chief Marketing Officer. The Council typically meets bi-annually, and more frequently upon request. Day-to-day sustainability issues and activities are orchestrated by a dedicated corporate team and subject matter experts in different functions. Sustainability-related actions and programs all have their named responsible owners.

Risk management

Sustainability risks are part of our Enterprise Risk Management framework with multi-disciplinary company-wide risk identification, assessment, and management processes. We recognize and aim to mitigate the potential risks and negative impacts associated with our business whether related to technology, supply chain, climate or people, while also driving the opportunities within and beyond our business in order to contribute to achieving the SDGs. Our Code of Conduct defines our way of working and we have clear policies and processes for each identified material sustainability risk.

The main features of our risk management systems are described as part of our Corporate governance statement (see Corporate Governance—Risk management, internal control and internal audit functions at Nokia). In addition, the “Risk factors” section of this Annual Report on Form 20-F provides discussion on the most important risk factors affecting our operations. These risks include sustainability-related threats such as: risks related to product safety, environmental accidents, health and privacy and security, including cybersecurity threats; risk of potential human rights abuse through misuse of the technology we provide; risk of potential lack of proper respect for human rights, fair labor conditions, the environment and communities in our operations and supply chains; risk of non-compliance with regulations or our supplier and customer requirements; violation of ethical standards, including our Code of Conduct; labor unrest and strikes; inability to retain, motivate, develop and recruit appropriately skilled employees; purchasing boycotts and public harm to our brand; risks related to issues with tariffs and taxation, including tax disputes; and disruptions in our manufacturing, service creation, delivery, logistics or supply chain caused, for instance, by natural disasters, military actions, civil unrest, public health and safety threats (including disease outbreaks), many of which may be fueled by the adverse effects resulting from climate change.

Strategy and targets

At the core of our sustainability approach is the belief that the purpose of technology is to improve people's lives. During 2020, we launched our new sustainability strategic approach, which is focused on the areas we believe will have the greatest impact on sustainable development and our business. Although we need to be agile with our sustainability approach, we have identified three main cornerstones through which we can truly improve people's lives with technology and on which we need to focus to maintain our leading position in industry sustainability: climate, integrity and culture.

In terms of the fundamental necessities of responsible business, we also need to ensure we continuously develop our existing sustainability-related housekeeping practices to create value and comply with stakeholder requests, legal requirements, customer expectations and increased demand for efficiency and transparency. The housekeeping practices provide a solid foundation to our sustainable development as a company, including areas such as: operational environmental management and circularity; health and safety; labor practices in our own operations; responsible sourcing; and preventing the misuse of technology.

In 2020, we had 20 short- and long-term sustainability targets. The key targets are listed in the table. Other targets are set for specific material sustainability topics and can be found as part of our 2020 People & Planet report. We take a systematic approach to identifying sustainability risks and opportunities, and we aim to minimize the negative impact of our operations and to find new opportunities for revenue increase and cost savings. Sustainability with targets, activities and follow-up processes is included in various business activities and related strategies. Our business model is described in the "Business overview" section of this Annual Report on Form 20-F.

Our key sustainability targets

Focus area	Target	Target status
Improving lives with technology	Helping our customers connect the next billion subscriptions between 2016 and 2022	Achieved
Climate	Science Based Target (Scope 1 and 2): Reduce GHG emissions from our own operations by 41% between 2014 and 2030	On track
	Science Based Target (Scope 3): Reduce GHG emissions from our products by 75% between 2014 and 2030	On track
Integrity	Achieve 95% completion rate for Ethical Business Training in 2020	Achieved
Culture	Increase the share of women in leadership by 25% between 2016 and 2020	Not achieved

Dealing with the COVID-19 pandemic

As a global business, many aspects of our operations have been impacted by the ongoing COVID-19 pandemic. Telecommunications is an essential service and one that became even more so as countries progressively locked down in 2020 to reduce the spread of the virus. We have had to adapt our ways of working to ensure that our people remain safe while our operations continue. This has been led centrally by a global crisis and continuity management team with regional and country crisis management teams ensuring local implementation.

Our primary aim was to limit the likelihood of exposure for Nokia staff and those working for us. This means that in very early phases of the pandemic we transferred all our employees to a temporary work from home policy regardless of whether they were able to conduct their work remotely or not. Other actions included restricting travel, imposing self-quarantine requirements on return for employees who have been traveling, prohibiting visitors from accessing Nokia sites, eventually closing virtually all Nokia sites, and only allowing access to Nokia sites to a small number of people involved in critical work that could not be conducted offsite.

In order to facilitate operations where remote work is not possible, including field teams and factory operations, guidelines and mitigating controls were implemented. As countries have eased restrictions, we have made changes both to the physical working environments and our procedures for their use, ensuring that physical distancing is maintained and hygiene levels remain high, and that processes are in place for both infection management and contact tracing. We continually update our guidance as the situation develops.

We recognize that the pandemic impacts our employees' work and personal lives in diverse ways. We offer flexible working hours so people can also fulfill their personal responsibilities during these challenging times. We conducted our 2020 annual salary review cycle and continued to pay incentives to our employees where applicable. We have continued to pay salary and benefits for employees who cannot work from home and whose work site is closed and ensured additional paid leave and sick leave for employees who are in self-quarantine and cannot work remotely. We have also kept frequent contact with our colleagues who were on an international assignment and supported them with accommodation, medical coverage and registration to local embassies.

As most of our employees continue working remotely, we are providing guidance on how staff can maintain a healthy work-life balance and look after their physical and mental well-being. For example, our Personal Support Service provides our employees with the opportunity of attending virtual learning events on a broad range of health and well-being related topics, as well as professional, confidential support. We introduced separate people management guidelines during the crisis, and we ensure our employees, line managers and senior leaders are updated on the pandemic guidelines via multiple channels: webcasts, newsletters, line manager and Human Resources calls, and a dedicated COVID-19 information hub. We also ran several employee surveys to track how our employees were coping with the pandemic, share experiences and provide an additional channel for feedback and to request guidance and support.

Amid the crisis, we also launched our COVID-19 donation fund in March 2020 and engaged with local organizations such as hospitals, community groups and non-governmental organizations in 48 countries, helping them fight the pandemic and mitigate its impacts.

Improving lives with technology

Our technology connects people to the services, places, opportunities and other people that matter to them. One of our key targets includes helping our customers to connect the next billion subscribers by 2022, compared to approximately 5.5 billion at the end of 2016. The target is measured by number of subscriptions in Nokia radio customers' networks. In 2020, the radio networks we supplied to our customers served around 6.6 billion subscriptions worldwide, meaning we reached the target ahead of the targeted timeline. In addition, our approach has been validated in the market with 1 545 mission-critical customers and our private wireless solutions are used by 260 customers globally.

During 2020, we announced several new deals that will bring connectivity to the most rural and underserved areas, making sure small businesses, farms and schools are connected. We also continued our shared value project with UNICEF in Kenya. The aim of the project is to bring together all relevant parties in collaboration to demonstrate the best solutions to connect the unconnected schools to digital learning in Kenya, and to enable accessible, quality and inclusive education through digital connectivity particularly for girls and disabled children. The project started in 2018 and the first schools were connected in September using our Fixed Wireless Access solution.

Combating climate change

Climate change remains a significant risk to society. We recognize that we provide products and services globally that may affect the environment as manufacturing, distributing, and operating these products require energy and other resources. The most material climate-related opportunities and risks are related to our ability to help other industries to reduce their emissions and the energy efficiency of our products. We believe that the opportunities our technology provides to our customers, industry and society, and the measures we have taken in our operations can positively contribute to the fight against climate change. Our own operations are not very sensitive to the changes in energy pricing or natural catastrophes. However, climate change can impact our customers and supply chain, as well as the global economy, political and social stability.

We have utilized climate-related scenarios to support the review of our climate-related risks, opportunities, and related implications to our business. In our analysis, we applied global warming scenarios of 1.5°C and 2.0°C, based on 2DS scenario by the International Energy Association's and RCP2.6 (Representative Concentration Pathway) scenario by the Intergovernmental Panel on Climate Change. The results of this analysis have provided information for our risks and opportunity analysis, stressed the need for greater and more urgent greenhouse gas (GHG) emission reduction activities and served as a basis for our Science Based Target setting. We have also aligned our climate-related disclosures in our CDP report according to the guidance of the Task Force on Climate-related Financial Disclosures. CDP is a global organization that runs a bespoke global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts. We publish our detailed GHG emissions also in our People & Planet report.

We constantly strive to drive down the energy required by our products in use in our customers' communications networks, helping them to reduce their carbon footprint as this is by far the greater part of our own carbon footprint. We have delivered zero emission products to over 150 customers around the world. Modernization of legacy networks drives improved energy efficiency. The customer base station sites we modernized in 2020 used on average 54% less energy than those where our customers did not modernize. Not only does this reduce environmental impacts, it also provides an improved financial upside for our customers.

During 2020, we worked hard to recalibrate our existing long-term science-based targets in line with the goal to limit rises in global average temperatures to 1.5°C. This is a commitment we made in 2019, and we expect to communicate our updated science-based targets in early 2021. The existing targets seek to reduce emissions from sold products in use by 75% and operational emissions by 41% by 2030, as compared to the 2014 baseline. At the end of 2020, we were on track to reach the targets by 2030. The progress of these targets is linked to the pricing mechanism of our Revolving Credit Facility loan announced in 2019.

We have in place a robust environmental management system and environmental policy, supported by documented processes and procedures globally to ensure implementation. The system helps us to monitor our progress and identify needed improvements. Our own operational footprint is certified under the ISO 14001 environmental management system standard and in 2020 the coverage of employees within the scope of that certification was 90%. Circular economy and waste reduction are also key in our work and we offer refurbishment, reuse, and recycling of older equipment as an integral component of the product lifecycle management. In 2020, we sent around 4 700 metric tons of old telecommunications equipment for materials recovery and we refurbished or reused approximately 79 400 units with a combined total weight of 570 metric tons.

Conducting our business with integrity

Our long-standing reputation for integrity is our most important asset. At Nokia, every employee is responsible and accountable for upholding our high ethical values. Trust has never been more important, and we strive every day to earn and to keep the trust of our customers, governments, employees and other stakeholders with whom we interact. In these challenging times, our unwavering commitment to integrity remains steadfast.

Our Code of Conduct is the foundation upon which this commitment rests. Our Code sets out four straightforward defining principles: we follow the laws where we do business; we set an example for one another by being honest and fair; we promote a culture of integrity through mutual respect and trust; and we hold each other accountable to adhere to the Code and report potential violations.

These guiding principles are supplemented by 14 key business policy statements covering critical issues and risks we face: Improper Payments/Anti-Corruption, Conflicts of Interests, Fair Competition, Privacy, Dealing with Government Officials, Intellectual Property & Confidential Information, Working with Third Parties, Trade Compliance, Insider Trading, Health, Safety & Labor Conditions, Controllership, Fair Employment Practices, Human Rights, and Environment. An additional Code of Ethics sets out further expectations of our CEO and senior executive financial officers. Our Third-Party Code of Conduct applies to the various third parties with whom we work and clearly states our expectations of them on ethical conduct. Our codes are further supplemented by policies, procedures and guidance documents covering a range of topics such as third-party screening procedures, corporate hospitality, and more.

In 2020, we continued our longstanding practice of providing annual training to our employees on ethical business practices, as well as other important topics such as quality, health, safety, and well-being. Our Ethical Business Training was completed by 96.2% of our employees, surpassing the target of 95%. In response to COVID-19, we redoubled our efforts to stay connected with employees worldwide, leveraged the use of internal social media channels, increased our communications on our global Ombuds program, and conducted various other virtual activities. Throughout 2020, we closely monitored and responded to the impact of the pandemic on our compliance program, shifting our resources and priorities as circumstances dictated, and planning for continued monitoring and action as required.

Anti-corruption and bribery

We do not engage in, nor do we tolerate, corrupt behavior by our employees or suppliers. We employ a multi-faceted approach to prevent corruption. We have clear and unequivocal policies concerning improper payments, facilitation payments, gifts and hospitality, sponsorships and donations, and other areas of risk for public and private corruption.

We carry out training and regularly communicate to our employees regarding legal and compliance risks, and we review these risks and our mitigation measures with the company's senior leadership and Audit Committee. We conduct periodic audits and risk assessments to ensure that we identify and respond to corruption risks across our operations. Our Compliance Controls Framework (CCF) reviews are comprehensive, bottom-up assessments that identify gaps or shortcomings in our compliance program, and we develop and implement risk mitigation plans in response to each review. We also carry out risk-based due diligence and monitoring procedures for different categories of third parties (such as suppliers and business partners) to assess and to manage potential risks related to engaging and working with them. In addition, we screen our end-customers to assess possible legal, compliance and reputational risks associated with them (including, but not limited to, sanctions and money laundering risks).

The Anti-Corruption Center of Excellence (CoE) is a dedicated group within our compliance team that assesses and monitors risks associated with commercial third parties and the provisioning of hospitality, sponsorships, and donations on behalf of Nokia. The activities of the CoE are digitalized and tool-based, including for example monitoring and online training. Third parties are not only expected to adhere to our Third-Party Code of Conduct; they are required annually to sign our anti-corruption certification.

We provide a range of trainings and resources that include comprehensive online courses, targeted micro-learning, compliance job aids, and before the pandemic also face-to-face training. In 2020, anti-corruption training was delivered to business groups, regional groups, Nokia service companies, joint ventures and other stakeholders with over 3 000 individuals trained. We also celebrated Nokia Integrity Day in October with a variety of online activities, including two virtual global events hosted by our Chief Compliance Officer and a compliance panel. This gave employees around the world the opportunity to review real high-risk case scenarios and engage with the compliance team to ask questions and discuss compliance topics. Integrity Day celebrates Nokia's commitment to integrity and seeks to draw all employees into a conversation about the importance of this core value.

Oversight and grievance mechanisms

Our Board of Directors, Audit Committee, and executive leadership team all provide oversight of our ethics and compliance program. Our Chief Compliance Officer provides periodic reports and updates concerning compliance programs, investigations, and evolving external enforcement and risk trends. Employees are expected and encouraged to report concerns about ethical misconduct or potential violations of law, our Code of Conduct or our company policies. We provide numerous channels and mechanisms to facilitate such reporting and strive to ensure that employees feel comfortable reporting concerns, including means to report anonymously where permissible by local law. Nokia's global Ombuds program helps drive our 'speak up' culture and allays any concerns employees may feel about potential reprisal for having filed a report.

In 2020, we received 776 concerns, of which 329 were investigated by our Business Integrity Group as alleged violations of our Code of Conduct. 106 of such integrity allegations were substantiated with cause found after investigations. Specifically, two concerns were received as alleged violations of our anti-bribery policies, involving third parties. One of these concerns was not substantiated, and the other investigation was not concluded by the end of 2020. We also implemented corrective actions including 16 dismissals and 20 written warnings following these and other investigations. Beyond individual discipline, these investigations resulted in detailed root cause analysis, and remedial measures and improvements were identified and monitored for implementation, thereby ensuring constant improvement.

Data privacy and security

We have established a comprehensive company-wide privacy program based on relevant laws, best practices, and standards. This program is supported by, and aligned with, corporate, business-group, and central functions-level policies and processes. We aim to mitigate privacy risk in relation to the data we collect, process, and store. We observe the concept of data minimization, meaning we endeavor only to collect personal data that is necessary for the purposes for which they are collected and to retain such data for no longer than is necessary. We implement appropriate controls to ensure that only persons with a clear and justifiable need to know can access personal data. We have formal processes and procedures in place to manage and mitigate any related risk to data subjects in the event of a personal data breach. These processes also include mechanisms to communicate in a timely fashion with supervisory authorities, should that be required. We measure and monitor privacy maturity and ambition by undertaking privacy maturity assessments across the business. A program of privacy awareness and training ensures we continuously and effectively address areas of highest privacy impact.

Security is a key concern in 5G, IoT and other new technologies. We aim to develop products and services that meet or surpass the applicable security standards. Nevertheless, we and our products may be subject to cybersecurity breaches, including those resulting from hacking, viruses, malicious software, unauthorized modifications, or other activities that may cause potential security risks and other harm to us, our customers or consumers, and other end-users of our products and services. We have developed and implemented processes and tools for use in product development, referred to as Design for Security or DfSec, which underlies all product development. We maintain internal IT security and cybersecurity operations, including monitoring our internal network resources and we have ISO 27001 certifications for selected operations. We have also implemented policies, processes, and tools to enhance the security of our products and services, including managing the security risks in third parties.

Human rights – Freedom of expression and privacy

We are committed to the principles of the Universal Declaration of Human Rights, the United Nations Global Compact, and the Organisation for the Economic Co-operation and Development (OECD) guidelines for Multinational Enterprises. We encourage our suppliers and business partners to share these values. We endorsed the United Nations Guiding Principles on Business and Human Rights in 2011. Our Code of Conduct together with our Human Rights Policy sets out our approach to human rights. Our human rights processes cover the whole value chain, from supplier management to product end use and we have set clear targets for all areas separately.

Our Human Rights Due Diligence (HRDD) process, which is embedded in our global sales process, provides the mechanism and tools to effectively deal with our most salient human rights risks arising from the potential misuse of the products and technology we provide. We aim to ensure the technology we provide is not used to infringe on human rights, including the right to privacy, freedom of expression and assembly. Before any sale is made, the HRDD process is used to identify the potential risk level to human rights through potential misuse of our technology. Of the cases handled by HRDD in 2020, 70% were resolved as 'Go', 30% as 'Go with conditions', and 0% as 'No go'. In addition to potential product misuse, human rights risks appear in our global supply chain. Our supply chain risks and activities are further discussed in the Responsible Sourcing section below and in a separate modern slavery statement.

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We are a member of the Global Network Initiative (GNI), a multi-stakeholder group of companies, civil society organizations (including human rights and press freedom groups), investors, and academics working together to protect and advance freedom of expression and privacy in the ICT sector. A condition of membership for companies is agreement to adhere to the GNI Principles and allowing GNI to conduct an independent assessment of the member company's progress towards implementing the GNI Principles.

Responsible sourcing

We expect our suppliers to adhere to our Third Party Code of Conduct and provide them with our Supplier Requirements, including the Responsible Business Alliance (RBA) Code of Conduct and additional, Nokia-specific sustainability requirements. The requirements cover such topics as environment, health, safety and security, privacy, risk management, labor rights management, and ethics. We also run assessments and audits of our suppliers and provide training to ensure they meet our ethical requirements and continuously improve on their performance. In 2020, we introduced a sustainability award as part of our Supplier Diamond Awards to recognize innovation around sustainability.

In 2020, we implemented 391 supply chain audits (332 in 2019), including 24 onsite in-depth audits on corporate responsibility topics, 27 onsite audits against our supplier requirements and 340 supplier assessments conducted using the EcoVadis scorecards. We also ran training workshops for suppliers, which were this year organized remotely, including for example topics such as climate change, conflict-free sourcing, modern slavery, as well as a special series of sessions around health and safety topics. These trainings covered altogether over 1 300 supplier participants. Following growing concerns around mistreatment of ethnic and other minorities, we have conducted a refresher training session regarding modern slavery for our suppliers, conducted further risk assessments, and strengthened our Corporate Responsibility auditing guidelines to communicate Nokia's requirements concerning the treatment of ethnic or any other minorities and for appropriate actions to be taken. We also continued our work with the Joint Audit Cooperation (JAC), a group of our major customers which collaborate to drive improvement and transparency in supply chain management.

We see the highest risk exposure to health and safety in the delivery of field work, which is predominantly delivered by our contractors in tasks such as working at height, driving for work and electrical installation and maintenance. Consequently, we have set stringent key performance indicators related to the supplier ability to deliver safely, which is evaluated by our Health and Safety Maturity Assessment process. By the end of 2020, 97% of suppliers delivering high-risk activity had been assessed using our H&S Maturity Assessment Process and 99% of the assessed suppliers met H&S compliant supplier status. We also carried out impact assessments on 96% of all high-risk projects. 99% of those projects were found to meet our minimum non-negotiable requirements.

The potential risks associated with the mining and trade of metals that provide key minerals in electronic components may include impacts related to military conflict, human rights violations, as well as negative environmental impacts. This is one reason why the traceability of our materials and ensuring our products are conflict-free are a priority for us, as evidenced in our updated Responsible Minerals Policy, which can be found online. Tin, tantalum, tungsten, gold and cobalt are in scope of our due diligence. By the end of 2020, 98% of our suppliers had achieved full visibility to the smelters in our supply chain, and for 95% of our suppliers the entire supply chain consists of smelters that have been validated conflict-free or active in validation process. Out of all the smelters identified as part of our supply chain, 80% have been validated as conflict-free or are active in the validation process. Our latest Conflict Minerals report was also updated during the year.

We continued our CDP Supply Chain Program, creating environmental improvement programs and improving our upstream indirect emissions that occur in the chain. In 2020, 430 of our key suppliers responded to the CDPs request to disclose their climate performance information and 262 also provided emission reduction targets. We also had 275 suppliers responding on the water aspect via the CDP program. To move forward with climate-related targets, we also encouraged suppliers to set climate targets for the next stage to be in line with the Science Based Targets initiative.

Our culture – respecting people

We believe our people are our greatest asset and we aim to enable a culture that encourages high-performance, integrity, and inclusion. The market for skilled employees in our business is extremely competitive. Our workforce has fluctuated over recent years as we have introduced changes in our strategy to respond to our business targets and our activities. These changes may in the future cause disruption and fatigue among employees. It is imperative that we work to create and sustain a corporate culture that is motivational, inclusive, and encourages creativity and continuous learning to meet challenges.

In 2020, the average number of employees was 92 039 (98 322 in 2019 and 103 083 in 2018). The table below shows the average number of employees in 2020 by geographical location:

Region	Average number of employees
Finland	6 098
Other European countries	32 686
Middle East & Africa	3 319
China	13 749
Asia Pacific	20 511
North America	12 002
Latin America	3 674
Total	92 039

With a change in our leadership in 2020, we took the opportunity to refresh our view on the employee experience. For Day 1 of Pekka Lundmark's tenure, we launched a global survey that asked whether employees felt pride in working for Nokia, and whether they felt the working atmosphere enabled them to give their best. The survey garnered over 50 000 responses in July. 88.7% of employees responded that they feel pride in working for Nokia, while 75.1% agreed that the working atmosphere enabled them to give their best.

We are committed to employee development and career growth. In 2020, many of our instructor-led programs were impacted by COVID-19 and repurposed to be delivered virtually. We delivered our corporate leadership programs targeting new line managers to senior leaders virtually for over 1 100 participants. We also continued to train our senior managers on coaching skills by delivering virtual Coaching for Success programs. In 2020, over 7 000 employees studied leadership related online solutions and videos. We have nearly 300 internal coaches who are made available to all employees. We also focused on supporting line managers and employees during the pandemic with five quick guides, including topics such as resilience and well-being, leading virtual teams and working from home.

Inclusion and diversity

Inclusion was highlighted as a critical behavior in Nokia's 2020 turnaround agenda. We believe that by acting inclusively we can leverage the differences to achieve better business results and growth. To make sure that our leaders understand how bias can adversely impact people-related actions and decisions, we arranged workshops on navigating bias with inclusion. During 2020, these virtual workshops reached over 85% of all leaders, with a satisfaction rate of 98%. As part of our Diversity & Inclusion strategy implementation, we also continued to focus on training women in leadership, and delivered on our Accelerated Women Leader program. The program was sponsored by executives and includes mentoring and coaching. We also delivered our 'Out Leader' program consisting of external networking and mentoring by Nokia leaders, aiming for further inclusion of sexual minorities.

As a cornerstone of our commitment to equal treatment, we continue to annually monitor pay equity and fund special remediation increases as necessary, to ensure that the unexplained pay-gap, which was first closed in 2019, stays closed in 2020 and in future years. In 2020, 23.5% of Nokia's leadership team's positions were held by women, while the share of women in all leadership positions across Nokia was 15.3%. In total, women accounted for 22.2% of our workforce. Back in 2016, we set a target to increase the percentage of women in leadership by 25% by the end of 2020. Each business group has been able to successfully hire and retain its women employees but the pipeline of women to senior positions is still weak. Most of the women in the company still find themselves in middle management. Hence, we were not able to reach the target.

Health, safety and labor conditions

Our Code of Conduct is the basis for labor conditions, enhanced by a full set of global human resources policies and procedures that enable fair employment. We adhere to the International Labor Organization (ILO) Declaration on Fundamental Principles and Rights at Work and we meet, or where possible exceed, the requirements of labor laws and regulations wherever we have operations. We work hard to ensure decent working conditions and fair employment, taking into account both international and local laws and guidelines.

Our health and safety management system is the basis for our overall program and an integral part of how we manage health and safety. The management system is certified with the internationally recognized OHSAS 18001, and during 2020 we started our transitioning to the new ISO 45001 standard. Certification is provided by a third party, Bureau Veritas, and it covers activities within all Networks' business groups, customer operations and supporting corporate functions. We implement training, analysis, assessments and consequence management to address job-related health and safety risks. We run a wide range of programs targeted at constantly improving our health and safety performance, while also encouraging employees and contractors to report near misses and dangerous incidents.

Shares and shareholders

Share details

Shares and share capital

Nokia has one class of shares. Each Nokia share entitles the holder to one vote at general meetings of Nokia.

As of December 31, 2020, the share capital of Nokia Corporation equaled EUR 245 896 461.96 and the total number of shares issued was 5 653 886 159. As of December 31, 2020, the total number of shares included 36 389 799 shares owned by Group companies representing approximately 0.6% of the total number of shares and the total voting rights.

In 2020, under the authorization held by the Board of Directors, the Parent Company issued 13 350 000 new shares without consideration to itself to fulfill the company's obligation under the Nokia Equity Programs.

In 2020, under the authorization held by the Board of Directors, the Parent Company issued 11 915 070 treasury shares to employees, including certain members of the Group Leadership Team, as settlement under Parent Company equity-based incentive plans and the employee share purchase plan. The shares were issued without consideration and in accordance with the rules of the plans.

Information on the authorizations held by the Board of Directors in 2020 to issue shares and special rights entitling to shares, to transfer shares and repurchase own shares, as well as information on related party transactions, the shareholders, stock options, shareholders' equity per share, dividend yield, price per earnings ratio, share prices, market capitalization, share turnover and average number of shares is available in the "Corporate governance —Compensation" and "Financial statements" sections.

The Board of Directors held at December 31, 2020 a total of 1 033 100 shares and ADSs in Nokia, which represented approximately 0.02% of our total shares and voting rights excluding shares held by Nokia Group. The CEO owned at December 31, 2020 a total of 788 850 shares.

Refer to Note 20, Shares of the Parent Company, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding Nokia shares.

Nokia does not have minimum or maximum share capital or a par value of a share.

As of December 31	2020	2019	2018	2017	2016
Share capital, EURm	246	246	246	246	246
Shares, (000s)	5 653 886	5 640 536	5 635 945	5 839 404	5 836 055
Shares owned by the Group, (000s)	36 390	34 955	42 783	259 887	115 552
Number of shares excluding shares owned by the Group, (000s)	5 617 496	5 605 581	5 593 162	5 579 517	5 720 503
Average number of shares excluding shares owned by the Group during the year					
Basic, (000s) ⁽¹⁾	5 612 418	5 599 912	5 588 020	5 651 814	5 732 371
Diluted, (000s) ⁽¹⁾	5 612 418	5 626 375	5 588 020	5 651 814	5 741 117
Number of registered shareholders ⁽²⁾	246 886	248 526	243 409	247 717	237 700

(1) Used in calculation of earnings per share for profit or loss for the year attributable to equity holders of the parent.

(2) Each account operator is included in the figure as only one registered shareholder.

Key ratios

For the year ended December 31, Continuing operations	2020	2019	2018	2017	2016
Earnings per share, basic, EUR	(0.45)	0.00	(0.10)	(0.26)	(0.13)
Earnings per share, diluted, EUR	(0.45)	0.00	(0.10)	(0.26)	(0.13)
P/E ratio, basic ⁽¹⁾	neg.	—	neg.	neg.	neg.
Dividend per share, EUR ⁽²⁾	0.00	0.00	0.10	0.19	0.17
Total dividends paid, EURm ⁽²⁾	—	—	560	1 063	963
Payout ratio, basic ⁽²⁾	—	—	neg.	neg.	neg.
Dividend yield, % ⁽¹⁾⁽²⁾	—	—	1.99	4.88	3.70
As of December 31	2020	2019	2018	2017	2016
Shareholders' equity per share, EUR	2.22	2.73	2.73	2.89	3.51
Market capitalization, EURm ⁽¹⁾	17 701	18 476	28 134	21 704	26 257

(1) Based on Nokia closing share price at year-end on Nasdaq Helsinki.

(2) No dividend is proposed by the Board of Directors of the Parent Company for the financial year 2020. Amounts presented for the financial years 2019, 2018, 2017 and 2016 represent the actual amounts paid to equity holders of the parent.

Share turnover

For the year ended December 31	2020	2019	2018	2017	2016
Number of shares traded during the year (000s) ⁽¹⁾	13 903 762	11 003 630	8 960 687	8 839 680	9 604 722
Average number of shares excluding shares owned by the Group during the year (000s)	5 612 418	5 599 912	5 588 020	5 651 814	5 732 371
Share turnover %	248	196	160	156	168

(1) Source: Nasdaq Helsinki, the NYSE composite tape and Euronext Paris (since November 2016).

The principal trading markets for the shares are Nasdaq Helsinki and Euronext Paris, in the form of shares, and the NYSE, in the form of ADSs.

Share price development

Annual data	Nasdaq Helsinki			New York Stock Exchange			Euronext Paris		
	High	Low	Value	High	Low	Value	High	Low	Value
	EUR			USD			EUR		
2020 Full year High/Low	4.34	2.08		5.14	2.34		4.35	2.08	
2020 Full year Average (Volume-weighted)			3.39			3.98			3.44
Year-end value December 31, 2020			3.15			3.91			3.14
Year-end value December 31, 2019			3.30			3.71			3.31
Change from December 31, 2019 to December 31, 2020			(4,5)%			5,4%			(5,1)%

Stock option exercises

Year ⁽¹⁾	Stock option category	Subscription price EUR	Number of new shares 000s	Date of payment	Net proceeds EURm	New share capital EURm
2018	Nokia Stock Option Plan 2012 1Q	3.48	0	2018	0.00	—
	Nokia Stock Option Plan 2012 2Q	2.08	128	2018	0.27	—
	Nokia Stock Option Plan 2012 3Q	1.82	170	2018	0.31	—
	Nokia Stock Option Plan 2012 4Q	1.76	0	2018	0.00	—
	Nokia Stock Option Plan 2013 1Q	2.58	0	2018	0.00	—
	Nokia Stock Option Plan 2013 2Q	2.35	127	2018	0.30	—
	Nokia Stock Option Plan 2013 3Q	2.72	0	2018	0.00	—
	Nokia Stock Option Plan 2013 4Q	5.41	0	2018	0.00	—
	Total		425		0.87	
2019	Nokia Stock Option Plan 2013 1Q	2.58	0	2019	0.00	—
	Nokia Stock Option Plan 2013 2Q	2.35	23	2019	0.05	—
	Nokia Stock Option Plan 2013 3Q	2.72	0	2019	0.00	—
	Nokia Stock Option Plan 2013 4Q	5.41	0	2019	0.00	—
	Total		23		0.05	

(1) After 2019 the Group no longer administered any global stock option plan. Refer to Note 26, Share-based payment.

Dividend

The dividend to shareholders is Nokia's principal method of distributing earnings to shareholders. Beginning with the distribution for the financial year 2018, Nokia started paying dividends in quarterly instalments. On October 24, 2019, the Board resolved to pause dividend distributions, in order to: a) guarantee Nokia's ability to increase 5G investments, b) continue investing in growth in strategic focus areas of enterprise and software and c) strengthen Nokia's cash position. This was done in accordance with Nokia's dividend policy, which states that dividend decisions are made taking into account Nokia's cash position and expected cash flow generation.

The Board is pleased with Nokia's recent operational performance and the track record of sustainable cash generation that Nokia is starting to build. The Board is satisfied that Nokia has strengthened its cash position. However, the Board continues to focus on ensuring Nokia's ability to increase investments in 5G and strategic areas, while continuing to establish a track record of sustainable cash generation. Therefore, the Board does not propose a dividend or dividend authorization for the financial year 2020.

We distribute distributable funds, if any, within the limits set by the Finnish Companies Act as defined below. We make and calculate the distribution, if any, in the form of cash dividends, assets from the reserve for invested unrestricted equity, share buy-backs, or in some other form, or a combination of these. There is no specific formula by which the amount of a distribution is determined, although some limits set by law are discussed below. The timing and amount of future distributions of retained earnings and/or assets from the reserve for invested unrestricted equity, if any, will depend on our future results and financial conditions.

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Under the Finnish Companies Act, we may distribute retained earnings and/or assets from the reserve for invested unrestricted equity on our shares only upon a shareholders' resolution and subject to limited exceptions in the amount proposed by the Board. The amount of any distribution is limited to the amount of distributable earnings of the Parent Company pursuant to the last accounts approved by our shareholders, taking into account the material changes in the financial situation of the Parent Company after the end of the last financial period and a statutory requirement that the distribution of earnings must not result in insolvency of the Parent Company. Subject to exceptions relating to the right of minority shareholders to request a certain minimum distribution, the distribution may not exceed the amount proposed by the Board of Directors.

Shareholders

As of December 31, 2020, shareholders registered in Finland represented approximately 24% and shareholders registered in the name of a nominee represented approximately 76% of the total number of shares of Nokia Corporation. The number of directly registered shareholders was 246 886 as of December 31, 2020. Each account operator (14) is included in this figure as only one registered shareholder.

Largest shareholders registered in Finland as of December 31, 2020⁽¹⁾

Shareholder	Total number of shares 000s	% of all shares	% of all voting rights
Solidium Oy	296 000	5.24	5.24
Keskinäinen Eläkevakuutusyhtiö Ilmarinen	79 800	1.41	1.41
Keskinäinen Työeläkevakuutusyhtiö Varma	78 952	1.40	1.40
Keskinäinen Työeläkevakuutusyhtiö Elo	44 307	0.78	0.78
Valtion Eläkerahasto	42 000	0.74	0.74
Schweizerische Nationalbank	27 112	0.48	0.48
Nordea Bank Abp	16 962	0.30	0.30
Oy Lival Ab	16 700	0.30	0.30
Svenska Litteratursällskapet i Finland r.f.	15 678	0.28	0.28
Danske Invest Finnish Equity Fund	15 300	0.27	0.27

(1) Excluding nominee registered shares and shares owned by Nokia Corporation. Nokia Corporation owned 24 931 138 shares as of December 31, 2020.

Breakdown of share ownership as of December 31, 2020⁽¹⁾

By number of shares owned	Number of shareholders	% of shareholders	Total number of shares	% of all shares
1–100	55 705	22.56	2 970 824	0.05
101–1 000	116 103	47.03	52 207 178	0.92
1 001–10 000	66 069	26.76	206 558 643	3.65
10 001–100 000	8 472	3.43	206 905 293	3.66
100 001–500 000	424	0.17	83 320 702	1.47
500 001–1 000 000	42	0.02	30 352 097	0.54
1 000 001–5 000 000	49	0.02	127 487 410	2.26
Over 5 000 000	22	0.01	4 944 084 012	87.45
Total	246 886	100.00	5 653 886 159	100.00

(1) The breakdown covers only shareholders registered in Finland, and each account operator (14) is included in the number of shareholders as only one registered shareholder. As a result, the breakdown is not illustrative of the entire shareholder base of Nokia.

By nationality	% of shares
Non-Finnish shareholders	76.17
Finnish shareholders	23.83
Total	100.00

By shareholder category (Finnish shareholders)	% of shares
Corporations	2.35
Households	8.19
Financial and insurance institutions	2.22
Non-profit organizations	1.24
Governmental bodies (incl. pension insurance companies)	9.83
Total	23.83

As of December 31, 2020, a total of 770 246 104 ADSs (equivalent to the same number of shares or approximately 14% of the total shares) were outstanding and held of record by 114 939 registered holders in the United States. We are aware that many ADSs are held of record by brokers and other nominees, and accordingly the above number of holders is not necessarily representative of the actual number of persons who are beneficial holders of ADSs or the number of ADSs beneficially held by such persons. Based on information available from Broadridge Financial Solutions, Inc., the number of beneficial owners of ADSs as of December 31, 2020 was 522 361.

Based on information known to us as of January 29, 2021, as of December 31, 2020, Blackrock, Inc. beneficially owned 333 048 530 Nokia shares, which at that time corresponded to approximately 5.9% of the total number of shares and voting rights of Nokia.

According to a notification received by Nokia on September 3, 2020, the holdings of Solidium Oy in Nokia amounted to a total of 283 000 000 shares, corresponding to approximately 5.01% of the total number of shares and voting rights of Nokia at that time.

To the best of our knowledge, Nokia is not directly or indirectly owned or controlled by any other corporation or any government, and there are no arrangements that may result in a change of control of Nokia.

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Shares and stock options owned by the members of the Board and the Nokia Group Leadership Team

As of December 31, 2020, the members of our Board and the Group Leadership Team held a total of 4 480 039 shares and ADSs in Nokia, which represented approximately 0.08% of our shares and total voting rights excluding shares held by the Nokia Group.

Offer and listing details

Our capital consists of shares traded on Nasdaq Helsinki under the symbol "NOKIA" and Euronext Paris under the symbol "NOKIA". Our ADSs, each representing one of our shares, are traded on the NYSE under the symbol "NOK". The ADSs are evidenced by American Depositary Receipts (ADRs) issued by Citibank, N.A.

Articles of Association

Articles of Association

Amendment of our Articles of Association requires a resolution of the general meeting of shareholders, supported by two-thirds of the votes cast and two-thirds of the shares represented at the meeting.

Our Articles of Association include provisions for obligations to redeem our shares. Amendment of the provisions of Article 13 of the Articles of Association, "Obligation to purchase shares", requires a resolution supported by three-quarters of the votes cast and three-quarters of the shares represented at the meeting.

Registration

Nokia is organized under the laws of the Republic of Finland and registered under the business identity code 0112038-9. Under its current Articles of Association, Nokia's corporate purpose is to research, develop, manufacture, market, sell and deliver products, software and services in a wide range of consumer and business-to-business markets. These products, software and services relate to, among others, network infrastructure for telecommunication operators and other enterprises, the IoT, human health and well-being, multimedia, big data and analytics, mobile devices and consumer wearables and other electronics. The company may also create, acquire and license intellectual property and software as well as engage in other industrial and commercial operations, including securities trading and other investment activities. The company may carry on its business operations directly, through subsidiary companies, affiliate companies and joint ventures.

Directors' voting powers

Under Finnish law, resolutions of the Board shall be made by a majority vote. A director shall refrain from taking any part in the consideration of an agreement between the director and the company or third party, or any other issue that may provide any material benefit to him or her, which may be contradictory to the interests of the company. Under Finnish law, there is no age limit requirement for directors, and there are no requirements under Finnish law that a director must own a minimum number of shares in order to qualify to act as a director. However, in accordance with the current company policy, approximately 40% of the annual fee payable to the Board members is paid in Nokia shares purchased from the market or alternatively by using treasury shares held by Nokia, and the directors shall retain until the end of their directorship such number of shares that corresponds to the number of shares they have received as Board remuneration during their first three years of service (the net amount received after deducting those shares used for offsetting any costs relating to the acquisition of the shares, including taxes).

Share rights, preferences and restrictions

Each share confers the right to one vote at general meetings. According to Finnish law, a company generally must hold an Annual General Meeting called by the Board within six months from the end of the financial year. Additionally, the Board is obliged to call an Extraordinary General Meeting, whenever such meeting is deemed necessary, or at the request of the auditor or shareholders representing a minimum of one-tenth of all outstanding shares. Under our Articles of Association, the Board is elected at least annually at the Annual General Meeting of the shareholders for a term ending at the end of the next Annual General Meeting.

Under Finnish law, shareholders may attend and vote at general meetings in person or by proxy. It is not customary in Finland for a company to issue forms of proxy to its shareholders. Accordingly, Nokia does not do so. However, registered holders and beneficial owners of ADSs are issued forms of proxy by the Depositary.

To attend and vote at a general meeting, a shareholder must be registered in the register of shareholders in the Finnish book-entry system on or prior to the record date set forth in the notice of the general meeting. A registered holder or a beneficial owner of the ADSs, like other beneficial owners whose shares are registered in the company's register of shareholders in the name of a nominee, may vote with their shares provided that they arrange to have their name entered in the temporary register of shareholders for the general meeting.

The record date is the eighth business day preceding the meeting. To be entered in the temporary register of shareholders for the general meeting, a holder of ADSs must provide the Depositary, or have his broker or other custodian provide the Depositary, on or before the voting deadline, as defined in the proxy material issued by the Depositary, a proxy with the following information: the name, address, and social security number or another corresponding personal identification number of the holder of the ADSs, the number of shares to be voted by the holder of the ADSs and the voting instructions. The register of shareholders as of the record date of each general meeting is public until the end of the respective meeting. Other nominee registered shareholders can attend and vote at the general meetings by instructing their broker or other custodian to register the shareholder in Nokia's temporary register of shareholders and give the voting instructions in accordance with the broker's or custodian's instructions.

By completing and returning the form of proxy provided by the Depositary, a holder of ADSs also authorizes the Depositary to give notice to us, required by our Articles of Association, of the holder's intention to attend the general meeting.

Each of our shares confers equal rights to share in the distribution of the company's funds. Dividend entitlement lapses after three years if a dividend remains unclaimed for that period, in which case the unclaimed dividend will be retained by Nokia.

Under Finnish law, the rights of shareholders are related to the shares as set forth in law and our Articles of Association. Neither Finnish law nor our Articles of Association sets limitations on the rights to own Nokia securities, including the rights of foreign shareholders to hold or exercise voting rights in the said securities. Amendment of the Articles of Association requires a decision of the general meeting, supported by two-thirds of the votes cast and two-thirds of the shares represented at the meeting.

Disclosure of shareholder ownership or voting power

According to the Finnish Securities Market Act, a shareholder shall disclose his or her ownership or voting power to the company and the Finnish Financial Supervisory Authority when the ownership or voting power reaches, exceeds or falls below 5, 10, 15, 20, 25, 30, 50 or 90% of all the shares or the voting rights outstanding. The term "ownership" includes ownership by the shareholder, as well as selected related parties, and calculating the ownership or voting power covers agreements or other arrangements, which when concluded would cause the proportion of voting rights or number of shares to reach, exceed or fall below the aforementioned limits. Upon receiving such notice, the company shall disclose it by a stock exchange release without undue delay.

Purchase obligation

Our Articles of Association require a shareholder that holds one-third or one-half of all of our shares to purchase the shares of all other shareholders that so request. A shareholder who becomes subject to the purchase obligation is also obligated to purchase any subscription rights, stock options or convertible bonds issued by the company if so requested by the holder. The purchase price of the shares under our Articles of Association is the higher of: (a) the weighted average trading price of the shares on Nasdaq Helsinki during the ten business days prior to the day on which we have been notified by the purchaser that its holding has reached or exceeded the threshold referred to above or, in the absence of such notification or its failure to arrive within the specified period, the day on which our Board otherwise becomes aware of this; or (b) the average price, weighted by the number of shares, which the purchaser has paid for the shares it has acquired during the last 12 months preceding the date referred to in (a).

Under the Finnish Securities Market Act, a shareholder whose voting power exceeds 30% or 50% of the total voting rights in a company shall, within one month, offer to purchase the remaining shares of the company, as well as any other rights entitling to the shares issued by the company, such as subscription rights, convertible bonds or stock options issued by the company. The purchase price shall be the market price of the securities in question. Subject to certain exceptions, the market price is determined on the basis of the highest price paid for the security during the preceding six months by the shareholder or any party in close connection to the shareholder. Subject to certain exceptions, if the shareholder or any related party has not during the six months preceding the offer acquired any securities that are the target for the offer, the market price is determined based on the average of the prices paid for the security in public trading during the preceding three months weighted by the volume of trade.

Under the Finnish Companies Act, a shareholder whose holding exceeds nine-tenths of the total number of shares or voting rights in Nokia has both the right and, upon a request from the minority shareholders, the obligation to purchase all the shares of the minority shareholders for the then current market price. The market price is determined, among other things, on the basis of the recent market price of the shares. The purchase procedure under the Finnish Companies Act differs, and the purchase price may differ, from the purchase procedure and price under the Finnish Securities Market Act, as discussed above. However, if the threshold of nine-tenths has been exceeded through either a mandatory or a voluntary public offer pursuant to the Finnish Securities Market Act, the market price under the Finnish Companies Act is deemed to be the price offered in the public offer, unless there are specific reasons to deviate from it.

Pre-emptive rights

In connection with any offering of shares, the existing shareholders have a pre-emptive right to subscribe for shares offered in proportion to the amount of shares in their possession. However, a general meeting of shareholders may vote, by a majority of two-thirds of the votes cast and two-thirds of the shares represented at the meeting, to waive this pre-emptive right provided that, from the company's perspective, weighty financial grounds exist.

Monitoring of Foreign Corporate Acquisitions

Under the Finnish Act on the Monitoring of Foreign Corporate Acquisitions (2012/172 as amended), a notification to the Ministry of Economic Affairs and Employment is required for a non-resident of Finland, directly or indirectly, when acquiring one-tenth or more of the voting power or corresponding factual influence in a company. The Ministry of Economic Affairs and Employment has to confirm the acquisition unless the acquisition would jeopardize important national interests, in which case the matter is referred to the Council of State. If the company in question is operating in the defense sector, an approval by the Ministry of Economic Affairs and Employment is required before the acquisition is made. These requirements are not applicable if, for instance, the voting power is acquired in a share issue that is proportional to the holder's ownership of the shares. Moreover, the requirements do not apply to residents of countries in the European Economic Area or EFTA countries, except where at least one tenth of shares or other controlling right in such resident are held by a party not resident in the European Economic Area or EFTA.

Risk factors

Set forth below is a description of risk factors that could affect our business. Shareholders and potential investors should carefully review the following risk factors, in addition to other information contained in this Annual Report on Form 20-F. The risk factors described below should not be construed as exhaustive. There may be additional risks that are unknown to us and other risks currently believed to be immaterial that could turn out to be material.

These risks, either individually or collectively, could adversely affect our business, sales, profitability, results of operations, financial condition, competitiveness, costs, expenses, liquidity, market share, brand, reputation and share price. Unless otherwise indicated or the context otherwise requires, references in these risk factors to “Nokia”, the “Nokia Group”, “Group”, “we”, “us” and “our” mean Nokia’s consolidated operating segments. Certain risks or events may be more prevalent with respect to the Group or a certain business group, business or part of the Group.

In evaluating the risks, one should not rely exclusively on the bullets in the below summary but read the full risk factor discussion. This Annual Report on Form 20-F also contains forward-looking statements that involve risks and uncertainties presented in “Forward-looking statements” above.

Risk factors summary

Our capability to implement our strategic plans, improve competitiveness, sustain or improve the operational and financial performance of our business groups, identify or successfully pursue business opportunities or otherwise grow our business is dependent on multiple external and internal factors, partially outside our control, including such as:

Risks related to strategy and its execution

- Our ability to implement the new operating model;
- Our ability to develop market recognition as a leading provider of technology, software and services in the information technology and communications and related services business in the industries and markets in which we operate;
- Trends, such as cloudification, open RAN/openness, virtualization and disaggregation with potential impact on our portfolio of products and services, competitive landscape, business models and our margin profile;
- The degree our investments result in technologies, products or services that achieve or retain broad or timely market acceptance, answer to the expanding needs or preferences of our customers or consumers, or in break-through innovations that we could otherwise utilize for value creation; and
- Our success in improving our operations and efficiencies through investing in R&D, entering into licensing arrangements, acquiring businesses and technologies, recruiting expert employees and partnering with third parties or forming joint ventures.

Surrounding economic, financial and competitive environment

- General economic and financial market conditions and other developments in the economies and industries where we, our customers and suppliers operate;
- Duration of the COVID-19 outbreak, disruptiveness of the related measures to contain the virus and other prolonged impacts of the pandemic;
- The cyclical nature of the markets in which we operate, competitor behavior, customer consolidation, customer purchase and spending behavior, deployments and rollout timing;
- Price erosion largely driven by competition challenging the connectivity business models of our customers;
- Our dependency on a limited number of customers and large multi-year agreements/turnkey projects;
- Competitiveness of or developments regarding pricing and agreement terms we offer, including developments with respect to customer financing or extended payment terms or credit lines that we provide our customers; and
- Willingness of banks or other institutions to purchase our receivables.

Our competitiveness

- Our ability to adapt to changing business models, technological changes and to meet new competition;
- Our ability to make and successfully integrate acquisitions and investments or complete divestitures, joint ventures or partnerships;
- Investing in new competitive high-quality products, services, upgrades and technologies that achieve or retain a broad market acceptance or bring them to market in a timely manner;
- Our success in the development of 5G technology and the rollout and commercialization of 5G services;
- Our capabilities to manage end-to-end costs related to our portfolio of products and services; and
- Identifying and implementing the appropriate measures to improve cost-efficiency or to maintain achieved efficiency levels.

Intellectual property rights, technology and brand licensing

- Our ability to create new relevant technologies, products and services through our R&D, as well as our ability to protect our innovations and to maintain the relative strength of our intellectual property portfolio;
- Our ability to protect and monetize our intellectual property e.g. due to market, regulatory and other developments, or court rulings in intellectual property-related litigation and other disputes;
- Uncertainty relating to the evolving global regulatory landscape relating to intellectual property;
- Developments in the concentrated smartphone market, the source of a significant portion of our patent licensing income;
- Success and profitability of technology licensing, brand licensing and other business ventures;
- Claims that we have allegedly infringed third parties' IPR; and
- Our ability to renew or finalize licenses regarding technologies that are licensed to us on acceptable commercial terms.

Geopolitical and regulatory environment

- Direct and indirect regulation and political developments regulating trade, taxes, national security, competition law, export controls and sanctions, cyber security, and anti-corruption;
- Changes in regulations or in their application applicable to current or new technologies or products;
- Emerging new regulation applicable to current or new technologies or products;
- Our products and services meeting all relevant quality, health, safety or security standards and other recommendations and regulatory requirements globally;
- Compliance with laws and regulations relating to privacy, data protection, and the protection or transfer of personal data; and
- Our ability to maintain an effective system of governance and compliance processes, disclosure controls and internal control over financial reporting.

Business operations

- Our manufacturing, service creation, delivery, logistics or supply chain to operate without significant interruptions or shortages;
- Performance capabilities of our partners and suppliers and their high standards to meet product quality, health, safety or security requirements or comply with other regulations or local laws;
- Inefficiencies, breaches, malfunctions or disruptions of our information technology systems and processes or disruptions of services relying on our or third-party IT;
- Actual or perceived security or privacy breaches, as well as defects, errors or vulnerabilities in our technology and that of third-party providers;
- Damage caused to existing undersea infrastructure during installation or maintenance of undersea telecommunications cable networks;
- Our ability to retain, develop and recruit appropriately skilled employees in the right locations and to maintain motivation and energy as our efforts to evolve our business and improve efficiency continue;
- The degree of control and level of influence in the joint ventures where Nokia is the minority partner or where Nokia does not have direct management control; and
- Natural or man-made disasters, military actions, labor unrest, civil unrest or health crises impacting our service delivery or production sites or the production sites of our suppliers, which are geographically concentrated.

Financial and taxes related uncertainties

- Complex tax laws and rules as well as diverse tax authority practices and interpretations;
- Our ability to utilize our tax attributes and deferred tax assets;
- Access to sources of funding on favorable terms (or at all);
- Our ability to re-establish investment grade rating or maintain our credit ratings;
- Exchange rate fluctuations impacting our net sales, costs and results of operations, as well as the US dollar value of our dividends and market price of our ADSs;
- Pension and post-employment cost-related risks and our ability to avoid or control costs resulting from a need for increased funding; and
- Recoverability of the carrying amount of our goodwill, which could result into significant impairment charges.

Matters regarding ownership of our shares

- The amount of dividend and/or repayment of capital distributed to shareholders for each financial period is uncertain;
- Volatility of the trading price of our shares and ADSs, including as a result of factors outside our control; and
- Shareholders may be required to provide detailed information to obtain advantageous withholding tax treatment for dividends.

Full risk factor discussion

Risks related to our strategy and its execution

We may be unable to successfully implement our strategic plans, the new operating model, sustain or improve the operational and financial performance of our business groups, correctly identify or successfully pursue business opportunities or otherwise grow our business.

We operate in rapidly changing and innovative industries and the opportunities we pursue require significant investments in innovation in order to generate growth, profitability or other targeted benefits across our business. On October 29, 2020, we announced a new operating model that became effective on January 1, 2021 and that we are renewing our strategy planned to be announced at Capital Markets Day on March 18, 2021. The aim of our new operating model with four P&L responsible business groups is to better align with the needs of our customers, increase accountability, reduce complexity, improve cost-efficiency as well as to have a more rigorous approach to capital allocation and we will invest to win in those segments where we choose to compete. If we are unable to successfully implement the new operating model and achieve the goals set for it, this could have a material impact on our results of operations and financial condition.

Our strategic plans, which include targeted investments in our business and pursuing new business opportunities based on identified trends and opportunities, even if successful, may not yield a return on our investment as planned or at all. There can be no assurance that we will correctly identify trends or opportunities to pursue or be able to achieve the goals or targets we have set. Furthermore, there can be no assurance that our investments will result in technologies, products or services that achieve or retain broad or timely market acceptance, answer to the expanding needs or preferences of our customers or consumers, or breakthrough innovations that we could otherwise utilize for value creation. As an example, while we believe that the progress of cloudification and open RAN/openness creates an opportunity for us to differentiate with our products and to serve our customers better, it may lead to entry of new competitors with different business models and, on the long-term horizon, could attempt to disaggregate the hardware from the software to build multi-vendor RAN networks. The virtualization of core and radio networks and the convergence of IT and telecommunications may lower barriers of entry for IT and webscale companies in the traditional telecommunications industry or they may build up tight strategic partnerships with our traditional competitors or our communication service provider customers. The enhanced competition might result in increased price competition and negatively affect our margins. Virtualization and disaggregation might also affect other parts of our portfolio and lead to changes in competitive landscape, business models, and margin profile. Our success is dependent on our ability to develop market recognition as a leading provider of technology, software and services in the information technology and communications and related services business in the industries and markets in which we operate.

We target on a continuous basis various improvements in our operations and efficiencies through investing in R&D, entering into licensing arrangements, acquiring businesses and technologies, recruiting expert employees and partnering with third parties or forming joint ventures. There can be no assurance that our efforts will generate the expected results or improvements in our operations or that we will achieve our intended targets or financial objectives related to such efforts. For instance, the underlying business case in terms of profits, revenue, strategic impact or otherwise justifying the creation or continuation of the arrangement may not be realized.

We may be unable to successfully implement planned transactions or transactions may result in liabilities.

From time to time, as part of our strategy, we may consider and engage in possible transactions, such as acquisitions, divestments, mergers, joint ventures or minority investments that could complement our existing operations and enable us to grow our business or shift focus via divestitures of our existing businesses or operations. We may engage in further transactions, such as acquisitions, divestments, mergers, joint ventures or minority investments in the future. Additionally, we may make investments in certain investment funds, including NGP Capital, that invest in other companies.

The transactions that we initiate may not ultimately be completed on favorable terms or at all or provide the benefits or return on investment that we had originally anticipated. After reaching an agreement for a transaction, we may need to satisfy pre-closing conditions on acceptable terms, which may prevent us from completing the transaction or result in changes to the scope of the transaction. Furthermore, our initial assumptions may be incorrect in evaluating a transaction. Therefore, we may be exposed to unknown, larger or contingent liabilities of acquired businesses, such as those related to contractual obligations, taxes, pensions, environmental liabilities, disputes and compliance matters. Transactions may result in claims between the parties (including, but not limited to, any indemnification or breach of contract claims), which can consume time and management attention, and the outcome of any claims related to transactions may be difficult to predict. Additionally, there are multiple other events or conditions that can hamper or delay a transaction or impact our ability to realize value from the transaction, including:

- Unanticipated delays or inability to proceed with transactions as planned, for instance, due to issues in obtaining regulatory or shareholder approvals, completing public offers or proposals, the imposition of conditions on the acquirer of a business to divest certain assets or impose other obligations due to competition laws or other regulations;
- Unanticipated costs or changes in scope, for instance due to issues with regulators or courts imposing terms on a transaction or obstacles that result in changes required in the scope of the transaction;
- The potential loss of key employees, customers and suppliers;
- Unanticipated changes in business, industry or general economic conditions that affect the assumptions underlying the acquisition;
- Impairments related to goodwill and other intangible assets, for instance due to business performance after an acquisition or differences in evaluating the goodwill with respect to the acquired businesses;
- Unexpected costs associated with the integration or the separation of the business as applicable;
- Additional payment obligations and higher costs resulting from non-performance by divested businesses;
- Exposure to contingent liabilities in connection with any regulatory or compliance failures relating to divested products or any indemnity we provide to the purchaser in connection with such divestment;
- Our dependence on some of the divested businesses as our suppliers in the future; and
- High transaction costs.

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We may be unable to realize the anticipated benefits, synergies, cost savings or efficiencies from acquisitions, and we may encounter issues or inefficiencies related to our organizational and operational structure, including being unable to successfully implement our business plans.

The level of effort required for successful integration of acquired businesses or assets depends on the complexity of the acquired business or asset. There can be no assurance that we will be able to realize the intended organizational and operational benefits and potentially targeted cost savings related to our business plans in the manner or within the timeframe currently anticipated. The risks and uncertainties relating to the integration include, among others, the distraction of our management's attention from our business resulting in performance shortfalls, the disruption of our ongoing business, interference with our ability to maintain our relationships with customers, vendors, regulators and employees and inconsistencies in our services, standards, quality, product road maps, controls, procedures and policies, any of which could have a material adverse effect on our business, financial condition and results of operations.

These failures could be triggered, among others, by the following factors impacting the integration process and operations:

- adverse contractual issues with respect to various agreements with third parties, employment agreements, or pension and other post-employment benefits-related funding or liability issues;
- our failure to identify issues and liabilities at the target business or assets during the due diligence and pre-acquisition process;
- disruptions caused, for instance, by reorganizations, which may result in inefficiency within the new organization through loss of key employees or delays in implementing our intended structural changes, among other issues;
- inability to rationalize or streamline our organization or product lines/services or to retire legacy products and related services as a result of pre-existing customer commitments;
- loss of, or lower volume of, business from key customers, or the inability to renew agreements with existing customers or establish new customer relationships, including limitations linked to customer policies with respect to aggregate vendor share or supplier diversity policies or increased efforts from competitors aiming to capitalize on disruptions;
- conditions and burdens imposed by laws, regulators or industry standards on our business or adverse regulatory or industry developments or litigation affecting us;
- issues relating to fraud, non-compliance with applicable laws and regulations, improper accounting policies, improper internal control or other improper activities;
- challenges relating to the consolidation or ongoing integration of corporate, financial data and reporting, control and administrative functions;
- the coordination of R&D, marketing and other support functions of the combined business may fail or cause inefficiencies or other administrative burdens; and
- our inability to eliminate the complexity of our corporate structure following the acquisition.

Additionally, the anticipated cost reductions and other benefits expected to arise from the acquisitions and integration of businesses, as well as related costs to implement such measures, are derived from our estimates, which are uncertain. The underlying assumptions are inherently uncertain and subject to a variety of significant business, economic, and competitive factors, risks and uncertainties that could cause our actual results to differ materially from those contained in the expected synergy benefits and related cost estimates.

As previously disclosed, we were made aware of certain practices relating to compliance practices at the former Alcatel-Lucent business that have raised concerns. We voluntarily reported the matter to the relevant regulatory authorities and we continue to cooperate with them. We have seen no evidence that would suggest that criminal penalties would apply in this case, and we believe it is highly likely that any penalties that might apply would be limited and immaterial.

Risks related to the general economic and financial market conditions and the industries and markets in which we operate

We may be materially and adversely affected by general economic and financial market conditions and other developments in the economies where we operate.

As we are a company with global operations and sales in many countries around the world, our sales and profitability are dependent on general economic and financial market conditions both globally and locally. We have manufacturing facilities and suppliers located in various countries around the world that may equally be impacted by these conditions. Adverse developments in, or the general weakness of, economic conditions, such as unemployment or consumer spending, may have an adverse impact on the spending patterns of end-users. This, in turn, may affect demand for consumables, such as mobile devices, mobile subscriptions and related services, which would have an adverse effect on Nokia Technologies. In our Networks and Nokia Software segments, this may also affect both the services that end-users subscribe to and the usage levels of such services, which may lead service providers to invest less in related infrastructure and services or to invest in low-margin products and services. Likewise, adverse developments in economic conditions may lead certain customer segments, such as webscale companies, TXLE, transportation, energy and public safety, to invest less or delay spend in infrastructure and services to digitize their operations or to invest in low-margin products and services. Negative market developments affecting our customers (including our licensees) and their end-users may also be caused by other adverse conditions such as natural or man-made disasters, geopolitical disruptions, civil unrest or health crises.

General uncertainty and adverse developments in the financial markets and the general economy could have a material adverse effect on our or our partners' or suppliers' ability to obtain sufficient or affordable financing on satisfying terms, having in turn an adverse effect on our ability to deliver our products and services in time and with acceptable quality. Uncertain market conditions may increase the price of financing or decrease its availability. We or our suppliers could also encounter difficulties in raising funds or accessing liquidity necessary to maintain financial condition and results of operations.

Depending on the duration of the COVID-19 outbreak and disruptiveness of the related measures to contain the virus, the pandemic could have further adverse effect on the results of our operations and financial condition.

The impact of COVID-19 on our operations in 2020 was primarily related to temporary factory closures in the first half of the year. Although we believe that our industry is relatively resilient to the effects of COVID-19, customer demand and/or our capacity to meet customer demand could be further impacted in the future. The measures taken by the governmental authorities have adversely affected and/or may further adversely affect our employees, supply chain, product development, service delivery and other operations. Any of such events could have a material adverse effect on

our results of operations and financial condition. The impact of COVID-19 on the global economy and financial markets has also adversely affected and/or may further adversely affect the value of our financial, tax, pension and other assets. In addition, the spread of COVID-19 has caused us to modify our business practices (including employee travel, employee work locations, and cancellation of physical participation in meetings, events and conferences), and we may take further actions as may be required by government authorities or determined by us to be necessary to protect our employees. We recognize that this pandemic has significantly increased the number of employees and suppliers working from home or remotely, which inherently raises the vulnerability of IT security environment. As a result, we have adapted our IT security training, processes and tools accordingly. There is no certainty that the measures we or the governments take will be sufficient to mitigate the risks posed by the virus. The continued spread of COVID-19 could cause further disruption or delays in our operations and/or the operations of our suppliers, partners, customers and/or licensees. The degree to which COVID-19 affects the Nokia's operations, results, assets and financial condition will depend on future developments, which are highly uncertain and cannot be predicted, including, but not limited to, the duration and spread of the outbreak, its severity, locations impacted, the actions to contain the virus or treat its impact, and how quickly and to what extent normal economic and operating conditions can resume. For instance, despite the upcoming 5G cycle of investments, the severity and length of the COVID-19 pandemic might result in a net decline of our key markets and cause delay of private wireless investments from large enterprises.

We face intense competition and are dependent on development of the industries and markets in which we operate. The information technology and communications industries and related services market are cyclical and are affected by many factors, including the general economic environment, technological changes, competitor behavior, customer consolidation, purchase and spending behavior of service providers and vertical customers, consumers and businesses, deployments and rollout timing. Our competition and new competition challenging the connectivity business models of our customers are driving price erosion.

The competitive environment in the markets where we operate, including the information technology and communications and related services market in numerous markets around the world, continues to be intense and is characterized by maturing industry technologies, 5G and related new technologies, equipment price erosion and aggressive price competition. For instance, we are particularly dependent on the investments made by service providers in network infrastructure and related services. The pace and size of such investments are in turn dependent on the ability of service providers to increase their subscriber numbers, reduce churn, maintain or increase their average revenue per user, and compete with business models eroding revenue from traditional voice, messaging and data transport services, as well as the financial condition of such service providers. Further, the purchasing power of our customers, particularly in developing markets, depends to a greater extent on the price development of basic commodities and currency fluctuations, which may render our products or services unaffordable.

We continue to face intense competition, including from companies based in China, that endeavor to gain market share in selected regions where Nokia has a large footprint. Despite exponential growth in mobile data traffic, most of our customer base has been facing persistent revenue erosion and is reverting to vendors to compensate for it. Competition for new customers, as well as for new infrastructure deployment, is particularly intense and focused on the favorability of price and agreement terms. We compete with companies that have large overall scale, which affords such companies more flexibility compared with us. In addition, new competition may be entering the network infrastructure and related services business through new technologies (such as virtualized RAN and O-RAN) or business models (such as products/services as-a-service models).

Service providers' cost reductions and network sharing, and industry consolidation among operators have reduced the amount of available business, resulting in further competition and pressure on pricing and profitability. Consolidation of operators may result in vendors and service providers concentrating their business in certain service providers and increasing the possibility that agreements with us are terminated or not renewed. Merger activity between our customers has in the past constricted, and may continue to do so, such customers' capital expenditure. In addition, the investments of the service providers in the new spectrum assets may reduce their funds available for investing in the new network infrastructure and related services. Furthermore, the level of demand by service providers and other customers that purchase our products and services can change quickly and can vary over short periods of time. In addition, a portion of our revenues is driven by the timing of completion and customer acceptances, which particularly in relation to 5G are further dependent on maturity of the whole 5G ecosystem. As a result of the uncertainty and variations in the telecommunications and vertical industries, accurately forecasting revenues, results and cash flow remains difficult. Significant reduction of business with us could result in the loss of benefits related to economies of scale.

We may be unable to respond successfully to technological changes in the markets in which we operate. Market developments favoring new technological solutions, such as SDN, cloud and virtualization, may result in reduced spending for the benefit of our competitors who have, or may have, a stronger position in such technologies. The technological viability of standardized, low-margin hardware products in combination with the virtualization of functions can induce a change in purchase behavior, resulting in favoring other vendors or in higher bargaining power versus Nokia due to more alternative vendors. Our customers may prefer best-of-breed from multiple vendors or turn to alternative vendors to maintain end-to-end services. Additionally, new competitors may enter the industry as a result of acquisitions or shifts in technology. Furthermore, some companies, including webscale companies, may drive a faster pace of innovation in telecommunication infrastructure through more collaborative approaches and open technologies across access, backhaul, core and management.

We expect to generate a significant share of our growth from new customers, including webscale companies and vertical customers in energy, transport, public sector, manufacturing and TXLEs. Each of these sectors may face adverse industry developments, which may significantly impact the size of investments addressable by us and our ability to address these investments, in terms of both having the right products available and being able to attain new customers and having the right go-to-market capabilities and expertise to address the specific needs of these sectors. Furthermore, there are various incumbent and new players competing with Nokia in these customer groups we strategically target. With these types of customers, the nature of competition and the required capabilities can be significantly different from the communication service provider market, including competition based on access network, core network, cloud infrastructure, platforms, applications and devices, and related services.

We may be adversely affected by developments with respect to customer financing or extended payment terms that we provide to our customers. Unwillingness of banks or other institutions to provide guarantees or financing to our customers or purchase our receivables could impair our capability to enter new customers or markets, mitigate payment risk and to manage our liquidity.

Requests for customer financing and extended payment terms are typical for our industry and uncertainty in the financial markets, among other things, may result in increased customer financing requests.

As a strategic marketing requirement, we arrange and facilitate financing or provide extended payment terms to a number of our customers, typically supported by export credit agencies or through the sale of related deferred receivables. In certain cases, the amounts and duration of these financings and trade credits, and the associated impact on our working capital, may be significant. Furthermore, reduced availability of export credits supporting our sales could affect our ability to attract customers and enter new markets thus facing the possibility of reduced sales.

In the event that export credit agencies face future constraints on their ability or willingness to provide guarantees or financing to our customers, or there is insufficient demand from banks or other financial institutions to purchase receivables, such events could have a material adverse effect on our business and financial condition. We have agreed to extended payment terms for a number of our customers and may continue to do so in the

future. Extended payment terms may result in a material aggregate amount of trade credits. Even when the associated risk is mitigated by a diversified customer portfolio, defaults in the aggregate could have a material adverse effect on us.

Our ability to manage our total customer financing and trade credit exposure depends on a number of factors, including capital structure, market conditions affecting our customers, the levels and terms of credit available to us and our customers, the cooperation of export credit agencies and our ability to mitigate exposure on acceptable terms. We may be unsuccessful in managing the challenges associated with the customer financing and trade credit exposure that we may face from time to time, particularly in difficult financial conditions on the market. While defaults under financings, guarantees and trade credits to our customers resulting in impairment charges and credit losses have not been significant for us in the past, these may increase in the future, in particular in markets such as India with increased risks potentially affecting our customers. Further, commercial banks may not continue to be able or willing to provide sufficient long-term financing, even if backed by export credit agency guarantees, due to their own constraints. Additionally, certain of our competitors may have greater access to arranging such financing, which could adversely affect our ability to compete in similar manner for business opportunities in the markets in which we operate.

We have sold certain receivables to banks or other financial institutions to mitigate the payment risk and improve our liquidity, and any significant change in our ability to continue this practice could impair our capability to mitigate such payment risk and to manage our liquidity.

Nokia arranges bank guarantees and issues commercial guarantees in customers' favor in relation to our business. We may not be able to collect outstanding guarantees and bonds that could limit our possibilities to issue new guarantees and/or bonds, which are required in customer agreements or practices. We also face risks that such commercial guarantees and bonds may be unfairly called.

We are dependent on a limited number of customers and large multi-year agreements. The loss of a single customer or contract, operator consolidation, unfavorable contract terms or other issues related to a single agreement may have a material adverse effect on our business and financial condition.

A significant proportion of the net sales and profits that we generate have historically been derived from a limited number of customers. As consolidation among existing customers continues, it is possible that an even greater portion of our net sales will be attributable to a smaller number of large service providers operating in multiple markets. These developments are also likely to increase the impact on our net sales based on the outcome of certain individual agreement tenders.

Service providers are increasingly entering into network sharing arrangements, as well as joint procurement agreements, which may reduce their investments and the number of networks available for us to service. Furthermore, procurement organizations of certain large service providers sell consulting services to enhance the negotiating position of small operators with their vendors. As a result of these trends and the intense competition in the industry, we may be required to agree to increasingly less favorable terms in order to remain competitive. Any unfavorable developments in relation to, or any change in the agreement terms applicable to, a major customer may have a material adverse effect on our business, results of operations and financial condition. Also, due to the long-term nature of the agreements, it is possible that the contract terms of the agreement may prove less favorable to us than originally expected, for instance due to changes in costs and product portfolio decisions. Furthermore, in particular given the bargaining power of our customers or limited legal ability to deviate from the standard governmental contract terms, we may be exposed to onerous terms and liabilities in our customer contracts.

During 2020, we have lost share at one large North American customer. The loss of a single customer or contract, or other issues related to a single agreement, may have a material adverse effect on our business and financial condition. Furthermore, any suspension, termination or non-performance by us under an agreement's terms may have a material adverse effect on us, for example due to penalties for breaches, early termination or reduced orders or customer footprint. In addition, we may lose existing agreements, or we may be unable to renew or gain new agreements, for instance due to customer diversity policies that limit the ability of customers to have one network provider exceeding a certain threshold of business in a given market.

Agreements in the networks infrastructure business are typically complex and long-term in nature and over time the contracts may turn commercially less successful than anticipated. The timing of sales and results of operations associated with large multi-year agreements or turnkey projects may differ from expectations. For instance, recognition of sales and related costs in network implementation projects is often linked with achievement of customer acceptances, which may delay for reasons contributable or not contributable to us. Moreover, such agreements often require dedication of substantial amounts of working capital and other resources, which may adversely affect our cash flow, particularly in the early stages of an agreement's term, or may require us to continue to sell certain products and services, or to sell in certain markets that would otherwise be discontinued or exited, thereby diverting resources from developing more profitable or strategically important products and services, or focusing on more profitable or strategically important markets. Furthermore, our customer agreements may involve complex transformation of the networks as the customers deploy new technologies and the related costs and scope of required deliverables may differ from our expectations at the time we enter into such agreements.

Risks impacting our competitiveness

We may fail to effectively and profitably invest in new competitive high-quality products, services, upgrades and technologies or bring them to market in a timely manner. We also may fail to adapt to changing business models.

Our business and the markets where we operate are characterized by rapidly evolving technologies, frequent new technological requirements, product feature introductions and evolving industry standards. The participants in the information technology, communications and related services market compete on the basis of product offerings, technical capabilities and quality in addition to price and affordability through consumer financing arrangements. As a result, our business performance depends on the timely and successful introduction of new products, services and upgrades of current products to meet the evolving requirements of customers, comply with emerging industry standards and address competing technological and product developments carried out by competitors while keeping prices and costs at competitive levels.

The R&D of new and innovative, technologically advanced products, as well as upgrades to current products and new generations of technologies, is a complex and uncertain process requiring high levels of innovation and investment, in addition to accurate anticipation of technological, regulatory and market trends. We may focus our resources on products and technologies that do not become widely accepted or ultimately prove unviable. Additionally, many of our current and planned products are highly complex and may contain defects or errors that are, for instance, detected only after deployment in telecommunications networks. Our results of operations will depend to a significant extent on our ability to succeed in the following areas:

- maintaining and developing a competitive product portfolio and service capability that are attractive to our customers, for instance by keeping pace with technological advances in our industry and pursuing the technologies that become commercially accepted and price competitive;
- continuing to introduce new products and product upgrades successfully and on a cost-efficient and timely basis;

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- developing new or enhancing existing tools for our service offerings;
- optimizing the amount of customer or market-specific technology, product and feature variants in our product portfolio;
- continuing to meet expectations and enhance the quality of our products and services as well as introducing products and services that have desired features and attributes, such as energy efficiency;
- maintaining and building up strategic partnerships in our value creation chain (e.g. in product creation and project delivery); and
- leveraging our technological strengths.

Certain of our competitors have significant resources to invest in market exploration and may seek new monetization models or drive industry development and capture value in areas where we may not currently be competitive or do not have similar resources available to us. These areas may include monetization models linked to large amounts of consumer data, large connected communities, home or other entertainment services, alternative payment mechanisms or marketing products. We also face competition from various companies that may be able to develop technologies or products that become preferred over those developed by us or result in adverse effects on us through, for instance, developing technological innovations that make our innovations less relevant. In addition, reduced government funding and support for our R&D activities could affect our ability to develop new technology or products.

We must invest effectively and profitably in new competitive products, services, upgrades or technologies (such as 5G, IoT, the cloud or software) and manage proactively the costs related to our portfolio of products and services (including component sourcing, manufacturing, logistics and other operations). However, we may still fail to maintain or improve our market position, competitiveness or scale, or we may fail to leverage our scale to the fullest extent and keep prices and costs at competitive levels or provide high-quality products and services.

We may encounter difficulties and challenges in the development of 5G technology and the rollout and commercialization of 5G services.

One of our primary operational objectives is the rollout of our 5G networks. Our 5G-related R&D efforts as well as product rollouts require us to devote financial and operational resources, and we expect to continue to make substantial investments in 5G and 5G-related technology. However, the 5G rollout and commercialization has not and may not develop in the manner or in the time periods we anticipate. The acceleration of the 5G rollout and commercialization requires us and our partners to accelerate the related R&D, manufacturing and supply chain efforts, which have and may risk our readiness to meet the timelines of our customers. Further, competitive intensity remains high in the market as competitors seek to take share in the early stage of 5G, which is creating a risk of persistent high price erosion in the industry. If domestic and global economic conditions worsen, overall spending on 5G infrastructure may be reduced or delayed, and spending in our other networks products and services might be even more rapidly reduced to preserve the customer investment in 5G, which would adversely impact demand for our products and services in these markets.

Even if the 5G infrastructure market develops in the manner or in the time periods we anticipate, if we do not have timely, competitively priced, market-accepted products available to meet our customers' planned rollout of 5G networks or, if we have products below expected performance in the commercial networks, we may miss significant opportunities or, in the worst case, lose already awarded business. We have faced and may face challenges with respect to the R&D roadmaps, SoC chipset development and cost competitiveness of our 5G products and our actions and investments to accelerate those roadmaps and improve our cost competitiveness to address those challenges may prove to be insufficient. Further, any reduction in our market share in 5G compared with our installed base in 4G due to decisions to protect our profitability, inability to meet the customers' requirements or other reasons, may have a material negative effect on our scale and profitability.

Our efforts aimed at managing and improving our competitiveness, financial or operational performance may not lead to targeted results, benefits, cost savings or improvements.

We are continuously targeting increased efficiency of our operations. For instance, we have recently completed our operating cost and production overheads savings program and have announced changes to our operating model (effective as of January 1, 2021) aiming at better accountability and transparency, reduction of complexity and further improving cost-efficiency. Failure by us to determine the appropriate prioritization of operating expenses and other costs, to identify and implement the appropriate measures to improve cost-efficiency, increase simplicity or to adjust our operating expenses and other costs on timely basis, or to maintain achieved efficiency levels, could have a material adverse effect on our business, results of operations and financial condition. We may, in the ordinary course of business, institute new plans for restructuring measures or implement various programs aimed at improving cost savings and financial performance. Such measures may be costly, potentially disruptive to operations, and may not lead to sustainable improvements in our overall competitiveness and profitability and there can be no assurance that such measures will be met as planned in contemplated timeframes or at all. Our plans may be altered in the future, including adjusting any projected financial or other targets. The anticipated costs or the level of disruption expected from implementing such plans or restructurings may be higher than expected. Efforts to plan and implement cost-saving initiatives may divert management attention from the rest of the business and adversely affect our business.

There are also several other factors that may prevent or delay a successful implementation of any cost-saving initiatives, including, among others, the following:

- need to make additional investments in other areas such as 5G and automation/digitalization of our operations;
- changes in the general economic conditions, whether globally, nationally or in the markets in which we operate or inaccuracy in our expectations with respect to market growth, customer demand and other trends;
- legislative constraints or unfavorable changes in legislation in the markets in which we operate may influence timing, costs and expected savings of certain initiatives contemplated;
- our ability to swap equipment of certain customers in line with our future product lines development and to secure continued business from such customers;
- our ability to align and adjust resources, systems and tools, including digitalization and automation, related to implementation of planned organizational changes;
- our cost-saving initiatives, including R&D, may negatively affect our ability to develop new or improve existing products and compete effectively in certain markets, and there is no guarantee that we will continue to be able to successfully innovate or remain technologically competitive;
- intended business plans may require us to inform or consult with employees and labor representatives, and such processes may influence the timing, costs and extent of expected savings and the feasibility of certain of the initiatives contemplated; and

- bargaining power of our suppliers may prevent us from achieving targeted procurement savings.

Risks associated with intellectual property rights, technology and brand licensing

Our patent licensing income and other intellectual property-related revenues are subject to risks and uncertainties such as our ability to maintain our existing sources of intellectual property-related revenue, establish new sources of revenue and protect our intellectual property from infringement. A proportionally significant share of the current patent licensing income is generated from the smartphone market, which is rapidly changing and features a limited number of large vendors.

We have a long history of continuously investing significantly in R&D to develop new relevant technologies, products and services for our business. As a result, we have maintained a strong intellectual property portfolio, which our products and services and future cash generation and income depend on. Many of our products and services use or are protected by patents in our portfolio.

The continued strength of our intellectual property portfolios depends on our ability to create new relevant technologies, products and services through our R&D activities and to protect our intellectual property rights (IPR). If those technologies, products and services do not become relevant, and therefore attractive to licensees, the strength of our intellectual property portfolios could be reduced, which could adversely affect our ability to use our intellectual property portfolios for revenue generation. Despite the steps that we have taken to protect our technology investments with IPR, we cannot be certain that any rights or pending applications will be granted or that the rights granted in connection with any future patents or other IPR will be sufficiently broad to protect our innovations and maintain the relative strength of our portfolio. Third parties may infringe our intellectual property relating to our proprietary technologies or disregard their obligation to seek necessary licenses under our patents or seek to pay less than reasonable license fees. As a result, we may be unable to continue to develop or protect our intellectual property-related revenue or establish new sources of revenue.

Nokia Technologies business group's sales and profits are currently largely derived from patent licensing. Our ability to protect and monetize our intellectual property may depend on regulatory and other developments in various jurisdictions with respect to protection awarded to technology innovations or compensation trends with respect to licensing and the actions or implementation of the regulations by administrative bodies. Any patents or other IPR may be challenged, invalidated or circumvented, and any right granted under our patents may not provide competitive advantages for us. Our ability to protect, license or divest our patented innovations may vary by region. In the technology sector generally, certain licensees are actively avoiding license payments, while some licensors are using aggressive methods to collect license payments, with both behaviors attracting regulatory attention. Authorities in various countries have increasingly monitored patent monetization and may aim to influence the terms on which patent licensing arrangements or patent divestments may be executed, which could compromise control over or protection of our technology and proprietary information. Such terms may be limited to a certain country or region; however, authorities could potentially seek to widen the scope and even impose global terms, potentially resulting in an adverse effect on us or limiting our ability to monetize our patent portfolios.

Patent licensing income may be adversely affected by general economic conditions or adverse market developments. Their impact is particularly relevant in the current climate, influenced heavily by COVID-19 and its effects on the world markets. For example, our patent licensing business may be adversely affected if a licensee's ability to pay is reduced or it becomes insolvent or bankrupt. Additionally, poor performance of potential or current licensees may limit a licensee's motivation to seek new or renew existing licensing arrangements with us. In certain cases, patent licensing income is dependent on the sales of the licensee, where the reduced sales of the licensee have a direct effect on the patent licensing income received by the Nokia Technologies business group. Furthermore, patent license agreements can cover both licensees' past and future sales, and the portion of the income that relates to licensees' past sales is not expected to have a recurring benefit and ongoing patent income from licensing is generally subject to various factors (for instance, sales by the licensees) that we have little or no control over, and it can vary considerably from time to time based on factors such as the terms of agreements we enter into with licensees, and there is no assurance that past levels are indicative of future levels of intellectual property-related revenue.

While we seek to renew existing license agreements and negotiate new license agreements in the industries where we have established licensing programs, we also seek to expand the scope of our licensing activities to other industries, in particular those that implement mobile communication technologies. The players in some of these industries may not have traditionally paid intellectual property-related royalties, which may hamper the expansion of our licensing activities. Entering new segments may involve litigation, while entering highly fragmented markets or markets with high volume of licensees may affect our effectiveness and/or profitability.

We retained our patent portfolio after the sale of Devices & Services business in 2014. Following the sale of Devices & Services business, Nokia Technologies is no longer required to agree cross-licenses to cover its handset business, which has contributed to growing our licensing revenue. While this has been our practice, there can be no guarantee that this can be continued in future. Also, in the past, parts of our intellectual property development were driven by innovation from the Devices & Services Business. As we no longer own this business, our future intellectual property relating to the mobile phone sector may lessen and our ability to influence industry trends and technology selections may reduce.

We also enter into business agreements separately by our business groups, which may grant certain licenses to our patents. Some of these agreements may inadvertently grant licenses to our patents with a broader scope than intended, or they may otherwise make the enforcement of our patents more difficult.

To enforce our intellectual property rights against unlawful infringement, we may engage in legal actions, the outcomes of which are uncertain.

Intellectual property-related disputes are common in the technology industry. Litigation and arbitration are often used to enforce patents or other rights, or to set licensing fees. In certain cases, we have initiated litigation or arbitration proceedings to enforce our rights, for instance to enforce our patents or to establish the terms of a patent license between the parties. Due to the nature of any litigation or arbitration proceedings, there can be no assurances as to the final outcome or timing of any outcome of litigation, or arbitration.

In other cases, other companies have commenced and may continue to commence actions against us seeking to establish the invalidity of our intellectual property, including our patents or to contest our licensing practices. In the event that one or more of our patents is challenged, a court may invalidate the patent or determine that the patent is not enforceable, which could have an impact on our competitive position. The outcome of court proceedings is difficult to predict and, consequently, our ability to use intellectual property for revenue generation may from time to time depend on favorable court rulings. Additionally, if any of our patents is invalidated, or if the scope of the claims in any patents is limited by a court decision, we could be prevented from using such patents as a basis for product differentiation or from licensing the invalidated or limited portion of our IPR. Even if such a patent challenge is not successful, the related proceedings could be expensive and time-consuming, divert the attention of our management and technical experts from our business and have an adverse effect on our reputation. Any diminution in the protection of our IPR could cause us to lose certain benefits of our R&D investments.

While the primary source of Nokia Technologies business group net sales and profits is licensing of the Nokia patents, we are also engaged with technologies and the Nokia brand licensing and other business ventures, including technology innovation and incubation. Expected net sales and profitability for these businesses may not materialize as planned or at all.

Nokia Technologies has a strategic agreement covering branding rights and intellectual property licensing with HMD global. Under the agreement, Nokia receives royalty payments from HMD global for sales of Nokia-branded mobile phones and tablets, covering both brand and patent licensing. Nokia also has a small number of territorially restricted brand licensing agreements beyond mobile devices and is exploring further opportunities to license the brand in new categories. However, there can be no assurance that we will successfully reach additional new brand licensing arrangements at all or on terms that prove satisfactory to us. The agreement with HMD global limits Nokia's possibilities to license the Nokia brand for certain types of devices over an agreed time and as such limiting Nokia's licensing possibilities with respect to such devices.

Additionally, licensing the Nokia brand to HMD global and other companies could – in cases where the licensee acts inconsistently with our ethical, compliance or quality standards – negatively affect our reputation and the value of our brand, thus diminishing the business potential with respect to utilizing our brand for licensing opportunities or otherwise having a negative effect on our business. Nokia has limitations in its ability to influence HMD global or other brand licensees in their business and other operations, exposing us to potential adverse effects from the use of the Nokia brand by HMD global or other brand licensees or other adverse developments encountered by brand licensees that become attributable to Nokia. Following a loan conversion, Nokia currently has a minority shareholding in HMD global.

There can be no assurances that our Nokia Technologies business group, or any other part of Nokia, will be successful in innovation and incubation or in generating net sales and profits through its business plans, for instance in patent, technology and brand licensing. The industries in which we operate, or may operate in the future, are generally fast-paced, rapidly evolving and innovative. Such industries are at different levels of maturity, and there can be no assurances that any investment we make will yield an expected return or result in the intended benefits. Additionally, we are entering into new business areas based on our technology assets and may explore new business ventures. Such business areas or plans may be adversely affected by adverse industry and market developments in the numerous diverse markets in which we operate, as well as by general economic conditions globally and regionally. As such, the investments may not be profitable or achieve the targeted rates of return. Particularly the consumer business environment is currently unstable and unpredictable due to the COVID-19 situation and poor performance by any of Nokia's patent, technology or brand licensees may impact Nokia financially.

Our products, services and business models depend on technologies that we have developed as well as technologies that are licensed to us by certain third parties. As a result, evaluating the rights related to the technologies we use or intend to use is increasingly challenging, and we expect to continue to face claims that we have allegedly infringed third parties' IPR. The use of these technologies may also result in increased licensing costs for us, restrictions on our ability to use certain technologies in our products and/or costly and time-consuming litigation.

Our products and services include increasingly complex technologies that we have developed or that have been licensed to us by certain third parties. The amount of such proprietary technologies and the number of parties claiming to own relevant IPR continue to increase. The holders of patents and other IPR potentially relevant to these complex technologies may be unknown to us, may have different business models, may refuse to grant licenses to their proprietary rights or may otherwise make it difficult for us to acquire a license on commercially acceptable terms. If licensing agreements are not available on commercially acceptable terms, we could be precluded from making and selling the affected products, or could face increased licensing costs. As new features are added to our products, we may need to acquire further licenses, including from new and sometimes unidentified owners of intellectual property. The lack of availability of licenses for copyrighted content, delayed negotiations or restrictive IPR license terms may have a material adverse effect on the cost or timing of content-related services and products offered by us, mobile network operators or third-party service providers. The cumulative costs of obtaining any necessary licenses are difficult to predict and may be significant.

Additionally, although we endeavor to ensure that we and the companies collaborating with us possess appropriate IPR or licenses, we cannot fully avoid the risks of IPR infringement by suppliers of components, processes and other various layers in our products, or by companies with which we collaborate. Similarly, we and our customers may face claims of infringement in connection with the use of our products. Any restrictions on our ability to sell our products due to expected or alleged infringements of third-party IPR and any IPR claims, regardless of merit, could result in a material loss of profits, costly litigation, the obligation to pay damages and other compensation, the diversion of the attention of our key employees, product shipment delays or the need for us to develop non-infringing technology or to enter into a licensing agreement on unfavorable commercial terms.

In line with standard practice in our industry, we generally indemnify our customers for certain intellectual property-related infringement claims initiated by third parties relating to products or services purchased from us. These may include claims from non-practicing entities having no product or service business. If such claims are made directly against our customers, we may have limited opportunities to participate in the processes including in negotiations and in defenses, or to evaluate the outcomes and resolutions in advance. All IPR indemnifications can result in significant payment obligations for us that are difficult to estimate in advance. Moreover, our indemnification responsibilities typically arise whether or not the IPR assertions against our customers have merit.

Since all technology standards that we use and rely on, including mobile communication technologies such as UMTS, LTE and 5G, or fixed line communication technologies, include certain IPR, we cannot avoid risks of facing claims for infringement of such rights due to our reliance on such standards. We believe the number of third parties declaring their patents to be potentially relevant to these standards is increasing, which may increase the likelihood that we will be subject to such claims in the future. As the number of market entrants and the complexity of technologies increase, it remains likely that we will need to obtain licenses with respect to existing and new standards from other licensors. While we believe most of such IPR declared or actually found to be essential to a particular standard carries an obligation to be licensed on fair, reasonable and non-discriminatory terms, not all intellectual property owners agree to apply such terms, nor do all owners agree on what is fair, reasonable and non-discriminatory. As a result, we have experienced costly and time-consuming litigation proceedings against us and our customers or suppliers over such issues and we may continue to experience such litigations in the future.

From time to time, certain existing patent licenses may expire or otherwise become subject to renegotiation. The inability to renew or finalize such arrangements or renew licenses with acceptable commercial terms may result in costly and time-consuming litigation, and any adverse result in any such litigation may lead to restrictions on our ability to sell certain products and could result in payments that could be significant. These legal proceedings may continue to be expensive and time-consuming and divert the efforts of our management and technical experts from our business and, if decided against us, could result in unfavorable judgements, restrictions on our ability to sell our products, require us to pay increased licensing fees, costly settlements, fines or other penalties and expenses.

Our patent license agreements may not cover all the future businesses that we may enter, our existing business may not necessarily be covered by our patent license agreements if there are changes in our corporate structure or our subsidiaries, or our newly-acquired businesses may already have patent license agreements with terms that differ from similar terms in our patent license agreements. This may result in increased costs,

restrictions in the use of certain technologies or time-consuming and costly disputes whenever there are changes in our corporate structure or our subsidiaries, or whenever we enter into new business areas or acquire new businesses.

We make accruals and provisions to cover our estimated total direct IPR costs for our products. The total direct IPR costs consist of actual payments to licensors, accrued expenses under existing agreements and provisions for potential liabilities. We believe our accruals and provisions are appropriate for all technologies owned by third parties. The ultimate outcome, however, may differ from the provided level, which could have an adverse impact on us.

Risks stemming from geopolitical, legal, regulatory and compliance environment

We conduct our business globally, being subject to direct and indirect regulation and exposed to geopolitical and regulatory risks, such as unfavorable or unpredictable treatment in relation to trade sanctions, tariffs, tax matters, export controls, exchange controls, and other restrictions. Our governance, internal controls and compliance processes could fail to detect errors or wrongdoings and to prevent regulatory penalties at corporate level, in operating subsidiaries and joint ventures.

Our business and activities cover multiple jurisdictions and are subject to complex regulatory frameworks, political, regulatory and economic developments such as political turmoil, trade barriers, tariffs, military actions, labor unrest, civil unrest, and public health and safety threats, which could have a material adverse effect on us, our supply chain, our ability to supply products and services, including network infrastructure equipment manufactured in such countries, and on our sales and results of operations. Furthermore, we have observed an increase in the adoption of surveillance, data localization, national sourcing and national hiring requirements regulations and policies. Current international trends show increased enforcement activity in areas such as national security, competition law, export control and sanctions, privacy, cybersecurity and anti-corruption. Despite our Group-wide compliance measures, including annual ethical business training and other measures, we may not be able to prevent breaches of law or governance standards within our business, subsidiaries or joint ventures. If we fail to or are unable to comply with applicable law and regulations, we could experience penalties and adverse rulings in enforcement and other proceedings.

The regulatory, trade controls and sanctions legal environment can be difficult to navigate for companies with global operations, impacting our ability to grow business in specific markets or enter new markets. Export controls, tariffs or other fees or levies imposed on our products and environmental, health, product safety and data protection, security, consumer protection, money laundering and other regulations that adversely affect the export, import, technical design, pricing or costs of our products could also adversely affect our sales and results of operations. Our business may be impacted by new, existing or tightened export control regulations, sanctions, embargoes or other forms of economic and trade restrictions imposed on certain countries and entities.

As a global operator, Nokia conducts business subject to export controls regulations and business in countries subject to various sanctions. Although we strive to conduct all operations of Nokia, and in particular any operations undertaken in countries targeted by sanctions, in accordance with our comprehensive and robust Internal Compliance Program to ensure that they are in full compliance with all applicable laws and regulations, we cannot ensure that breaches will not occur. We continuously monitor international developments and assess the appropriateness of our presence and business in various markets. As an example, the US' unilateral withdrawal from the international agreement on Iran's nuclear activities has led to the reimposition of US sanctions while the EU and other signatories remain fully committed to the international agreement relaxing the sanctions against Iran. The diverging EU and US regulatory frameworks governing business activities in Iran continue to be complex and as a European company, it will require reconciling the opposing foreign policy regimes of the US and the EU.

The UK departed from the EU on January 31, 2020 and the terms of its withdrawal and the nature of its future relationship with the EU were decided in the form of the Withdrawal Agreement (including the Northern Ireland Protocol) which came into force on that same date and the Trade and Cooperation Agreement (TCA). The latter was agreed upon at the end of 2020 and is now in force following formal ratification by the UK, while the EU is applying it only provisionally until the European Parliament formally approves it. This may not happen until April 2021. The true long-term effects of Brexit will not materialize at least until when the various transition periods agreed in the TCA expire and are replaced by the final provisions of the TCA and the legislative and regulatory actions undertaken by the UK. The UK retained the freedom to diverge from EU regulation, so regulatory divergence will likely occur. Any of the potential or actual effects of Brexit (such as delays in supply chains, lack of access to skilled human resources, increased import-export controls, added bureaucracy, additional certification rules, rules of origin requirements, inability to easily transfer data) could have a negative effect on our business, both in the UK and in the EU, as well as in other countries, depending on the terms of the agreements the UK concludes with other trading partners.

The US continues to maintain tariffs implemented during 2019. In response, certain foreign governments have implemented or are reportedly considering implementing additional tariffs on US goods. Implementation of or uncertainties with respect to any tariffs, trade agreements or further escalation of a trade war could negatively impact the global economic markets and could affect our customers' ability to invest in capital expenditures, which may in turn result in reduced demand for our products and services. Changes in tariffs have resulted, and may continue to do so, in changes in supply and manufacturing.

We have a significant presence in emerging markets in which the political, economic, legal and regulatory systems are less predictable than in countries with more developed institutions. These markets represent a significant portion of our total sales, and a significant portion of expected future industry growth. Most of our suppliers are located in, and our products are manufactured and assembled in, emerging markets, particularly in Asia. Our business and investments in emerging markets may also be subject to risks and uncertainties, including unfavorable or unpredictable treatment in relation to tax matters, exchange controls, restrictions affecting our ability to make cross-border transfers of funds, regulatory proceedings, unsound or unethical business practices, challenges in protecting our IPR, nationalization, inflation, currency fluctuations or the absence of or unexpected changes in regulation, as well as other unforeseeable operational risks. The purchasing power of our customers in developing markets depends to a greater extent on the price development of basic commodities and currency fluctuations, which may render our products or services unaffordable.

In recent years, we have witnessed political unrest in various markets in which we conduct business or in which we have operations, which in turn has adversely affected our sales, profitability or operations in these markets, and also in certain cases affected us outside these countries or regions. Any recurrence or escalation of such unrest could have a further material adverse effect on our sales or results of operations. Should we decide to exit or otherwise alter our presence in a particular market, this may have an adverse effect on us through, for example, triggering investigations, tax audits by authorities, claims by contracting parties or reputational damage. The results and costs of investigations or claims against our international operations may be difficult to predict and could lead to lengthy disputes, fines or fees, indemnities or costly settlements.

Nokia is a publicly listed company and, as such, subject to various securities and accounting rules and regulations. For instance, we must monitor and assess our internal control over financial reporting and its compliance with the applicable rules and regulations. Our corporate function's, our operating subsidiaries' or our joint ventures' failure to maintain effective internal controls over financial reporting, or to comply with the applicable securities and accounting rules and regulations, could adversely affect the accuracy and timeliness of our financial reporting, which could result, for

instance, in loss of confidence in us or in the accuracy and completeness of our financial reports, or otherwise in the imposition of fines or other regulatory measures, which could have a material adverse effect on us.

Changes in various types of regulations or in their application, or emerging new regulation (in areas such as security/privacy, digital economy or sustainable finance), applicable to current or new technologies or products, may adversely affect us.

We develop our products based on existing regulations and technical standards, our predictions for, and interpretation of, unfinished technical standards and upcoming or draft regulations or, in certain cases, in the absence of applicable regulations and standards. The regulators' lack of appropriate frameworks, legislative support and competencies necessary to address the rapid evolution of technology in our domain presents a particular challenge. On the other hand, changes in various existing regulations or in their application, applicable to current or new technologies, products or telecommunication and technology sectors in general, may adversely affect our business and results of operations. For example, changes in regulation or standards affecting the construction of base stations and other network infrastructure could adversely affect the timing and costs of new network constructions or the expansion and commercial launch and ultimate commercial success of such networks.

The COVID-19 crisis exposed the limitations of the current mechanisms for delivering connectivity, such as market and community models. While new regulatory initiatives (including cross-jurisdictional partnerships, realistic spectrum pricing for 5G deployment and tax incentives to drive infrastructure development) are being launched, their immediate impact is difficult to predict. An increase in regulation of the digital economy and telecommunications following the European Commission's review of Europe's 5G Action Plan and Radio Spectrum Policy Programme could fail to find the right balance between political ambitions and practical considerations, which might negatively affect the further uptake of 5G services, with an adverse effect on Nokia. From a spectrum policy perspective, unrealistic spectrum pricing for 5G development, failure to enable access to additional spectrum in various bands and/or failure to achieve frequency band harmonization could also adversely impact Nokia's customers and Nokia itself.

Changes in applicable privacy-related regulatory frameworks, such as EU General Data Protection Regulation, the upcoming EU eEvidence and e-Privacy Regulations and similar regulations in other countries or their application may adversely affect our business, including possible changes that increase costs, limit or restrict possibilities to offer products or services, or reduce or could be seen to reduce the privacy aspects of our offerings. Further, although we monitor for such changes and implement updates to applicable policies and compliance measures, we cannot ensure that violations will not occur. For instance, countries could require governmental interception capabilities or issue regulations aimed at allowing direct governmental access to data for the products and services we offer. Such requirements or regulations could adversely affect us, if, among other things, we decide to reduce our sales to such markets or if such requirements or regulations would be limiting our ability to use components, products or software that we have developed or sourced from other companies. Our current business models and operations rely on certain centralized data processing solutions and cloud or remote delivery-based services for distribution of services and software or data storage, which have certain inherent risks, including those stemming from applicable regulatory regimes, including data protection or data localization, that may cause limitations in implementing such business models or conducting business. An increase in the protectionist stances of governments around the world, which impact the free flow of data across borders, is already affecting our global service delivery model. Furthermore, we observe that enforcement actions and investigations by regulatory authorities related to data security incidents and privacy violations continue to increase. Unauthorized disclosure, transfer or loss of sensitive or confidential data, whether through systems failure, employee negligence, fraud or misappropriation, by the company, our vendors or other parties with whom we do business (if they fail to meet the standards we impose) could subject us to significant litigation, monetary damages, regulatory enforcement actions, fines and criminal prosecution in one or more jurisdictions.

We are seeing an increase in climate-related regulations and customer requirements globally and, in the longer term, such regulations or requirements could impact our energy, component and logistic costs or impact the competitiveness of our product offering. Emerging regulation coming from the European Union related to Sustainable Finance could also affect how our products are perceived by the markets. For example, the EU Taxonomy initiative aims to define rules of which economic activities are deemed to contribute to sustainability objectives. If our products did not belong to categories defined as sustainable according to the EU Taxonomy or comply with other set standards, we could potentially experience loss of sales, profit and brand value.

Our business and results of operations may be adversely affected by regulation favoring the local industry participants, as well as other measures with potentially protectionist objectives or outcomes that host governments in various countries may take. Governments and regulators, particularly after changes in political regimes, may make legal and regulatory changes or interpret and apply existing laws in ways that make our products and services less appealing to end-users or require us to incur substantial costs, change our business practices or prevent us from offering our products and services. Restrictive government policies or actions, such as limitations on visas or work permits for certain foreign workers, may make it difficult for us to move our employees into and out of these jurisdictions. Our operations and employee recruitment and retention depend on our ability to obtain the necessary visas and work permits for our employees to travel and work in the jurisdictions in which we operate. Our competitors have employed and will likely continue to employ significant resources to shape the legal and regulatory regimes in countries where we have significant operations. Achieving the right balance between security imperatives, technological development needs and political ambition is essential. The impact of changes in or uncertainties related to regulation and trade policies could adversely affect our business and results of operations even in cases where the regulations do not directly apply to us or our products and services.

We operate in many jurisdictions around the world, and we are subject to various legal frameworks regulating corruption, fraud, competition, trade policies, and other risk areas. At any given time, we may be subject to inspections, investigations, claims, and government proceedings, and the extent and outcome of such proceedings may be difficult to estimate with any certainty. We may be subject to material fines, penalties and other sanctions as a result of such investigations.

Bribery and anti-corruption laws in effect in many countries prohibit companies and their intermediaries from making improper payments to public officials or private individuals for the purpose of obtaining new business, maintaining existing business relationships or gaining any material advantage. Certain anti-corruption laws such as the United States Foreign Corrupt Practices Act (FCPA) also require the maintenance of proper books and records, and the implementation of controls and procedures in order to ensure that a company's operations do not involve corrupt payments. Since we operate throughout the world and, given that some of our customers are government-owned entities and that our projects and agreements often require approvals from public officials, there is a risk that our employees, suppliers, consultants or commercial third-party representatives may take actions that are in violation of our compliance policies and of applicable anti-corruption laws.

In many parts of the world where we operate, local practices and customs may be inconsistent with our policies, including the Nokia Code of Conduct, and could violate anti-corruption laws, including the FCPA and the UK Bribery Act 2010, and applicable European Union regulations, as well as applicable economic sanctions, embargoes and applicable competition laws. Our employees, or other parties acting on our behalf, could violate policies and procedures intended to promote compliance with anti-corruption laws, economic sanctions or competition laws. Violations of these laws by our employees or other parties acting on our behalf, regardless of whether we had participated in such acts or had knowledge of such acts, could result in us or our employees becoming subject to criminal or civil enforcement actions, including fines or penalties, disgorgement of profits and suspension or disqualification of sales. Additionally, violations of law or allegations of violations may result in reputational harm and

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loss of business and adversely affect our brand and reputation. Detecting, investigating and resolving such situations may also result in significant costs, including the need to engage external advisors, and consume significant time, attention and resources from our management and other key employees. The results and costs of such investigations or claims may be difficult to predict and could lead to, for instance, lengthy disputes, fines, fees or indemnities, costly settlement or the deterioration of the Nokia brand. Furthermore, even without allegations of misconduct against us, our employees or other parties acting on our behalf, we may face loss of business as a result of improper conduct or alleged improper conduct by our competitors.

We may be subject to claims, fines, investigations or assessments for conduct that we failed to or were unable to discover or identify in the course of performing our due diligence investigations of Alcatel-Lucent, including unknown or unasserted liabilities and issues relating to fraud, trade compliance, non-compliance with applicable laws and regulations, improper accounting policies or other improper activities. With the acquisition of Alcatel-Lucent, any historical issues with Alcatel-Lucent's operations may be attributed to or the responsibility of Nokia. In the past, Alcatel-Lucent has experienced both actual and alleged violations of anti-corruption laws. As a result of FCPA violations in the past, Alcatel-Lucent had to pay substantial amounts in fines, penalties and disgorgement of profits to government enforcement agencies in the United States and elsewhere.

We are subject to litigation proceedings, which may be disruptive and expensive. In addition, an unfavorable outcome of litigation, arbitrations, agreement-related disputes or product liability-related allegations against our business could have a material adverse effect on us.

We are a party to lawsuits, arbitrations, agreement-related disputes and product liability-related allegations in the normal course of our business. Litigation, arbitration or agreement-related disputes can be expensive, lengthy and disruptive to normal business operations and divert the efforts of our management. Moreover, the outcomes of complex legal proceedings or agreement-related disputes are difficult to predict. An unfavorable resolution of a particular lawsuit, arbitration or agreement-related dispute could have a material adverse effect on us. The investment or acquisition decisions we make may subject us to litigation arising from minority shareholders' actions and investor dissatisfaction with the activities of our business. Shareholder disputes, if resolved against us, could have a material adverse effect on us.

We record provisions for pending claims when we determine that an unfavorable outcome is likely and the loss can reasonably be estimated. Although we believe our provisions for pending claims are appropriate, due to the inherent uncertain nature of legal proceedings, the ultimate outcome or actual cost of settlement may materially differ from estimates.

Although our products are designed to meet all relevant safety standards and other recommendations and regulatory requirements globally, we cannot guarantee we will not become subject to product liability claims or be held liable for such claims, which could have a material adverse effect on us. We have been involved in several lawsuits alleging adverse health effects associated with our products, including those caused by electromagnetic fields, and the outcome of such procedures is difficult to predict, including potentially significant fines or settlements. Even a perceived risk of adverse health effects of mobile devices or base stations could have a material adverse effect on us through a reduction in the demand for mobile devices, for instance through a decreased demand for mobile networks or increased difficulty in obtaining sites for base stations.

For a more detailed discussion of litigation to which we are a party, refer to Note 30, Commitments, contingencies and legal matters, of our consolidated financial statements included in this Annual Report on Form 20-F.

Risks related to management and operations

We may face problems or disruptions in our or our partners' manufacturing, service creation, delivery, logistics or supply chain. Such challenges include securing adequate volumes to meet the demand, adapting supply, defects in products or related software or services and achieving required efficiencies and flexibility. Our supplier or suppliers/partners may fail to meet product quality, health, safety or security requirements or comply with other regulations or local laws, such as environmental or labor laws. Additionally, adverse events, such as geopolitical disruptions, natural or man-made disasters, civil unrest or health crises, may have a profound impact on our service delivery or production sites or the production sites of our suppliers/partners, which are geographically concentrated.

We, or third parties that we outsource manufacturing/services to, may experience difficulties in adapting supply to meet the changing demand for our products and services, ramping up and down production, adjusting network implementation capabilities as needed on a timely basis, maintaining an optimal inventory level, adopting new manufacturing processes, finding the most timely way to develop the best technical solutions for new products, managing the increasingly complex manufacturing process, service creation and delivery process or achieving required efficiencies and flexibility. In addition, these operations are exposed to various risks and potential liabilities, including those related to geopolitics, compliance with laws and regulations, exposure to environmental liabilities or other claims.

Our manufacturing operations depend on obtaining sufficient quantities of fully functional products, components, sub-assemblies, software and services on a timely basis. Our principal supply requirements for our products are for electronic components, mechanical components and software, which all have a wide range of applications in our products. In certain cases, a particular component or service may be available only from a limited number of suppliers or from a single supplier in the supply chain. Suppliers may from time to time extend lead times, limit supplies, change their partner preferences, increase prices, provide poor quality supplies or be unable to adapt to changes in demand due to capacity constraints or other factors, which could adversely affect our ability to deliver our products and services on a timely basis. If we fail to properly anticipate customer demand, an over-supply or under-supply of components and production or services delivery capacity could occur. In many cases, some of our competitors utilize the same contract manufacturers, component suppliers and service vendors. If they have purchased capacity or components ahead of us, or if there is significant consolidation in the relevant supplier base, this could prevent us from acquiring the required components or services, which could limit our ability to supply our customers or increase our costs.

A large proportion of Nokia manufacturing and field installation activities are carried out by third-party suppliers. These vary in size and often engage a number of tiers of suppliers, which limits Nokia's direct control. Our suppliers or a supplier may fail to meet our supplier requirements, such as our and our customers' product quality, safety, security and other standards. Certain suppliers may not comply with local laws, including, among others, local labor law, health and safety or environmental requirements. Consequently, some of our products or the manner in which services are delivered may be unacceptable to us or to our customers. This can in turn lead to exposure in the form of litigation, product recalls or brand damage through association.

Our products are highly complex and defects in their design, manufacture and associated hardware, software and content have occurred in the past and may continue to occur in the future. Defects and other quality issues may result from, among other things, failure in our own product manufacturing and service creation and delivery, as well as failure of our suppliers/partners to comply with our requirements, or failures in products and services created jointly with business partners or other third parties where the development and manufacturing process is not fully within our control. Quality issues may cause, for instance, delays in deliveries, loss of intellectual property, liabilities for network outages, court fees and fines due to breaches of significantly increasing regulatory privacy requirements and related negative publicity, and additional repair, product

replacement or warranty costs to us, and harm our reputation and our ability to sustain or obtain business with our current and potential customers. With respect to our services, quality issues may relate to the challenges of having the services fully operational at the time they are made available to our customers and maintaining them on an ongoing basis. We may also be subject to damages due to product liability claims arising from defective products and components. We make provisions to cover our estimated warranty costs for our products and pending liability claims. We believe our provisions are appropriate, although the ultimate outcome may materially differ from the provisions that are provided for, which could have a material adverse effect on us.

We may be subjected to negative publicity with respect to the activities that we manage or that are managed by third parties for us. For instance, we may experience challenges caused by third parties, or other external difficulties in connection with our efforts to modify our operations to improve the efficiency and flexibility of our manufacturing, service creation and delivery, as well as our logistics, including, but not limited to, strikes, purchasing boycotts, public harm to our brand and claims for compensation resulting from our decisions on where to place and how to utilize our manufacturing facilities. Such difficulties may result from, among other things, delays in adjusting production at our facilities, delays in expanding production capacity, failures in our manufacturing, service creation and delivery, as well as logistics processes, failures in the activities we have outsourced, and interruptions in the data communication systems that run our operations. Any of these events could delay our successful and timely delivery of products that meet our and our customers' quality, safety, security and other requirements, cause delivery of insufficient or excess volumes compared with our own estimates or customer requirements, or otherwise have a material adverse effect on our sales and results of operations or our reputation and brand value.

Many of our production sites or the production sites of our suppliers/partners are geographically concentrated, with a majority of our suppliers/partners based in Asia. We rely on efficient logistic chain elements, such as regional distribution hubs or transport chain elements (main ports, streets, and airways). In the event that any of these geographic areas are affected by any adverse conditions, such as severe impacts of climate change or other environmental events, natural or man-made disasters, geopolitical disruptions, civil unrest or health crises (such as the COVID-19 pandemic) that disrupt production or deliveries from our suppliers/partners, our ability to deliver our products on a timely basis could be adversely affected. In a similar manner, these adverse conditions may also cause disruption to our service creation and delivery, which, in either case, may lead to a material adverse effect on our business and results of operations.

Performance failures of our partners, as well as failures to agree to partnering arrangements with third parties could adversely affect us.

If any of the companies we partner and collaborate with were to fail to perform as expected, or if we fail to achieve the collaboration or partnering arrangements needed to succeed, we may be unable to bring our products, services or technologies to market successfully or in a timely manner. We are increasingly collaborating and partnering with third parties to develop technologies, products and services, as well as seeking new revenue streams through partnering arrangements. We also depend on third-party partners in our efforts to monetize our brands, including the Nokia and Nokia Bell Labs brands and technologies, and we have outsourced various functions to third parties and are relying on them to provide certain services to us. These arrangements involve the commitment of certain resources, including technology, R&D, services and employees. Although the objective of the collaborative and partnering arrangements is a mutually beneficial outcome for each party, our ability to introduce and provide products and services that are commercially viable and meet our, our customers' and consumers' quality, safety, security and other standards in a timely manner could be hampered from performance or other failures. For instance, if a partner acts inconsistently with our ethical, sustainability, compliance, brand, or quality standards, this can negatively affect our reputation, the value of our brand, and the business outcome of our partnerships.

In many areas, including IT, finance and human resources-related arrangements, a failure to maintain an efficient relationship with the selected partner may lead to ongoing operational problems or even to severe business disruptions, and the availability of the processes and services upon which we rely may be interrupted. Performance problems may result in missed reporting deadlines, internal controls challenges, financial losses, missed business opportunities and reputational harm. In addition, as management's focus shifts from a direct to an indirect operational control in these areas, there is a risk that without active management and monitoring of the relationship, the services provided may be below appropriate quality standards. Partners may not meet agreed service levels, in which case, depending on the impacted service, our contractual remedies may not fully cure all of the damages we may suffer. This is particularly true for any deficiencies that would impact the reporting requirements applicable to us as a company listed on multiple stock exchanges.

In order to implement outsourcing arrangements, we may be required to implement changes in our business practices and processes, for instance to capture economies of scale and operational efficiencies, and to reflect a different way of doing business. Consequently, business processes that were customized for individual business groups or for us generally may be converted to a more standardized format. During a transition to outsourcing, our employees may need to train the partner's staff or be trained in the partner's systems, potentially resulting in the distraction of our employees. Adjustments to staff size and transfer of employees to the partner's companies could have an adverse effect on us, for instance through impacting the morale of our employees and raising complex labor law issues and resulting in the loss of key personnel. Additionally, partnering and outsourcing arrangements can create a dependency on the outsourcing company, causing issues in our ability to learn from day-to-day responsibilities, gain hands-on experience, adapt to changing business needs and properly transfer the specific know-how to the new outsourcing partners. Concerns could equally arise from giving third parties access to confidential data, strategic technology applications and books and records. There is also a risk that we may not be able to determine whether controls have been effectively implemented, and whether the partner company's performance-monitoring reports are accurate.

Inefficiencies, breaches, malfunctions or disruptions of information technology systems and processes could have a material adverse effect on our business and results of operations. As our business operations, including those we have outsourced, rely on complex IT systems, networks and related services, our reliance on the precautions taken by external companies to ensure the reliability of our and their IT systems, networks and related services is increasing. Consequently, certain disruptions in IT systems and networks affecting our external providers could also have a material adverse effect on our business.

Our operations rely on the efficient and uninterrupted operation of complex and centralized IT systems, networks and processes, which are integrated with those of third parties. All IT systems, networks and processes are potentially vulnerable to damage, breaches, malfunction or interruption from a variety of sources. We are, to a significant extent, relying on third parties for the provision of IT services. We may experience disruptions if our partners do not deliver as expected or if we are unable to successfully manage systems and processes together with our business partners. The ongoing migration to cloud-based architectures and network function virtualization has introduced further complexity and associated risk.

We are constantly seeking to improve the quality and security of our IT systems. For instance, we have introduced new significant IT solutions in recent years. While we have outsourced certain functions, we have also increased our dependence on the reliability of external providers as well as on the security of communication with them. We will often need to use new service providers and may, due to technical developments or choices regarding technology, increase our reliance on certain new technologies, such as cloud or remote delivery on demand-based services and certain other services that are used over the internet rather than using a traditional licensing model. Switching to new service providers and introducing

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new technologies is inherently risky and may expose us to an increased risk of disruptions in our operations, for instance due to network inefficiency, a cybersecurity or a compliance breach, malfunctions, failure in disaster recovery/IT service continuity or other disruptions resulting from IT systems and processes.

We pursue various measures in order to manage our risks related to system and network malfunctions and disruptions, including the use of multiple suppliers and their strong technical and contractual engagements in IT security. However, despite precautions taken by us, any malfunction or disruption of our current or future systems or networks, such as an outage in a telecommunications network used by any of our IT systems, or a breach of our cybersecurity, such as an attack, malware, ransomware or other event that leads to an unanticipated interruption or malfunction of our IT systems, processes, networks or data leakages, could have a material adverse effect on our business, results of operations and brand value. Additionally, we may fail to successfully secure our IT. A disruption of services relying on our IT, for instance, could cause significant discontent among users resulting in claims, contractual penalties or deterioration of our brand value. Further, while we are increasing our investments in digitalizing our operations and transforming our IT, the legacy IT systems may be more vulnerable to malfunction, disruptions or security breaches than the new IT systems replacing them.

We are exposed to risks related to information security. Our business model relies on solutions for distribution of services and software or data storage, which entail inherent risks relating not only to applicable regulatory regimes, but also to cybersecurity breaches and other unauthorized access to network data or other potential security risks that may adversely affect our business and/or compromise personal data. Our business and operations rely on confidentiality of proprietary information as well as sensitive information, for instance related to our employees, consumers and our customers. Our business models rely on certain centralized data processing solutions and cloud or remote delivery-based services for distribution of services and software or data storage, accessible by our partners or subcontractors according to the roles and responsibilities defined.

We or our products and online services, marketing and developer sites may be subject to cybersecurity breaches, including hacking, ransomware, viruses, worms and other malicious software, unauthorized modifications, or illegal activities that may cause potential security risks and other harm to us, our customers or consumers and other end-users of our products and services. IT is rapidly evolving, the techniques used to obtain unauthorized access or sabotage systems change frequently and the parties behind cyber-attacks and other industrial espionage are believed to be sophisticated and have extensive resources, and it is not commercially or technically feasible to mitigate all known vulnerabilities in a timely manner or to eliminate all risk of cyber-attacks and data breaches. Further, while we are increasing our investments in digitalizing our operations and transforming our IT, the legacy IT systems may be more vulnerable to malfunction, disruptions or security breaches than the new IT systems replacing them. Additionally, we contract with multiple third parties in various jurisdictions who collect and use certain data on our behalf. Although we have processes in place designed to ensure appropriate collection, handling and use of such data, third parties may use the data inappropriately or breach laws and agreements in collecting, handling or using or leaking such data. This could lead to lengthy legal proceedings or fines imposed on us, as well as adverse effects to our reputation and brand value. Additionally, cyber-attacks can be difficult to prevent, detect or contain. We cannot rule out the possibility that there may have been cyber-attacks that have been successful and/or evaded our detection. We continue to invest in risk mitigating actions; however, there can be no assurance that such investments and actions will prevent or detect future cyber-attacks.

In connection with providing products and services to our customers and consumers, certain personal and consumer data are collected, stored and processed through us, either by us or by our business partners or subcontractors in various jurisdictions. We have outsourced a significant portion of our IT operations, as well as the network and information systems that we sell to third parties or for whose security and reliability we may otherwise be accountable. Loss, improper disclosure or processing or leakage of any personal or consumer data collected by us or which is available to our partners or subcontractors, made available to us or stored in or through our products, could have a material adverse effect on us and harm our reputation and brand. Additionally, governmental authorities may use our networks products to access the personal data of individuals without our involvement; for example, through the so-called lawful intercept capabilities of network infrastructure, impairing our reputation.

Our business is also vulnerable to theft, fraud or other forms of deception, sabotage and intentional acts of vandalism by third parties and employees. Unauthorized access to or modification, misappropriation or loss of our intellectual property and confidential information, including personal data, could result in litigation and potential liability to customers, suppliers and other third parties, harm our competitive position, reduce the value of our investment in R&D and other strategic initiatives or damage our brand and reputation. Additionally, the cost and operational consequences of implementing further information system protection measures, especially if prescribed by national authorities, could be significant. We may not be successful in implementing such measures in due time, which could cause business disruptions and be more expensive, time-consuming and resource-intensive.

We engage in the installation and maintenance of undersea telecommunications cable networks. During this activity, we may cause damage to existing undersea infrastructure, for which we may ultimately be held responsible.

We supply, install and maintain submarine optical fiber cable networks linking mainland to islands, island to island or several points along a coast. Our activities also include the provision of optical fiber infrastructure to oil and gas platforms and other offshore installations. Expert personnel, specialist equipment and an independently certified management system are integral to our management of risk throughout the entire planning and execution phases of such activities. We perform surveys, follow rigorous permit processes and use third-party cartographic databases maintained by recognized hydrographic institutes. However, there is a risk that previously-laid infrastructure, such as third-party fiber optic cables, electrical power lines or hydrocarbon pipelines, may go undetected despite such precautions, and be damaged during the process of laying or maintaining the telecommunications cables. Such an event could potentially cause temporary business interruption to third parties operating in the same area, environmental incidents, safety accidents, unwanted media or regulatory attention, loss of reputation, litigation, repair costs or compensation payments for the affected parties. While we have contractual limitations in place and maintain insurance coverage to limit our exposure, these protections may be insufficient to cover such exposure entirely.

We may be unable to retain, motivate, develop and recruit appropriately skilled employees or we may fail in workforce balancing. Employees may face change fatigue, reduction in motivation and energy as our efforts to evolve our business and improve efficiency continue. Increase in the share of remote working was sharp and rapid due to COVID-19 pandemic, allowing little time to adapt the respective health and safety practices, processes and policies.

Our success is dependent in part on our ability to retain, motivate, develop and recruit appropriately skilled employees. The market for skilled employees and leaders in our business is extremely competitive. We continuously work on developing a corporate culture that is motivational, based on equal opportunities and encourages creativity and continuous learning to meet the challenges.

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We have encountered, and may in the future encounter, shortages of appropriately skilled employees or lose key employees or senior management, which may hamper our ability to implement our strategies and may have a material adverse effect on us. Changes in our strategy in order to respond to our business targets and endeavors and related uncertainty have caused and may in the future cause disruption, dissatisfaction and fatigue among employees, as our efforts to evolve our business and maximize operational efficiency continue. As a result, employee motivation, energy, focus, morale and productivity may be reduced, causing inefficiencies and other problems across the organization resulting in the loss of key employees, difficulties in recruiting employees and increased costs in resolving and addressing such matters. The loss of key employees could result in resource gaps, some of which may only be noticed after a certain period of time or which negatively impact our relationship with customers, vendors or other business partners. We have acquired, and may from time to time acquire, businesses or complete other transactions where retaining key employees may be crucial to obtain the intended benefits of such transactions. There can be no assurances that we will be able to implement measures successfully to retain or hire the required employees. We believe this will require significant time, attention and resources from our senior management and other key employees within our organization and may result in increased costs.

We may fail in our efforts to rebalance our workforce as planned, which may result in larger than expected costs, or we may not be able to complete such efforts, for instance due to legal restrictions, resulting in a non-optimal workforce that could hinder our ability to reach targeted cost savings. Relationships with employee representatives are generally managed at the site level in accordance with country-specific legislation and most collective bargaining agreements have been in place for several years. Our inability to negotiate successfully with employee representatives or failures in our relationships with such representatives could result in strikes by the employees, increased operating costs as a result of higher wages or benefits paid to employees as the result of such strike or other industrial action or inability to implement changes to our organization and operational structure in the planned timeframe or expense level, or at all. If our employees were to engage in a strike or other work stoppage, we could experience a significant disruption in our day-to-day operations and higher ongoing labor costs.

We continue to have exposure to the health risks of COVID-19 pandemic and to the control and mitigation measures deployed by governments to reduce the spread of the virus. We were able to pivot to remote working very effectively in the early days of the pandemic; however, these changes were required in short timeframes that allowed little time to adapt. We believe that this pandemic will permanently increase share of remote working, and we may be exposed to a larger extent than before to impacts related to remote work and arranging the home office, such as decreased creativity or productivity of employees, supervising working hours, challenges in identifying, assessing and supporting employees in stress or poor mental health, inability to help employees to work safely in their home office environment (e.g. furnishing, equipment, lighting, ventilation) or developing and supervising the execution of related internal policies leading to potential health issues and litigation.

We are involved in joint ventures and are exposed to risks inherent to companies under joint management.

We have a number of joint ventures in various parts of the world, including those where Nokia is the minority partner or where Nokia does not have direct management control. The agreements related to our joint ventures may require unanimous consent or the affirmative vote of a qualified majority of the shareholders to take certain actions, thereby possibly slowing down the decision-making process or impairing our ability to implement our key policies and practices, such as our compliance processes and culture in a comprehensive or timely manner. In addition, joint venture companies involve inherent risks such as those associated with a complex corporate governance structure, including lack of transparency and consequent risks of compliance breaches or other similar issues, or issues in dissolving such entities or divesting their shareholdings, assets and liabilities, and also may involve negative public perceptions caused by the joint venture partner that are adverse to us.

Taxes-related uncertainties

We have operations in many countries with different tax laws and rules, which may result in complex tax issues and disputes.

Taxation or other fees collected by governments or governmental agencies may result in unexpected payment obligations, and in response to prevailing difficult economic conditions in the public sector, coupled with already enacted and proposed fundamental changes in international tax regulations, there may be an increased aggressiveness in collecting such fees or taxes. We may be obliged to pay additional taxes for past periods as a result of changes in law, or changes of tax authority practice or interpretation (possibly with retroactive effect in certain cases), or inaccurate interpretations of tax laws by us resulting potentially in a material adverse effect on our cash flow and financial position. The taxes for which we make provisions, such as income taxes, indirect taxes and social taxes, could increase significantly in the future as a result of changes in applicable tax laws or global guidance in the area of transfer pricing in the countries in which we operate. There may also be unforeseen tax expenses that turn out to have an unfavorable impact on us. As a result, and given the inherently unpredictable nature of taxation, our tax rate may change from its current level and our cash flows regarding taxes may not be stable.

Our business, investments and activities cover multiple jurisdictions and are subject to complex tax laws and rules as well as diverse tax authority practices and interpretations, including any changes (possibly unfavorable or unpredictable or with retroactive effect in certain cases) in the aforesaid. Despite our governance and compliance procedures, there might be unintended consequences from changes in interpretation of complex tax regulations or retroactive implications in tax reforms to our business, subsidiaries and joint ventures. As a company with global operations, we are subject to tax investigations in various jurisdictions, and such proceedings can be lengthy, involve actions that can hinder local operations and affect unrelated parts of our business, and the outcome of such proceedings is difficult to predict. While we have made provisions for certain tax issues, the provisions we have made may not be adequate to cover such increases.

We may face adverse tax consequences due to our past acquisitions and divestments, including, but not limited to, stamp duties, land transfer taxes, franchise taxes and other levies and in connection with any indemnity for tax liabilities we have provided in connection with such divestments. Additionally, there may be other potential tax liabilities of which we are not currently aware but which may result in significant tax consequences now or in the future.

In the context of our sale of Devices & Services business to Microsoft, we are required to indemnify Microsoft for certain tax liabilities, including (i) tax liabilities of the Nokia entities acquired by Microsoft in connection with the closing of the sale of Devices & Services business, (ii) tax liabilities associated with the assets acquired by Microsoft and attributable to tax periods ending on or prior to the closing date of the sale of Devices & Services business, and (iii) tax liabilities relating to the pre-closing portion of any taxable period that includes the closing date of the sale of Devices & Services business.

Our actual or anticipated performance, among other factors, could reduce our ability to utilize our tax attributes and deferred tax assets.

Deferred tax assets recognized on tax losses, unused tax credits and tax-deductible temporary differences are dependent on our ability to offset such items against future taxable income within the relevant tax jurisdiction. Such deferred tax assets are also based on our assumptions on future taxable earnings and these may not be realized as expected and could be adversely impacted by the COVID-19 crisis, which may cause the deferred tax assets to be materially reduced. In the fourth quarter of 2020, Nokia derecognized EUR 2.9 billion deferred tax assets related to Finland. There can be no assurances that reductions in deferred tax assets will not occur in the future. Any such reduction could have a material adverse effect on us. Additionally, our earnings have been unfavorably affected in the past, and may continue to be in the future, in the event that no tax benefits are recognized for certain deferred tax items.

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Potential changes in re-allocation of taxing rights and other fundamental international tax principles, in particular related to digital business operations, could adversely impact our business, operating results and overall tax burden. These changes could also lead to overlapping tax systems and re-evaluation of our global tax operating model, which could adversely impact our overall tax burden.

Financial risks

We may not have access to sources of funding on favorable terms, or at all.

Our business requires a significant amount of cash and we continue to invest in our R&D capabilities, particularly in the 5G. We rely on multiple sources of funding for short-term and long-term capital and aim to minimize the liquidity risk by maintaining a sufficient cash position and having committed credit lines in place. However, there can be no assurances that we will be able to generate sufficient amounts of capital or to maintain an efficient capital structure from time to time.

We also may not be able to have access to additional sources of funds that we may need from time to time with reasonable terms, or at all. If we cannot access capital or sell receivables on a commercially viable basis, our business, financial condition and cash flow could materially suffer.

We may not be able to re-establish investment grade rating or maintain our credit ratings.

Moody's, Standard & Poor's, Fitch and other credit rating agencies have assigned credit ratings to us and we have set a goal of re-establishing investment grade credit ratings. There can be no assurances that we will be able to achieve investment grade credit ratings.

In the event our credit rating is downgraded, it could have a material adverse effect, for instance on our cost of funds and related margins, our business and results of operations, financial condition, liquidity, or access to capital markets.

Due to our global operations, our net sales, costs and results of operations, as well as the US dollar value of our dividends and market price of our ADSs, are affected by exchange rate fluctuations.

We operate globally and are therefore exposed to foreign exchange risks in the form of both transaction risks and translation risks. Our policy is to monitor and hedge exchange rate exposure, and we manage our operations to mitigate, but not to eliminate, the impacts of exchange rate fluctuations. Our hedging activities may prove unsuccessful in mitigating the potentially negative impact of exchange rate fluctuations. Additionally, significant volatility in the relevant exchange rates and interest rates may increase our hedging costs, as well as limit our ability to hedge our exchange rate exposure. In particular, we may not adequately hedge against unfavorable exchange rate movements, including those of certain emerging market currencies. Furthermore, exchange rate fluctuations may have an adverse effect on our net sales, costs and results of operations, as well as our competitive position, through their impact on our customers, suppliers and competitors.

We also experience other financial market-related risks, including changes in interest rates and in prices of marketable securities that we own. We may use derivative financial instruments to reduce certain of these risks. If our strategies to reduce such risks are not successful, our financial condition and results of operation may be harmed.

Additionally, exchange rate fluctuations may materially affect the US dollar value of any dividends or other distributions that are paid in euro, as well as the market price of our ADSs.

We are exposed to pension and other post-employment cost-related risks and we may be unsuccessful in our ability to avoid or control costs resulting from a need for increased funding.

We are exposed to various employee cost-related risks, including those related to pension and post-employment healthcare and life insurance cost-related risks. In the US, we maintain significant employee pension benefit plans and a significant retiree welfare benefit plan (providing post-employment healthcare benefits and post-employment life insurance coverage). Outside the US, we contribute to pension schemes for large numbers of current and former employees. The US and non-US plans and schemes have funding requirements that depend on, among other things, various legal requirements, how assets set aside to pay for those obligations are invested, the performance of financial markets, interest rates, assumptions regarding the life expectancy of covered employees and retirees, and medical cost inflation and medical care utilization. To the extent that any of those variables change, the funding required for those plans/schemes may increase, and we may be unsuccessful in our ability to avoid or control costs resulting from such increased funding requirements.

With respect to our pension and post-employment obligations, we face the following risks, among others:

- financial market performance and volatility in asset values and discount rates affect the funded status of our pension obligations and could increase funding requirements, including legally required minimum contributions;
- our pension plan participants and post-employment health plan participants may live longer than has been assumed, which would result in an increase in our benefit obligations. We cannot be certain that the longevity of the participants in our pension plans or retiree healthcare plan will not exceed that indicated by the mortality tables we currently use or that future updates to those tables will not reflect materially longer life expectancies;
- we currently fund, and expect to be able to continue to fund, our US post-employment healthcare and group life insurance costs for our formerly represented retirees with excess pension assets in our (US) formerly represented pension plan, as permitted under Section 420 of the US Internal Revenue Code. A deterioration in the funded status of that pension plan could negatively affect our ability to continue making Section 420 transfers. Section 420 is currently set to expire in 2025; and
- we currently provide post-employment group life insurance coverage for a closed group of former non-represented employees who meet stated age and service criteria. This benefit obligation is largely insured through an experience-rated group life insurance policy issued by a reputable insurer, the premiums for which are paid from a voluntary employees' beneficiary association (veba) trust. Based on current actuarial and return-on-asset assumptions and the present level and structure of this group life insurance obligation, we believe that we can continue to fund the premiums for this policy from this trust for several more years. Once the trust's assets are depleted, however, the company will bear the annual premium cost associated with this benefit. Although we expect to be able, in the future, to fund this cost from excess pension assets in our (US) non-represented pension plan, under Section 420 of the US Internal Revenue Code, the level of excess pension assets in that plan in any given year may be insufficient to cover the annual premium cost. As noted, Section 420 is currently set to expire in 2025.

The carrying amount of our goodwill may not be recoverable.

We assess the carrying amount of goodwill annually, or more frequently if events or changes in circumstances indicate that such carrying amount may not be recoverable. We assess the carrying amount of other identifiable assets if events or changes in circumstances indicate that their carrying amounts may not be recoverable. If we do not generate revenues from our businesses as anticipated, our businesses may not generate sufficient positive operating cash flows. This, or other factors, may lead to a decrease in the value of our assets, including intangible assets and the goodwill attributed to our businesses, resulting in impairment charges that may adversely affect our net profit for the year. While we believe the

estimated recoverable values are reasonable, actual performance in the short- and long-term and our assumptions on which we base our calculations could materially differ from our forecasts, which could impact future estimates of our businesses' recoverable values, and may result in impairment charges.

Risks associated with our shares

Our share and/or ADS price may be volatile and subject to fluctuations.

Our share and/or ADS price may be volatile and could be subject to fluctuations in response to various factors, some of which are beyond our control. In addition to the factors described in this section, "Risk Factors", other factors that could cause fluctuations in our share price include, among others, high volatility in the securities markets generally and volatility in telecommunications and technology companies' securities in particular, trading volumes, speculation in the media or retail or institutional investment communities regarding the company and our prospects, future developments in our industry and competitors, our financial results and the expectations of financial analysts, as well as the timing or content of any public communications, including reports of operating results, by us or our competitors. Further, factors in the public trading market for our stock may produce price movements that may or may not comport with macro, industry or company-specific fundamentals, including, without limitation, the sentiment of retail investors (including as may be expressed on financial trading and other social media sites and online forums), the direct access by retail investors to broadly available trading platforms, the amount and status of short interest in our securities, access to margin debt, trading in options and other derivatives on our common stock and any related hedging and other trading factors.

The market price of, and trading volume for, our shares and/or ADS may change for reasons not necessarily related to our actual operating performance. The capital markets have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. In addition, in the past, following periods of volatility in the market price of a company's securities, stockholders often institute securities class action litigation against that company. This type of litigation could result in substantial costs and divert our management's attention and resources, which could have a material adverse effect on our cash flows, our ability to execute our business strategy and our ability to make distributions to our stockholders.

The amount of dividend and/or repayment of capital distributed to shareholders for each financial period is uncertain.

As announced on February 4, 2021, our Board proposed not to pay any dividend for the financial year 2020. We cannot assure that we will distribute dividends and/or capital repayments on the shares issued by us, nor is there any assurance as to the amount of any dividend and/or repayment of capital we may pay, including but not limited to situations where we make commitments to increase our dividends. The payment and the amount of any dividend and/or repayment of capital is subject to the discretion of the general meeting of our shareholders and our Board, and will depend on available cash balances, expected cash flow generation, anticipated cash needs, retained earnings, the results of our operations and our financial condition and terms of outstanding indebtedness, as well as other relevant factors such as restrictions, prohibitions or limitations imposed by applicable law. Further, even if any conditions or factors covering the issuance or distribution of dividends are met, the Board or the shareholders have in the past and may going forward decide not to issue or distribute dividends.

Shareholders may be required to provide detailed information to obtain advantageous withholding tax treatment for dividends.

As described in more detail under "General facts on Nokia – Taxation", non-Finnish shareholders are required to provide certain information in order to benefit from the reduced dividend withholding tax rates set out in the applicable tax treaties. Furthermore, custodians are required to fulfill certain strict requirements and take over certain responsibilities and assume liability of incorrectly applied withholding tax, or a higher withholding tax rate will apply. Such requirements may impose an additional administrative burden on shareholders or result in the higher withholding rate becoming applicable for non-Finnish shareholders.

Significant subsequent events

Changes in organizational structure

On January 1, 2021, the Group adopted a new operating model designed to better position the company for changing markets and align with customer needs. The new operating model includes four reportable segments aligned with customer buying behavior: (i) Mobile Networks, (ii) Network Infrastructure, (iii) Cloud and Network Services and (iv) Nokia Technologies. The new operating model is optimized for better accountability and transparency, increased simplicity and improved cost-efficiency.

Bond redemption

In January 2021, Nokia exercised its issuer call option to redeem 1.00% Senior Notes due March 2021 for the full amount of EUR 350 million. The redemption date for the notes was February 15, 2021.

Debt restructuring request of an emerging market customer

In February 2021, one of the Group's emerging market customers commenced negotiations to renegotiate its debt with the aim of avoiding insolvency. Although this event occurred after the reporting period, it confirms that the customer was credit-impaired as of December 31, 2020. As a result, the Group recognized an increase in the allowance for expected credit loss for loans extended to the customer of EUR 58 million in financial expenses. The Group also concluded that the collectability of consideration due from the customer is no longer probable resulting in adjustments in net sales, cost of sales and other operating expenses totaling EUR 34 million.

General facts on Nokia

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American Depositary Shares

Fees and charges

ADS holders may have to pay the following service fees to the Depositary:

Service	Fees, USD
Issuance of ADSs	Up to 5 cents per ADS ⁽¹⁾
Cancellation of ADSs	Up to 5 cents per ADS ⁽¹⁾
Distribution of cash dividends or other cash distributions	Up to 2 cents per ADS
Distribution of ADSs pursuant to (i) stock dividends, free stock distributions or (ii) exercises of rights to purchase additional ADSs	Up to 5 cents per ADS
Distribution of securities other than ADSs or rights to purchase additional ADSs	Up to 5 cents per ADS ⁽¹⁾
ADS transfer fee	1.50 cents per transfer ⁽¹⁾

(1) These fees are typically paid to the Depositary by the brokers on behalf of their clients receiving the newly issued ADSs from the Depositary and by the brokers on behalf of their clients delivering the ADSs to the Depositary for cancellation. The brokers in turn charge these transaction fees to their clients.

Additionally, ADS holders are responsible for certain fees and expenses incurred by the Depositary on their behalf and certain governmental charges such as taxes and registration fees, transmission and delivery expenses, conversion of foreign currency and fees relating to compliance with exchange control regulations. The fees and charges may vary over time.

In the event of refusal to pay the depositary fees, the Depositary may, under the terms of the deposit agreement, refuse the requested service until payment is received or may set off the amount of the depositary fees from any distribution to be made to the ADS holder.

Payments

In 2020, our Depositary made the following payments on our behalf in relation to our ADS program.

Category	Payment, USD
Settlement infrastructure fees (including the Depositary Trust Company fees)	759 498.53
Proxy process expenses (including printing, postage and distribution)	1 314 986.11
ADS holder identification expenses	102 311.87
Legal fees	—
NYSE listing fees	500 000.00
Total	2 676 796.51

Supply chain and manufacturing

Nokia is committed to ensuring our supply chain operations are resilient and still highly flexible to navigate global challenges. Our operations team manages the customer demand-driven supply chain for all Nokia's hardware, software and original equipment manufactured products. These end-to-end operations include procurement, demand and supply planning, manufacturing, distribution, and logistics.

Our agile supply chain processes optimize Nokia's supply chain through key strategies such as multi-sourcing key components, a global manufacturing network and distributed transportation. In times of crises, business continuity plans provide flexibility and reliability to minimize disruption to operations. Our supply chain also prioritizes environmental and social responsibility such as our green remanufacturing operations in Bydgoszcz, Poland, our responsible sourcing program and CO₂ emissions reduction initiatives.

Nokia's manufacturing network consists of our own manufacturing sites and numerous Electronics Manufacturing Services partners. This geographically dispersed and flexible manufacturing network provides the responsiveness needed to meet customer demand and cope with even the most demanding challenges, as we have demonstrated during the COVID-19 pandemic.

Nokia manufacturing sites include those by wholly-owned subsidiaries Radio Frequency Systems and Alcatel Submarine Networks. On December 31, 2020, Nokia had 11 manufacturing facilities and the production capacity for our infrastructure equipment is highlighted below:

Country	Location and products ⁽¹⁾	Productive capacity, Net (m ²) ⁽²⁾
Australia	Kilsyth: radio frequency systems	5 400
Brazil	Embu: radio frequency systems	8 100
China	Suzhou: radio frequency systems	27 000
Finland	Oulu: base stations	10 000
France	Calais: submarine cables	24 000
France	Trignac: radio frequency systems	7 300
Germany	Hannover: radio frequency systems	23 500
India	Chennai: base stations, radio controllers and transmission systems	12 000
Poland	Bydgoszcz: remanufacturing, product integration	6 200
UK	Greenwich: submarine cables	12 000
USA	Meriden: radio frequency systems	31 000

(1) We consider the production capacity of our manufacturing network to be sufficient to meet the requirements of our network infrastructure business. The extent of utilization of our manufacturing facilities varies from plant to plant and from time to time during the year. None of these facilities is subject to a material encumbrance.

(2) Productive capacity equals the total area allotted to manufacturing and to the storage of manufacturing-related materials.

Controls and procedures

Our management, with the participation of our President and CEO and our Chief Financial Officer, conducted an evaluation pursuant to Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act), of the effectiveness of our disclosure controls and procedures as of December 31, 2020. Based on such evaluation, our President and CEO and our Chief Financial Officer have concluded that our disclosure controls and procedures were effective.

Disclosure controls and procedures mean controls and other procedures that are designed to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and that such information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our President and CEO and our Chief Financial Officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosures.

Management's annual report on internal control over financial reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting for Nokia. Our internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation and fair presentation of published financial statements. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management evaluated the effectiveness of our internal control over financial reporting using the criteria described in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation, our management has assessed the effectiveness of Nokia's internal control over financial reporting at December 31, 2020 and concluded that such internal control over financial reporting is effective.

The effectiveness of our internal control over financial reporting as of December 31, 2020 has been audited by Deloitte Oy, an independent registered public accounting firm. Refer to "Reports of independent registered public accounting firms" of this Annual Report on Form 20-F.

Changes in internal control over financial reporting

There have been no changes in our internal control over financial reporting during 2020 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Attestation report of the registered public accounting firm

Refer to "Reports of independent registered public accounting firms" of this Annual Report on Form 20-F.

Exchange controls

There are currently no Finnish laws that may affect the import or export of capital, or the remittance of dividends, interest or other payments.

Government regulation

Nokia and its businesses are subject to direct and indirect regulation in each of the countries in which we and our customers do business. As a result, changes in or uncertainties related to various types of regulations applicable to current or new technologies, intellectual property, products, services, company operations and business environment (e.g. labor laws, taxation) could affect our business adversely. Moreover, the implementation of technological or legal requirements could impact our products and services, technology and patent licensing activities, manufacturing and distribution processes, and could affect the timing of product and services introductions and the cost of our production, products and services, as well as their commercial success. Also, our business is subject to the impacts of changes in economic and trade policies. Export control, tariffs or other fees or levies imposed on our products and services, environmental, product safety and security and other regulations that adversely affect the export, import, pricing or costs of our products and services as well as export prohibitions (sanctions) enacted by the EU, the United States or other countries or regions could adversely affect our net sales and results of operations. Further, potential governmental intervention in supply chain (e.g. prohibiting imports from certain geographies or imposing certain criteria on selection of suppliers) may impact Nokia's operations.

For example, in the United States, our products and services are subject to a wide range of government regulations that might have a direct impact on our business, including, but not limited to, regulation related to product certification, standards, spectrum management, provision of telecommunications services, privacy and data protection, competition and sustainability. The EU-level or local member state regulation has a direct impact on many areas of our business, markets and customers within the EU. The European regulation influences, for example, conditions for innovation for telecommunications infrastructure and internet and related services, as well as technology and patent licensing; investment in fixed and wireless broadband communication infrastructure and operation of global data flows. Additionally, with respect to certain developing market countries, the business environment we operate in can be affected by protectionist regulation.

We proactively exchange views and address the impact of any planned changes to the regulatory environment on our business activities with state agencies, regulators and other decision-makers either through our government relations representatives in various geographies and through our experts, or indirectly through the membership in industry associations.

Sales in United States-sanctioned countries

General

We are a global company and have sales in most countries of the world. Nokia is committed to the highest standards of ethical conduct, and adheres to all applicable national and international trade-related laws. As a leading international telecommunications company with global operations, Nokia has a presence also in countries subject to international sanctions. All operations of Nokia, and in particular any operations undertaken in countries targeted by sanctions, are conducted in accordance with our comprehensive and robust Internal Compliance Program to ensure that they are in full compliance with all applicable laws and regulations. In addition, we continuously monitor international developments and assess the appropriateness of our presence and business in these, and all, markets. Nevertheless, business in these markets is marked by complexity and uncertainty.

We cannot exclude the possibility that third parties may unlawfully divert our products to these countries from other countries in which we sell them, or that, for services distributed through the internet, third parties could have accessed them in markets or countries for which they are not intended by circumventing the industry standard protective mechanisms, such as IP address blocks, despite our efforts in implementing measures to prevent such actions.

Disclosure pursuant to Section 219 of the Iran Threat Reduction and Syria Human Rights Act of 2012

We operate in Iran in compliance with applicable economic sanctions and other trade-related laws. We provide telecommunications equipment with ancillary services to various network operator customers and internet service providers. We do not deliver equipment and services to Iran for military purposes, or for the purpose of limiting political discourse, blocking legitimate forms of free speech or conducting surveillance of individuals.

In connection with the business activities relating to Iran, we have two local offices in Iran that employed approximately 28 employees at the end of 2020 through a branch of a Finnish subsidiary. Nokia is the controlling shareholder in Pishahang Communications Network Development Company (Pishahang). The other minority shareholder in Pishahang is Information Technology Application Development TACFAM Company (Tacfam).

We continue to maintain routine contacts with governmental agencies in Iran as required, for example, to maintain a legal presence and office facilities in Iran, pay taxes and employ Iranian nationals.

To our knowledge, none of our sales in Iran in 2020 are required to be disclosed pursuant to ITRA Section 219, with the possible exception of the following.

In 2020, we continued only with our existing contractual obligations in compliance with applicable economic sanctions and other trade-related laws including limited local delivery of radio products and transmission licenses, including associated services, to MTN Irancell and some software and features to Mobile Communications Company of Iran (MCCI).

Although it is difficult to evaluate with any reasonable degree of certainty, we have concluded that we cannot exclude the possibility that MCCI, MTN Irancell or Tacfam is owned or controlled, directly or indirectly, by the government of Iran. None of these activities involve US affiliates of Nokia, or any persons from the United States.

Nokia does not normally allocate net profit on a country-by-country or activity-by-activity basis, other than as set forth in Nokia's consolidated financial statements prepared in accordance with IFRS. Therefore, for this exercise Nokia will reflect its sales margin in lieu of the net profit/loss. In 2020, we recognized net sales of EUR 1.1 million and a sales margin of EUR 1.1 million from business with MCCI, net sales of EUR 3.2 million and a sales margin of EUR 0.9 million from business with MTN Irancell.

Although we evaluate our business activities on an ongoing basis, we intend to continue not accepting any new business in Iran in 2021 and intend to only complete existing contractual obligations in Iran in compliance with applicable economic sanctions and other trade-related laws.

Taxation

General

The statements of the United States and Finnish tax laws set out below are based on the laws in force as of the date of this Annual Report on Form 20-F and may be subject to any changes in US or Finnish law, and in any double taxation convention or treaty between the United States and Finland, occurring after that date, possibly with retroactive effect.

For purposes of this discussion, "US Holders" are beneficial owners of ADSs that: (i) hold the ADSs as capital assets; (ii) are citizens or residents of the United States, corporations created in or organized under US law, estates whose income is subject to US federal income tax, or trusts that elect to be treated as a US person or are both subject to the primary supervision of a US court and controlled by a US person; and (iii) in each case, are considered residents of the United States for purposes of the current income tax convention between the United States and Finland, referred to as the "Treaty", and the limitation on benefits provisions therein. Special rules apply to US Holders that are also residents of Finland and to citizens or residents of the United States that do not maintain a substantial presence, permanent home or habitual abode in the United States. For purposes of this discussion, it is assumed that the Depositary and its custodian will perform all actions as required by the deposit agreement with the Depositary and other related agreements between the Depositary and Nokia.

If a partnership holds ADSs (including for this purpose any entity or arrangement treated as a partnership for US federal income tax purposes), the tax treatment of a partner will depend upon the status of the partner and activities of the partnership. If a US Holder is a partnership or a partner in a partnership that holds ADSs, the holder is urged to consult its own tax advisor regarding the specific tax consequences of owning and disposing of its ADSs.

Because this summary is not exhaustive of all possible tax considerations - such as situations involving financial institutions, banks, tax-exempt entities, pension funds, US expatriates, real estate investment trusts, persons that are dealers in securities, persons who own (directly, indirectly or

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by attribution) 10% or more of the share capital or voting stock of Nokia, persons who acquired their ADSs pursuant to the exercise of employee stock options or otherwise as compensation, or US Holders whose functional currency is not the US dollar, who may be subject to special rules that are not discussed herein - holders of shares or ADSs that are US Holders are advised to satisfy themselves as to the overall US federal, state and local tax consequences, as well as to the overall Finnish and other applicable non-US tax consequences, of their ownership of ADSs and the underlying shares by consulting their own tax advisors. This summary does not discuss the treatment of ADSs that are held in connection with a permanent establishment or fixed base in Finland, and it does not address the US Medicare tax on certain investment income.

For the purposes of both the Treaty and the US Internal Revenue Code of 1986, as amended, referred to as the "Code", US Holders of ADSs will be treated as the owners of the underlying shares that are represented by those ADSs. Accordingly, the following discussion, except where otherwise expressly noted, applies equally to US Holders of ADSs, on the one hand, and of shares on the other.

The holders of ADSs will, for Finnish tax purposes, be treated as the owners of the shares that are represented by the ADSs. The Finnish tax consequences to the holders of shares, as discussed below, also apply to the holders of ADSs.

US taxation of cash dividends

For US federal income tax purposes, the gross amount of dividends paid to US Holders of shares or ADSs out of our current or accumulated earnings and profits, including any related Finnish withholding tax, generally will be included in gross income as foreign source dividend income. We do not expect to maintain calculations of our earnings and profits under US federal income tax principles; therefore, US Holders should expect that the entire amount of any distribution generally will be reported as dividend income. Dividends will not be eligible for the dividends received deduction allowed to corporations under the Code. The amount includible in income (including any Finnish withholding tax) will equal the US dollar value of the payment, determined at the time such payment is received by the Depositary (in the case of ADSs) or by the US Holder (in the case of shares), regardless of whether the payment is in fact converted into US dollars. Generally, any gain or loss resulting from currency exchange rate fluctuations during the period between the time such payment is received and the date the dividend payment is converted into US dollars will be treated as US source ordinary income or loss to a US Holder.

Special rules govern and specific elections are available to accrual method taxpayers to determine the US dollar amount includible in income in the case of a dividend paid (and taxes withheld) in foreign currency. Accrual basis taxpayers are urged to consult their own tax advisors regarding the requirements and elections applicable in this regard.

Dividends received generally will constitute foreign source "passive category income" for foreign tax credit purposes. Subject to certain limitations, Finnish taxes withheld may be eligible for credit (not in excess of the applicable Treaty rate) against a US Holder's US federal income tax liability. Additionally, if Nokia makes a distribution from its SVOP-reserve (discussed below) when it does not have current or accumulated earnings and profits, a US Holder may not be able to claim such credit.

In lieu of a credit, a US Holder may elect to claim a deduction in respect of its Finnish income taxes provided the deduction is claimed for all of the foreign taxes paid by the US Holder in that particular taxable year. A deduction does not reduce US tax on a dollar-for-dollar basis like a tax credit. The deduction, however, is not subject to the limitations applicable to foreign tax credits.

Provided that certain holding period and other requirements are met, individuals and certain other non-corporate US Holders are eligible for reduced rates of US federal income tax at a maximum rate of 20% in respect of "qualified dividend income". Dividends that Nokia pays with respect to its shares and ADSs generally will be qualified dividend income if certain holding periods are met and Nokia was neither a passive foreign investment company (PFIC) in the taxable year prior to the year in which the dividend was paid nor in the taxable year in which the dividend is paid. Nokia currently believes that dividends it pays with respect to its shares and ADSs will constitute qualified dividend income for US federal income tax purposes; however, this is a factual matter and is subject to change. Nokia anticipates that its dividends will be reported as qualified dividends on Forms 1099-DIV delivered to US Holders. US Holders of shares or ADSs are urged to consult their own tax advisors regarding the availability to them of the reduced dividend tax rate in light of their own particular situation and the computations of their foreign tax credit limitation with respect to any qualified dividends paid to them, as applicable.

We believe we should not be classified as a PFIC for US federal income tax purposes for the taxable year ended December 31, 2020 and we do not expect to become a PFIC in the foreseeable future. US Holders are advised, however, that this conclusion is a factual determination that must be made annually and thus may be subject to change. If we were to be classified as a PFIC, the tax on distributions on our shares or ADSs and on any gains realized upon the disposition of our shares or ADSs generally would be less favorable than as described herein. Dividends paid by a PFIC are not "qualified dividend income" and are not eligible for reduced rates of taxation. Additionally, US persons who are shareholders in a PFIC generally will be required to file an annual report disclosing the ownership of such shares and certain other information. US Holders should consult their own tax advisors regarding the application of the PFIC rules, including the related reporting requirements, to their ownership of our shares or ADSs.

Finnish withholding taxes on dividends

Under the Finnish Income Tax Act and Act on Taxation of Non-residents' Income, non-residents of Finland are generally subject to a withholding tax at a rate of 30% on dividends paid by a Finnish resident company. Further, under the Finnish Prepayment Act, 50% preliminary tax must be withheld on dividends paid in certain situations. However, pursuant to the Treaty, dividends paid to US Holders are generally subject to Finnish withholding tax at reduced rates.

Under the Finnish Income Tax Act and tax court practice, the distribution of funds from reserves for invested unrestricted equity (an "SVOP-reserve") by a listed company such as Nokia is taxed as a distribution of a dividend.

As of January 1, 2021, nominee registered shares are generally subject to a withholding tax at a rate of 35% on dividends paid by Nokia. This new withholding tax regime is based on OECD's TRACE (Treaty Relief and Compliance Enhancement) model. Under the new rules, the 35% withholding tax will generally be applied on dividend distributions on nominee registered shares by listed companies such as Nokia, unless custodians fulfill certain strict requirements and are willing to take over certain responsibilities (e.g. registration with the Finnish Tax Administration (so-called authorized intermediary), identification of the beneficial owner of the dividend and collecting and submitting detailed recipient information to the Finnish Tax Administration using specific filing procedures). Furthermore, application of reduced withholding tax rates at source require that the custodian and dividend distributor are willing to assume liability of incorrectly applied withholding tax. If the custodian only registers with the Finnish Tax Administration and submits (or undertakes to submit) the detailed recipient details to the Finnish Tax Administration, 30% withholding tax rate can be applied, instead of 35%.

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Any tax withheld in excess can be reclaimed after the calendar year of the dividend payment by submitting a refund application to the Finnish Tax Administration no later than by the end of the third calendar year following the dividend payment year. During the year of dividend payment, the refund can be processed if custodians and dividend distributor fulfill the above-mentioned requirements laid down for actual dividend distribution.

It is exceptionally also possible that any tax not withheld at source is later assessed directly to the shareholder by the Finnish Tax Administration, in case the failure to withhold tax at source is not due to negligence of the custodian or the dividend distributor.

Holders of shares or ADSs are urged to consult their own custodian regarding the availability of reduced withholding tax rates in light of their own particular situation and approach their custodian in terms of their responsibilities, as well as consult their own tax advisors regarding the availability to them of the tax credit from dividend withholding tax.

US and Finnish tax on sale or other disposition

A US Holder generally will recognize taxable capital gain or loss on the sale or other disposition of ADSs in an amount equal to the difference between the US dollar value of the amount realized and the adjusted tax basis (determined in US dollars) in the ADSs. If the ADSs are held as a capital asset, this gain or loss generally will be long-term capital gain or loss if, at the time of the sale, the ADSs have been held for more than one year. Any capital gain or loss, for foreign tax credit purposes, generally will constitute US source gain or loss. In the case of a US Holder that is an individual, long-term capital gain generally is subject to US federal income tax at preferential rates. The deductibility of capital losses is subject to significant limitations.

The deposit or withdrawal by a US Holder of shares in exchange for ADSs or of ADSs for shares under the deposit agreement generally will not be subject to US federal income tax or Finnish income tax.

The sale by a US Holder of the ADSs or the underlying shares, other than an individual who, by reason of his residence in Finland for a period exceeding six months, is or becomes liable for Finnish income tax according to the relevant provisions of Finnish tax law, generally will not be subject to income tax in Finland, in accordance with Finnish tax law and the Treaty.

Finnish transfer tax

The transfer of our shares and ADSs for cash through a broker or other appropriate intermediary is generally not subject to Finnish transfer tax. Non-brokered transfers will generally be exempted from the transfer tax if the transferee has been approved as a trading party in the market where the transfer is executed, or other conditions are met. Transfers of ADSs on the New York Stock Exchange are exempt. Where the transfer does not fulfill the above requirements, and either the buyer or the seller is a Finnish resident or a Finnish branch office of a specified foreign financial service provider, the buyer is liable to pay transfer tax of 1.6% of the transaction price where the resulting tax is at least EUR 10. Selling shareholders should consult their tax advisors regarding the specific tax considerations of a sale of our shares or ADSs.

Finnish inheritance and gift taxes

A transfer of an underlying share by gift or by reason of the death of a US Holder and the transfer of an ADS are not subject to Finnish gift or inheritance tax provided that none of the deceased person, the donor, the beneficiary of the deceased person or the recipient of the gift is resident in Finland.

Non-residents of the United States

Beneficial owners of ADSs that are not US Holders will not be subject to US federal income tax on dividends received with respect to ADSs unless such dividend income is effectively connected with the conduct of a trade or business within the United States. Similarly, non-US Holders generally will not be subject to US federal income tax on any gain realized on the sale or other disposition of ADSs, unless (a) the gain is effectively connected with the conduct of a trade or business in the United States or (b) in the case of an individual, that individual is present in the United States for 183 days or more in the taxable year of the disposition and other conditions are met.

The United States information reporting and backup withholding

Dividend payments with respect to shares or ADSs and proceeds from the sale or other disposition of shares or ADSs may be subject to information reporting to the Internal Revenue Service and possible US backup withholding. Backup withholding will not apply to a holder if the holder furnishes a correct taxpayer identification number or certificate of foreign status and makes any other required certification in connection therewith, or if it is a recipient otherwise exempt from backup withholding (such as a corporation). Any US persons required to establish their exempt status generally must furnish a duly completed IRS Form W-9 (Request for Taxpayer Identification Number and Certification). Non-US holders generally are not subject to US information reporting or backup withholding. However, such holders may be required to provide certification of non-US status (generally on IRS Form W-8BEN for individuals and Form W-8BEN-E for corporations) in connection with payments received in the United States or through certain US-related financial intermediaries. Backup withholding is not an additional tax. Amounts withheld as backup withholding may be credited against a holder's US federal income tax liability, and the holder may obtain a refund of any excess amounts withheld under the backup withholding rules by timely filing the appropriate claim for refund with the Internal Revenue Service and furnishing the proper required information.

Key ratios

Earnings per share (basic)

Profit/(loss) attributable to equity holders of the parent
Weighted average number of shares outstanding

Earnings per share (diluted)

Profit/(loss) attributable to equity holders of the parent adjusted for the effect of dilution
Adjusted weighted average number of shares

P/E ratio

Closing share price as of December 31
Earnings per share (basic) for continuing operations

Payout ratio

Dividend per share
Earnings per share (basic) for continuing operations

Dividend yield %

Dividend per share
Closing share price as of December 31

Shareholders' equity per share

Capital and reserves attributable to equity holders of the parent
Number of shares as of December 31 - number of treasury shares as of December 31

Market capitalization

(Number of shares as of December 31 - number of treasury shares as of December 31) x closing share price as of December 31

Share turnover %

Number of shares traded during the year
Average number of shares during the year

Alternative performance measures

Certain financial measures presented in this Annual Report on Form 20-F are not measures of financial performance, financial position or cash flows defined in IFRS. As these measures are not defined in IFRS, they may not be directly comparable with financial measures used by other companies, including those in the same industry. The primary rationale for presenting these measures is that the management uses these measures in assessing the financial performance of the Group and believes that these measures provide meaningful supplemental information on the underlying business performance of the Group. These financial measures should not be considered in isolation from, or as a substitute for, financial information presented in compliance with IFRS.

Financial measure	Definition	Purpose
Total cash and current financial investments (total cash)	Total cash and current financial investments consist of cash and cash equivalents and current financial investments.	Total cash and current financial investments is used to indicate funds available to the Group to run its current and invest in future business activities as well as provide return for security holders.
Net cash and current financial investments (net cash)	Net cash and current financial investments equals total cash and current financial investments less long-term and short-term interest-bearing liabilities.	Net cash and current financial investments is used to indicate the Group's liquidity position after cash required to settle the interest-bearing liabilities.
Free cash flow	Net cash from/(used in) operating activities - purchases of property, plant and equipment and intangible assets (capital expenditures) + proceeds from sale of property, plant and equipment and intangible assets - purchase of non-current financial investments + proceeds from sale of non-current financial investments.	Free cash flow is the cash that the Group generates after net investments to tangible, intangible and non-current financial investments and it represents the cash available for distribution among its security holders. It is a measure of cash generation, working capital efficiency and capital discipline of the business.
Capital expenditure	Purchases of property, plant and equipment and intangible assets (excluding assets acquired under business combinations).	Capital expenditure is used to describe investments in profit-generating activities in the future.

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Consolidated income statement

For the year ended December 31	Notes	2020 EURm	2019 EURm	2018 EURm
Net sales	5, 7	21 852	23 315	22 563
Cost of sales ⁽¹⁾	8	(13 659)	(15 051)	(14 251)
Gross profit⁽¹⁾		8 193	8 264	8 312
Research and development expenses ⁽¹⁾	8	(4 087)	(4 532)	(4 777)
Selling, general and administrative expenses ⁽¹⁾	8	(2 898)	(3 219)	(3 549)
Other operating income ⁽¹⁾	10	150	237	267
Other operating expenses ⁽¹⁾	8, 10	(473)	(265)	(312)
Operating profit/(loss)		885	485	(59)
Share of results of associated companies and joint ventures	34	22	12	12
Financial income	11	156	165	85
Financial expenses	11	(320)	(506)	(398)
Profit/(loss) before tax		743	156	(360)
Income tax expense	12	(3 256)	(138)	(189)
(Loss)/profit for the year from continuing operations		(2 513)	18	(549)
(Loss)/profit for the year from discontinued operations	6	(3)	(7)	214
(Loss)/profit for the year		(2 516)	11	(335)
Attributable to:				
Equity holders of the parent		(2 523)	7	(340)
Non-controlling interests		7	4	5
Earnings per share attributable to equity holders of the parent	13	EUR	EUR	EUR
Basic				
Continuing operations		(0.45)	0.00	(0.10)
(Loss)/profit for the year		(0.45)	0.00	(0.06)
Diluted				
Continuing operations		(0.45)	0.00	(0.10)
(Loss)/profit for the year		(0.45)	0.00	(0.06)

(1) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2019 and 2018 have been recast accordingly. Refer to Note 2, Significant accounting policies.

The notes are an integral part of these consolidated financial statements.

Consolidated statement of comprehensive income

For the year ended December 31	Notes	2020 EURm	2019 EURm	2018 EURm
(Loss)/profit for the year		(2 516)	11	(335)
Other comprehensive income				
Items that will not be reclassified to profit or loss				
Remeasurements of defined benefit plans		624	414	388
Income tax related to items that will not be reclassified to profit or loss		(140)	(95)	(90)
Items that may be reclassified subsequently to profit or loss				
Translation differences		(1 232)	260	401
Net investment hedges		266	(58)	(73)
Cash flow and other hedges		15	(2)	(53)
Financial assets at fair value through other comprehensive income		47	8	(45)
Other increase, net		3	—	1
Income tax related to items that may be reclassified subsequently to profit or loss		25	11	33
Other comprehensive (loss)/income, net of tax	22	(392)	538	562
Total comprehensive (loss)/income for the year		(2 908)	549	227
Attributable to:				
Equity holders of the parent		(2 914)	545	221
Non-controlling interests		6	4	6

The notes are an integral part of these consolidated financial statements.

Consolidated statement of financial position

As of December 31	Notes	2020 EURm	2019 EURm
ASSETS			
Non-current assets			
Intangible assets	14, 17	7 027	7 956
Property, plant and equipment	15, 17	1 783	1 856
Right-of-use assets	16, 17	805	912
Investments in associated companies and joint ventures	17, 34	233	165
Non-current financial investments	24	745	740
Deferred tax assets	12	1 822	5 124
Other non-current financial assets	17, 24, 36	306	445
Defined benefit pension assets	27	5 038	4 830
Other non-current assets	19	217	292
Total non-current assets		17 976	22 320
Current assets			
Inventories	18	2 242	2 936
Trade receivables	24, 36	5 503	5 025
Contract assets	7, 36	1 080	1 489
Prepaid expenses and accrued income	19	850	908
Current income tax assets	12	265	279
Other current financial assets	24, 25, 36	214	164
Current financial investments	24, 36	1 121	97
Cash and cash equivalents	24, 36	6 940	5 910
Total current assets		18 215	16 808
Total assets		36 191	39 128
SHAREHOLDERS' EQUITY AND LIABILITIES			
Capital and reserves attributable to equity holders of the parent			
Share capital	20	246	246
Share issue premium		443	427
Treasury shares		(352)	(352)
Translation differences	21	(1 295)	(372)
Fair value and other reserves	21	1 910	1 382
Reserve for invested unrestricted equity		15 656	15 607
Accumulated deficit		(4 143)	(1 613)
Total capital and reserves attributable to equity holders of the parent		12 465	15 325
Non-controlling interests		80	76
Total equity		12 545	15 401
Non-current liabilities			
Long-term interest-bearing liabilities	23, 24, 36	5 015	3 985
Long-term lease liabilities	23	721	771
Deferred tax liabilities	12	260	390
Defined benefit pension and post-employment liabilities	27	4 046	4 343
Contract liabilities	7	566	915
Deferred revenue and other long-term liabilities	24, 28	541	712
Provisions	29	736	556
Total non-current liabilities		11 885	11 672
Current liabilities			
Short-term interest-bearing liabilities	23, 24, 36	561	292
Short-term lease liabilities	23	189	259
Other financial liabilities	24, 25, 36	738	803
Current income tax liabilities	12	188	187
Trade payables	24, 36	3 174	3 786
Contract liabilities	7	2 394	2 752
Accrued expenses, deferred revenue and other liabilities	28	3 721	3 323
Provisions	29	796	653
Total current liabilities		11 761	12 055
Total liabilities		23 646	23 727
Total shareholders' equity and liabilities		36 191	39 128

The notes are an integral part of these consolidated financial statements.

Consolidated statement of cash flows

For the year ended December 31	Notes	2020 EURm	2019 EURm	2018 EURm
Cash flow from operating activities				
(Loss)/profit for the year		(2 516)	11	(335)
Adjustments, total	31	5 267	2 627	2 093
Change in net working capital ⁽¹⁾				
(Increase)/decrease in receivables		(418)	159	246
Decrease/(increase) in inventories		553	285	(544)
Decrease in non-interest-bearing liabilities		(845)	(2 232)	(645)
Cash from operations		2 041	850	815
Interest received		33	57	68
Interest paid	16, 23	(35)	(1)	(159)
Income taxes paid, net		(280)	(516)	(364)
Net cash from operating activities		1 759	390	360
Cash flow from investing activities				
Purchase of property, plant and equipment and intangible assets		(479)	(690)	(672)
Proceeds from sale of property, plant and equipment and intangible assets		13	39	88
Acquisition of businesses, net of cash acquired		(104)	–	(31)
Proceeds from disposal of businesses, net of disposed cash		11	19	(18)
Purchase of current financial investments		(1 154)	(473)	(2 104)
Proceeds from maturities and sale of current financial investments		123	991	2 397
Purchase of non-current financial investments		(59)	(180)	(145)
Proceeds from sale of non-current financial investments		122	144	170
Other		10	(17)	–
Net cash used in investing activities		(1 517)	(167)	(315)
Cash flow from financing activities				
Proceeds from stock option exercises		–	–	1
(Purchase of)/proceeds from sale of equity instruments of subsidiaries		(1)	(1)	1
Proceeds from long-term borrowings	23	1 595	1 039	139
Repayment of long-term borrowings	23	(246)	(766)	(29)
(Repayment of)/proceeds from short-term borrowings	23	(83)	40	2
Payment of principal portion of lease liabilities	16, 23	(234)	(221)	(2)
Dividends paid		(148)	(570)	(1 081)
Net cash from/(used in) financing activities		883	(479)	(969)
Translation differences		(95)	(95)	(184)
Net increase/(decrease) in cash and cash equivalents		1 030	(351)	(1 108)
Cash and cash equivalents as of January 1		5 910	6 261	7 369
Cash and cash equivalents as of December 31		6 940	5 910	6 261

(1) Net working capital includes both short-term and long-term items.

The items in the consolidated statement of cash flows do not directly correspond to the changes in the respective items in the consolidated statement of financial position due to several reasons, principally due to the effects of foreign exchange differences arising on consolidation and changes in the consolidation scope. The consolidated statement of cash flows combines cash flows from both the continuing and the discontinued operations. For details of cash flows from discontinued operations, refer to Note 6, Discontinued operations.

The notes are an integral part of these consolidated financial statements.

Consolidated statement of changes in shareholders' equity

EURm	Notes	Share capital	Share issue premium	Treasury shares	Translation differences	Fair value and other reserves	Reserve for invested unrestricted equity	Accumulated deficit	Attributable to equity holders of the parent	Non-controlling interests	Total equity
As of January 1, 2018		246	447	(1 480)	(932)	842	15 616	1 345	16 084	80	16 164
Loss for the year								(340)	(340)	5	(335)
Other comprehensive income	21, 22				341	221		(1)	561	1	562
Total comprehensive income for the year		-	-	-	341	221	-	(341)	221	6	227
Share-based payments			68						68		68
Excess tax benefit on share-based payments			6						6		6
Settlement of share-based payments			(85)	72			(11)		(24)		(24)
Cancellation of treasury shares				1 000				(1 000)	-		-
Stock options exercised							1		1		1
Dividends ⁽¹⁾								(1 063)	(1 063)	(5)	(1 068)
Acquisition of non-controlling interests								(1)	(1)	1	-
Other movements					(1)			(2)	(3)		(3)
Total transactions with owners		-	(11)	1 072	(1)	-	(10)	(2 066)	(1 016)	(4)	(1 020)
As of December 31, 2018		246	436	(408)	(592)	1 063	15 606	(1 062)	15 289	82	15 371
Adoption of IFRS 16								4	4		4
As of January 1, 2019		246	436	(408)	(592)	1 063	15 606	(1 058)	15 293	82	15 375
Profit for the year								7	7	4	11
Other comprehensive income	21, 22				220	319		(1)	538		538
Total comprehensive income for the year		-	-	-	220	319	-	6	545	4	549
Share-based payments			81						81		81
Excess tax benefit on share-based payments			(7)						(7)		(7)
Settlement of share-based payments			(83)	56			1		(26)		(26)
Dividends ⁽¹⁾								(560)	(560)	(10)	(570)
Other movements								(1)	(1)		(1)
Total transactions with owners		-	(9)	56	-	-	1	(561)	(513)	(10)	(523)
As of December 31, 2019		246	427	(352)	(372)	1 382	15 607	(1 613)	15 325	76	15 401
Loss for the year								(2 523)	(2 523)	7	(2 516)
Other comprehensive loss	21, 22				(922)	528		3	(391)	(1)	(392)
Total comprehensive loss for the year		-	-	-	(922)	528	-	(2 520)	(2 914)	6	(2 908)
Share-based payments			76						76		76
Excess tax benefit on share-based payments			2						2		2
Settlement of share-based payments			(62)				49		(13)		(13)
Dividends ⁽¹⁾									-	(5)	(5)
Acquisition of non-controlling interests								(10)	(10)		(10)
Investment in subsidiary by non-controlling interest									-	2	2
Other movements					(1)				(1)	1	-
Total transactions with owners		-	16	-	(1)	-	49	(10)	54	(2)	52
As of December 31, 2020		246	443	(352)	(1 295)	1 910	15 656	(4 143)	12 465	80	12 545

(1) The Group did not pay dividends to equity holders of the parent in 2020 (dividends settled per share EUR 0.10 in 2019 and EUR 0.19 in 2018). No dividend is proposed by the Board of Directors of the Parent Company related to the financial year 2020.

The notes are an integral part of these consolidated financial statements.

Notes to consolidated financial statements

1. Corporate information

Nokia Corporation, a public limited liability company incorporated and domiciled in Helsinki, Finland, is the parent company (Parent Company or Parent) for all its subsidiaries (Nokia or the Group). The Group is a global provider of mobile and fixed network solutions combining hardware, software and services, as well as licensing of intellectual property, including patents, technologies and the Nokia brand. The Group's operational headquarters are located in Espoo, Finland. The shares of Nokia Corporation are listed on the Nasdaq Helsinki Stock Exchange, the New York Stock Exchange and the Euronext Paris Stock Exchange.

On March 4, 2021, the Board of Directors authorized the financial statements for the year ended December 31, 2020, for issuance and filing.

2. Significant accounting policies

Basis of presentation and statement of compliance

The consolidated financial statements are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB) and as adopted by the European Union (EU). The consolidated financial statements are presented in millions of euros (EURm), except as otherwise noted, and are prepared under the historical cost convention, except as disclosed in the accounting policies below. The notes to the consolidated financial statements also conform to the Finnish accounting legislation.

In 2020, the Group reviewed the presentation of income and expenses related to its restructuring plans, pension plan curtailments and amendments as well as certain asset impairments. As a result, the Group reclassified the restructuring and associated charges, pension curtailment and plan amendment income and expenses as well as certain impairment charges that were previously presented in other operating income and expenses to the functional line items to enhance the relevance of information provided in the Group's consolidated income statement.

The comparative amounts for 2019 and 2018 have been reclassified accordingly. Related to 2019, as a result of reclassification, the Group's cost of sales increased by EUR 62 million, research and development expenses increased by EUR 121 million, selling, general and administrative expenses increased by EUR 118 million, other operating income decreased by EUR 187 million and other operating expenses decreased by EUR 488 million compared to the previously reported amounts. Related to 2018, the Group's cost of sales increased by EUR 134 million, research and development expenses increased by EUR 157 million, selling, general and administrative expenses increased by EUR 86 million, other operating income decreased by EUR 23 million and other operating expenses decreased by EUR 400 million compared to the previously reported amounts.

Other information

This paragraph is included in connection with statutory reporting requirements in Germany. The fully consolidated German subsidiary, Nokia Solutions and Networks GmbH & Co. KG, registered in the commercial register of Munich under HRA 88537, has made use of the exemption available under § 264b and § 291 of the German Commercial Code (HGB).

Principles of consolidation

The consolidated financial statements comprise the financial statements of the Parent Company, and each of those companies over which it exercises control. Control over an entity exists when the Group is exposed, or has rights, to variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. When the Group has less than a majority of voting or similar rights in an entity, the Group considers all relevant facts and circumstances in assessing whether it has power over an entity, including the contractual arrangements, and voting rights and potential voting rights. The Group reassesses whether or not it controls an entity if facts and circumstances indicate that there are changes to the elements of control.

Consolidation of a subsidiary begins when the Group obtains control over the subsidiary and ceases when the Group loses control over the subsidiary. Assets, liabilities, income and expenses of a subsidiary acquired or disposed of during the year are included in the consolidated financial statements from the date the Group gains control until the date the Group ceases to control the subsidiary. A change in the ownership interest of a subsidiary, without a loss of control, is accounted for as an equity transaction. If the Group loses control in a subsidiary, the related assets, liabilities, non-controlling interest and other components of equity are derecognized with any gain or loss recognized in the consolidated income statement. Any investment retained in the former subsidiary is measured at fair value.

All intercompany transactions are eliminated as part of the consolidation process. Non-controlling interests are presented separately as a component of net profit or loss and are shown as a component of shareholders' equity in the consolidated statement of financial position.

Business combinations

Business combinations are accounted for using the acquisition method. The consideration transferred in a business combination is measured as the aggregate of the fair values of the assets transferred, liabilities incurred towards the former owners of the acquired entity or business and equity instruments issued. Acquisition-related costs are recognized as expenses in the consolidated income statement in the period in which the costs are incurred and the related services are received with the exception of costs directly attributable to the issuance of equity instruments that are accounted for as a deduction from equity.

Identifiable assets acquired and liabilities assumed are measured at the acquisition date fair values. The Group elects whether to measure the non-controlling interests in the acquiree at fair value or at the proportionate share of the acquiree's identifiable net assets on a business combination by business combination basis. The excess of the aggregate of the consideration transferred and the amount recognized for non-controlling interests over the acquisition date fair values of the identifiable net assets acquired is recorded as goodwill.

Investment in associates and joint ventures

An associate is an entity over which the Group exercises significant influence. Significant influence is the power to participate in the financial and operating policy decisions of the entity, but is not control or joint control over those policies.

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the arrangement. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about relevant activities require the unanimous consent of the parties sharing control.

The Group's investments in associates and joint ventures are accounted for using the equity method. Under the equity method, the investment in an associate or joint venture is initially recognized at cost. The carrying amount of the investment is adjusted to recognize changes in the Group's share of net assets of the associate or joint venture since the acquisition date. The Group's share of profits and losses of associates and joint ventures is included in the consolidated income statement outside operating profit or loss. Any change in other comprehensive income of associates and joint ventures is presented as part of the Group's other comprehensive income.

After application of the equity method, as of each reporting date, the Group determines whether there is objective evidence that the investment in an associate or joint venture is impaired. If there is such evidence, the Group recognizes an impairment loss that is calculated as the difference between the recoverable amount of the associate or joint venture and its carrying value. The impairment loss is presented within 'share of results of associated companies and joint ventures' in the consolidated income statement.

Non-current assets (or disposal groups) held for sale and discontinued operations

Non-current assets or disposal groups are classified as assets held for sale if their carrying amounts will be recovered principally through a sale transaction rather than through continuing use. For this to be the case, the asset, or the disposal group, must be available for immediate sale in its present condition subject only to terms that are usual and customary for sales of such assets or disposal groups, and the sale must be highly probable. These assets, or in the case of disposal groups, assets and liabilities, are presented separately in the consolidated statement of financial position and measured at the lower of the carrying amount and fair value less costs to sell. Non-current assets classified as held for sale, or included in a disposal group classified as held for sale, are not depreciated or amortized.

Discontinued operations are reported when a component of the Group, comprising operations and cash flows that can be clearly distinguished both operationally and for financial reporting purposes from the rest of the Group, is classified as held for sale or has been disposed of, or the component represents a major line of business or geographical area of operations, or is a part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations. Profit or loss from discontinued operations is reported separately from income and expenses from continuing operations in the consolidated income statement, with prior periods presented on a comparative basis. Cash flows for discontinued operations are presented separately in the notes to the consolidated financial statements. Intra-group revenues and expenses between continuing and discontinued operations are eliminated.

Revenue recognition

The Group accounts for a contract with a customer when the contract has been approved in writing, which is generally when both parties are committed to perform their respective obligations, the rights, including payment terms, regarding the goods and services to be transferred can be identified, the contract has commercial substance, and collection of the consideration to which the Group expects to be entitled is probable. Management considers only legally enforceable rights in evaluating the accounting for contracts with customers. As such, frame agreements that do not create legally enforceable rights and obligations are accounted for based on the issuance of subsequent legally binding purchase orders under the frame agreements.

A contract modification or a purchase order is accounted for as a separate contract if the scope of the contract increases by additional distinct goods or services, and the price of the contract increases by an amount that reflects the standalone selling price of those additional goods or services. In case the additional goods or services are distinct but not sold at a standalone selling price, the contract modification is accounted for prospectively. In cases where the additional goods or services are not distinct, the modification is accounted for through a cumulative catch-up adjustment.

The Group recognizes revenue from contracts with customers to reflect the transfer of promised goods and services to customers for amounts that reflect the consideration to which the Group expects to be entitled in exchange for those goods and services. The consideration may include a variable amount, which the Group estimates based on the most likely amount. Items causing variability include volume discounts and sales-based or usage-based royalties. The Group includes variable consideration into the transaction price only to the extent that it is highly probable that a significant revenue reversal will not occur. The transaction price also excludes amounts collected on behalf of third parties.

The Group's payment terms are 100 days on average. Invoices are generally issued as control transfers and/or as services are rendered. When this is not the case, the Group recognizes a contract asset or liability depending on the timing of payment versus transfer of control. In case the timing of payments provides either the customer or the Group with a significant benefit of financing, the transaction price is adjusted for the effect of financing and the related interest revenue or interest expense is presented separately from revenue. As a practical expedient, the Group does not account for financing components if, at contract inception, the consideration is expected to be received within one year before or after the goods or services have been transferred to the customer.

The Group enters into contracts with customers consisting of any combination of hardware, services and intellectual property. The associated revenue recognized for such contracts depends on the nature of the underlying goods and services provided. The promised goods or services in the contract might include sale of goods, license of intellectual property and grant of options to purchase additional goods or services that may provide the customer with a material right. The Group conducts an assessment at contract inception to determine which promised goods and services in a customer contract are distinct and accordingly identified as performance obligations. The Group considers that goods and services are distinct if the customer can benefit from the good or service either on its own or together with other resources readily available, and if the Group's promise to transfer the good or service is separately identifiable from other promises in the contract.

The Group allocates the transaction price to each distinct performance obligation on the basis of their standalone selling prices, relative to the overall transaction price. If a standalone selling price is not observable, it is estimated. The transaction price may include a discount or a variable amount of consideration that is generally allocated proportionately to all performance obligations in the contract unless the Group has observable evidence that the entire discount relates to only one or more, but not all, performance obligations in a contract.

Revenue is recognized when, or as, the Group satisfies a performance obligation by transferring a promised good or service to a customer, which is when the customer obtains control of that good or service. The amount of revenue recognized is the amount allocated to the satisfied performance obligation based on the relative standalone selling prices. A performance obligation may be satisfied at a point in time or over time.

Hardware and software sold by the Group includes warranty, which can either be assurance-type for repair of defects and recognized as a centralized warranty provision (refer to Note 29, Provisions), or service-type for scope beyond the repair of defects or for a time period beyond the standard assurance-type warranty period and considered a separate performance obligation within the context of the contract. Revenue is allocated to each performance obligation based on its standalone selling price in relation to the overall transaction price. The standalone selling price of each performance obligation is determined by considering factors such as the price of the performance obligation if sold on a standalone basis and the expected cost of the performance obligation plus a reasonable margin when price references are not available. The portion of the transaction price allocated to each performance obligation is then recognized when the revenue recognition criteria for that performance obligation have been met.

The Group presents its customer contracts in the consolidated statement of financial position as either a contract asset or a contract liability, depending on the relationship between the Group's performance and the customer's payment for each individual contract. On a net basis, a contract asset position represents where the Group has performed by transferring goods or services to a customer before the customer has provided the associated consideration or before payment is due. Conversely, a contract liability position represents where a customer has paid consideration or payment is due, but the Group has not yet transferred goods or services to the customer. Contract assets presented in the consolidated statement of financial position are current in nature while contract liabilities can be either current or non-current. Invoiced receivables represent unconditional rights to payment and are presented separately as trade receivables in the consolidated statement of financial position.

Sale of products

The Group manufactures and sells a range of networking equipment, covering the requirements of network operators. Revenue for these products is recognized when control of the products has transferred, the determination of which may require judgment. Typically, for standard equipment sales, control transfers upon delivery. For more complex solutions, control generally transfers upon acceptance.

In some arrangements, mainly within the submarine cable business, performance does not create an asset with an alternative use and the Group recognizes revenue over time using the output method, which faithfully depicts the manner in which the asset is transferred to the customer as well as the Group's enforceable rights to payment for the work completed to date. The output measure selected by the Group may vary from each contract depending on the nature of the contract.

Sale of services

The Group provides services related to the provision of networking equipment, ranging from managing a customer's network and product maintenance services to network installation, integration and optimization. Revenue for each separate service performance obligation is recognized as or when the customer obtains the benefits of the Group's performance. Service revenue is recognized over time for managed and maintenance services, as in these cases the Group performs throughout a fixed contract term and the customer simultaneously receives and consumes the benefits as the Group performs. In some cases, the Group performs services that are subject to customer acceptance where revenue is recognized when the customer acceptance is received.

Sale of intellectual property licenses

The Group provides its customers with licenses to intellectual property (IP) owned by the Group by granting software licenses and rights to benefit from the Group's IP in their products. When a software license is sold, revenue is recognized upon delivery or acceptance of the software, as the Group has determined that each software release is distinct and the license is granted for software as it exists at the point of transfer of control to the customer.

When the Group grants customers a license to use IP owned by the Group, the associated license fee revenue is recognized in accordance with the substance of the relevant agreements. In the majority of cases, the Group retains obligations to continue to develop and make available to the customer the latest IP in the licensed assets during the contract term, and therefore revenue is recognized pro rata over the period during which the Group is expected to perform. Recognition of the revenue as pro rata over the term of the license is considered the most faithful depiction of the Group's satisfaction of the performance obligation as the IP being licensed towards the customer includes new inventions patented by the Group that are highly interdependent and interrelated and created through the course of continuous research and development (R&D) efforts that are relatively stable throughout the year. In some contracts, the Group has no remaining obligations to perform after granting a license to the initial IP, and licensing fees are non-refundable. In these cases, revenue is recognized at the beginning of the license term.

Government grants

Government grants are recognized when there is reasonable assurance that the Group will comply with the conditions attached to them and the grants will be received. Government grants received as compensation for expenses or losses incurred are recognized in the consolidated income statement as a deduction against the related expenses. Government grants related to assets are presented in the consolidated statement of financial position as deferred income and recognized as income over the same period the asset is depreciated or amortized.

Government grants received in the form of R&D tax credits are recognized as a deduction against R&D expenses if the amount of the tax credit is linked to the amount of R&D expenditures incurred by the Group and the tax credit is a fully collectible asset that will be paid in cash by the government in case the Group is not able to offset it against its income tax payable. R&D tax credits that do not meet both conditions are recognized as income tax benefit.

Employee benefits

Pensions and other post-employment benefits

The Group companies have various post-employment plans in accordance with the local conditions and practices in the countries in which they operate. The plans are generally funded through payments to insurance companies or contributions to trustee-administered funds as determined by periodic actuarial calculations.

In a defined contribution plan, the Group's legal or constructive obligation is limited to the amount that it agrees to contribute to the fund. The Group's contributions to defined contribution plans, multi-employer and insured plans are recognized in the consolidated income statement in the period to which the contributions relate. If a pension plan is funded through an insurance contract where the Group does not retain any legal or constructive obligations, the plan is treated as a defined contribution plan. All arrangements that do not fulfill these conditions are considered defined benefit plans.

For defined benefit plans, including pension and post-employment healthcare and life insurance, costs are assessed using the projected unit credit method: the cost is recognized in the consolidated income statement so as to spread the benefit over the service lives of employees. The defined benefit obligation is measured as the present value of the estimated future cash outflows using interest rates on high-quality corporate bonds or government bonds with maturities that most closely match expected payouts of benefits. The liability or asset recognized in the consolidated statement of financial position is the present value of the defined benefit obligation as of the reporting date less the fair value of plan assets including effects of any asset ceiling.

Service cost related to employees' service in the current period as well as past service cost resulting from plan amendments, curtailments, and gains and losses on settlements are all presented within cost of sales, research and development expenses or selling, general and administrative expenses in the consolidated income statement. Past service costs are recognized immediately in the consolidated income statement when the plan amendment, curtailment or settlement occurs. Net interest, consisting of interest calculated by applying a discount rate to the net defined benefit liability or asset and the effect of asset ceiling, as well as pension plan administration costs not taken into account in determining the return on plan assets, are presented within financial income and expenses in the consolidated income statement. Remeasurements, comprising actuarial gains and losses, the effect of the asset ceiling and the return on plan assets, excluding amounts recognized in net interest, are recognized immediately in the consolidated statement of financial position with a corresponding debit or credit to pension remeasurements reserve within shareholders' equity through other comprehensive income in the period in which they occur. Remeasurements are not reclassified to profit or loss in subsequent periods.

Actuarial valuations for the Group's defined benefit post-employment plans are performed annually or when a material plan amendment, curtailment or settlement occurs.

Termination benefits

Termination benefits are payable when employment is terminated before the normal retirement date, or whenever an employee accepts voluntary redundancy in exchange for these benefits. The Group recognizes termination benefits when it is demonstrably committed to either terminating the employment of current employees according to a detailed formal plan without possibility of withdrawal, or providing termination benefits as a result of an offer made to encourage voluntary redundancy. These benefits are recorded as termination benefits as a component of the restructuring provision. Local laws may provide employees with the right to benefits from the employer upon termination whether the termination is voluntary or involuntary. For these specific benefits, the difference between the value of the higher benefit for involuntary termination and the lower benefit for voluntary termination is treated as a termination benefit and the portion of the benefit that the Group would be required to pay to the employee in the case of voluntary termination is treated as a contractual or legal obligation determined by local law and accounted for as a defined benefit arrangement as described in the pensions section above.

Share-based payments

The Group offers three types of global equity-settled share-based compensation plans for employees: performance shares, restricted shares and the employee share purchase plan.

Employee services received and the corresponding increase in equity are measured by reference to the fair value of the equity instruments as of the grant date, excluding the impact of any non-market vesting conditions. Non-market vesting conditions attached to the performance shares are included in assumptions about the number of shares that the employee will ultimately receive. The Group reviews the assumptions made on a regular basis and, where necessary, revises its estimates of the number of performance shares that are expected to be settled. Plans that apply tranching vesting are accounted for under the graded vesting model. Share-based compensation is recognized as an expense in the consolidated income statement over the relevant service periods.

Income taxes

The income tax expense comprises current tax and deferred tax. Tax is recognized in the consolidated income statement except to the extent that it relates to items recognized in other comprehensive income, or directly in equity; then the related tax is recognized in other comprehensive income or equity, respectively.

Current taxes are based on the results of Group companies and are calculated using the local tax laws and tax rates that are enacted or substantively enacted as of each reporting date. Corporate taxes withheld at the source of the income on behalf of Group companies are accounted for in income taxes where determined to represent a tax on net income.

Deferred tax assets and liabilities are determined using the balance sheet liability method for all temporary differences arising between the tax bases of assets and liabilities and their carrying amounts in the consolidated financial statements. Deferred tax assets are recognized to the extent it is probable that future taxable profit will be available against which the unused tax losses, unused tax credits and deductible temporary differences can be utilized in the relevant jurisdictions. Deferred tax assets are assessed for realizability as of each reporting date. When circumstances indicate it is no longer probable that deferred tax assets will be utilized, adjustments are made as necessary. Deferred tax liabilities are recognized for taxable temporary differences, and for temporary differences that arise between the fair value and the tax base of identifiable net assets acquired in business combinations.

Deferred tax assets and deferred tax liabilities are offset for presentation purposes when there is a legally enforceable right to set off current tax assets against current tax liabilities, and the deferred tax assets and deferred tax liabilities relate to income taxes levied by the same taxation authority on either the same taxable entity or different taxable entities, which intend either to settle current tax liabilities and assets on a net basis, or to realize the assets and settle the liabilities simultaneously in each future period in which significant amounts of deferred tax liabilities or deferred tax assets are expected to be settled or recovered.

Deferred tax liabilities are not recognized if they arise from the initial recognition of goodwill. Deferred tax liabilities are provided on taxable temporary differences arising from investments in subsidiaries, associates and joint arrangements, except for deferred tax liability where the timing of the reversal of the temporary difference is controlled by the Group, and it is probable that the temporary difference will not reverse in the foreseeable future.

The enacted or substantively enacted tax rates as of each reporting date that are expected to apply in the period when the asset is realized or the liability is settled are used in the measurement of deferred tax assets and deferred tax liabilities. Deferred tax assets and liabilities are not discounted.

The Group periodically evaluates positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation. It adjusts the amounts of current and deferred tax assets and liabilities recorded, where it is considered probable, i.e. more likely than not, that certain tax positions may not be fully sustained upon review by tax authorities. The amounts recorded are based on the most likely amount or the expected value, depending on which method the Group expects to better predict the resolution of the uncertainty, as of each reporting date.

Foreign currency translation

Functional and presentation currency

The financial statements of all Group companies are measured using functional currency, which is the currency of the primary economic environment in which the entity operates. The consolidated financial statements are presented in euro, the functional and presentation currency of the Parent Company.

Transactions in foreign currencies

Transactions in foreign currencies are recorded at exchange rates prevailing as of the dates of the individual transactions. For practical reasons, a rate that approximates the actual rate as of the date of the transaction is often used. Monetary assets and liabilities denominated in foreign currency are valued at the exchange rates prevailing at the end of the reporting period. Foreign exchange gains and losses arising from monetary assets and liabilities as well as fair value changes of related hedging instruments are recognized in financial income and expenses in the consolidated income statement. Unrealized foreign exchange gains and losses related to non-monetary non-current financial investments are included in the fair value measurement of these investments and recognized in other operating income and expenses in the consolidated income statement.

Foreign Group companies

On consolidation, the assets and liabilities of foreign operations whose functional currency is other than euro are translated into euro at the exchange rates prevailing at the end of the reporting period. The income and expenses of these foreign operations are translated into euro at the average exchange rates for the reporting period. The exchange differences arising from translation for consolidation are recognized as translation differences in the consolidated statement of comprehensive income. On disposal of a foreign operation the cumulative amount of translation differences relating to that disposal is reclassified to profit or loss.

Intangible assets

Intangible assets acquired separately are measured on initial recognition at cost. The cost of intangible assets acquired in a business combination is their fair value as of the date of acquisition. Internally generated intangibles, except for development costs that may be capitalized, are expensed as incurred. Development costs are capitalized only if the Group has the technical feasibility to complete the asset; has an ability and intention to use or sell the asset; can demonstrate that the asset will generate future economic benefits; has resources available to complete the asset; and has the ability to measure reliably the expenditure during development.

The useful life of the Group's intangible assets, other than goodwill, is finite. Following initial recognition, finite intangible assets are carried at cost less accumulated amortization and accumulated impairment losses. Intangible assets are amortized over their useful lives, generally three to ten years, using the straight-line method, which is considered to best reflect the pattern in which the asset's future economic benefits are expected to be consumed. Depending on the nature of the intangible asset, the amortization charges are presented within cost of sales, research and development expenses or selling, general and administrative expenses in the consolidated income statement.

Property, plant and equipment

Property, plant and equipment are stated at cost less accumulated depreciation and accumulated impairment losses. Depreciation is recorded on a straight-line basis over the expected useful lives of the assets as follows:

Buildings and constructions	
Buildings and constructions	20–33 years
Light buildings and constructions	3–20 years
Machinery and equipment	
Production machinery, measuring and test equipment	1–5 years
Other machinery and equipment	3–10 years

Land and water areas are not depreciated.

Maintenance, repairs and renewals are generally expensed in the period in which they are incurred. However, major renovations are capitalized and included in the carrying amount of the asset when it is probable that future economic benefits in excess of the originally assessed standard of performance of the existing asset will flow to the Group. Major renovations are depreciated over the remaining useful life of the related asset. Leasehold improvements are depreciated over the shorter of the lease term and the useful life. Gains and losses on the disposal of property, plant and equipment are included in other operating income or expenses.

Leases

On January 1, 2019, the Group adopted IFRS 16, Leases, which provides a single lessee accounting model, requiring lessees to recognize right-of-use assets and lease liabilities for all leases in the consolidated statement of financial position. The right-of-use asset represents the lessee's right to use the underlying leased asset while the lease liability represents the lessee's obligation to make lease payments.

The Group assesses at contract inception whether a contract is, or contains, a lease. That is, the Group assesses whether the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. At the commencement date of the lease, the Group recognizes a right-of-use asset and a lease liability for all leases with a lease term exceeding 12 months. The commencement date is the date when the lessor makes the underlying leased asset available for use by the Group.

The Group applies a practical expedient whereby leases for which the lease term is 12 months or less at the lease commencement date (short-term leases) are not recognized in its consolidated statement of financial position. Instead, the Group recognizes the lease payments associated with short-term leases as an operating expense on a straight-line basis over the lease term. In addition, as a practical expedient, the Group does not separate certain non-lease components from lease components but instead accounts for each lease component and associated specified non-lease component as a single lease component. Non-lease components such as payments for maintenance and services made in conjunction with the leased asset are included in the lease liability whenever these payments are fixed and defined in the lease contract. Other payments for non-lease components that are variable based on consumption, as an example property taxes, insurance payments and variable property service costs, are recognized as an expense when incurred.

The majority of the Group's leased assets relate to commercial and industrial properties such as R&D facilities, production facilities and office buildings. The Group also leases vehicles provided as employee benefits and service vehicles.

Right-of-use assets are measured at cost less accumulated depreciation and impairment losses, and adjusted for any remeasurements of the lease liabilities. The cost of right-of-use assets includes the amount of lease liabilities recognized, initial direct costs incurred, and lease payments made at or before the commencement date less any lease incentives received. Right-of-use assets are depreciated on a straight-line basis over the lease term as follows:

Buildings	3–10 years
Other	3–5 years

Lease liabilities are measured at the present value of lease payments to be made over the lease term. The Group determines the lease term as the non-cancellable term of the lease, together with any periods covered by an option to extend the lease if it is reasonably certain to be exercised, as well as any periods covered by an option to terminate the lease if it is reasonably certain not to be exercised. The lease payments include fixed lease payments and certain fixed non-lease components less any lease incentives receivable, variable lease payments that depend on an index or a rate, and appropriate termination fees whenever the lease term has been determined based on the expectation that the Group will exercise its option to terminate. The Group does not generally enter into lease contracts with variable lease payments linked to future performance or use of an underlying asset.

After the commencement date, the amount of lease liabilities is measured on an amortized cost basis using the effective interest method where the lease liabilities increase related to the accretion of interest and decrease for lease payments made. In addition, the carrying amounts for the right-of-use asset and lease liability are remeasured if there is a modification, a change in the lease term or a change in the future lease payments resulting from a change in an index or rate used to determine such lease payments. The interest component of the lease payments is recognized as interest expense within financial income and expenses.

The Group uses its incremental borrowing rate to calculate the present value of lease payments as the interest rate implicit in the lease is not readily determinable. The Group estimates its incremental borrowing rate quarterly based on the rate of interest that the Group would pay to borrow over the lease term with a similar security to obtain an asset of a similar value to the leased asset in a similar economic environment. The Group measures all leases at amortized cost based on the appropriate discount rate available in the quarter when lease commencement occurred. Where a lease contract modification or reassessment of the lease liability resulting from a change in the lease term occurs, the Group remeasures the present value of the lease liability based on the appropriate discount rate available in the quarter when the reassessment or modification occurs.

The Group acts primarily as a lessee in its leasing transactions. However, the Group will enter into contracts to sublease vacant leasehold or freehold properties for sublease terms up to 10 years to offset or mitigate the unavoidable costs associated with those properties. In these cases, the Group classifies each sublease as a finance lease whenever the sublease contract transfers substantially all the risks and rewards incidental to ownership to the subtenant. All other subleases are classified as operating leases.

Included within other financial assets in its consolidated statement of financial position, the Group recognizes a net investment asset for all finance subleases based on the present value of future sublease payments at the sublease commencement date. After the commencement date, the net investment asset is measured on an amortized cost basis using the effective interest method where the net investment asset increases related to the accretion of interest income and decreases for sublease payments received. Sublease payments received from operating subleases is recognized as other operating income on a straight-line basis over the lease term.

Impairment of goodwill, other intangible assets, property, plant and equipment and right-of-use assets

The Group assesses the recoverability of the carrying value of goodwill, other intangible assets, property, plant and equipment and right-of-use assets if events or changes in circumstances indicate that the carrying value may be impaired. In addition, the Group tests the carrying value of goodwill for impairment annually even if there is no indication of impairment.

Factors that the Group considers when it reviews indications of impairment include, but are not limited to, underperformance of the asset relative to its historical or projected future results, significant changes in the manner of using the asset or the strategy for the overall business, and significant negative industry or economic trends.

Goodwill is allocated to the cash-generating units or groups of cash-generating units that are expected to benefit from the synergies of the related business combination and that reflect the lowest level at which goodwill is monitored for internal management purposes. A cash-generating unit, as determined for the purposes of the Group's goodwill impairment testing, is the smallest group of assets generating cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The carrying value of a cash-generating unit includes its share of relevant corporate assets allocated to it on a reasonable and consistent basis. When the composition of one or more groups of cash-generating units to

which goodwill has been allocated is changed, the goodwill is reallocated based on the relative fair value of the affected groups of cash-generating units.

The Group conducts its impairment testing by determining the recoverable amount for an asset, a cash-generating unit or groups of cash-generating units. The recoverable amount of an asset, a cash-generating unit or groups of cash-generating units is the higher of its fair value less costs of disposal and its value-in-use. The recoverable amount is compared to the asset's, cash-generating unit's or groups of cash-generating units' carrying value. If the recoverable amount for the asset, cash-generating unit or groups of cash-generating units is less than its carrying value, the asset is considered impaired and is written down to its recoverable amount. Impairment losses are presented in cost of sales, research and development expenses or selling, general and administrative expenses in the consolidated income statement, except for impairment losses on goodwill, which are presented in other operating expenses.

Inventories

Inventories are stated at the lower of cost and net realizable value. Cost is determined using standard cost, which approximates actual cost on a first-in first-out (FIFO) basis. Net realizable value is the amount that can be realized from the sale of the inventory in the normal course of business after allowing for the costs of realization. In addition to the cost of materials and direct labor, an appropriate proportion of production overhead is included in the cost of inventory. An allowance is recorded for excess inventory and obsolescence based on the lower of cost and net realizable value.

The Group classifies its inventories to raw materials and semi-finished goods, finished goods, and contract work in progress. Raw materials and semi-finished goods include purchased materials, components and supplies to be used in production. Finished goods include goods manufactured by the Group or by subcontractors that are ready for sale and goods purchased for resale. Contract work in progress includes costs incurred to date for customer contracts where the contractual performance obligations are not yet satisfied. Contract work in progress will be recognized as cost of sales when control of the related performance obligation is transferred to the customer.

Fair value measurement of financial instruments

A number of financial instruments are measured at fair value as of each reporting date after initial recognition. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value of an asset or a liability is measured using the assumptions that market participants would use when pricing the asset or liability, assuming that market participants act in their economic best interest, by using quoted market rates, discounted cash flow analyses and other appropriate valuation models. The Group uses valuation techniques that are appropriate in the circumstances and for which sufficient data is available to measure fair value, maximizing the use of relevant observable inputs and minimizing the use of unobservable inputs. All financial assets and liabilities for which fair values are being measured or disclosed in the consolidated financial statements are categorized within the fair value hierarchy, described as follows, based on the lowest level input that is significant to the fair value measurement as a whole:

Level 1—Quoted (unadjusted) market prices for exchange-traded products in active markets for identical assets or liabilities;

Level 2—Valuation techniques for which significant inputs other than quoted prices are directly or indirectly observable; and

Level 3—Valuation techniques for which significant inputs are unobservable.

The Group categorizes assets and liabilities that are measured at fair value on a recurring basis into an appropriate level of the fair value hierarchy at the end of each reporting period.

Classification and measurement of financial assets

The Group has classified its financial assets that are debt instruments in the following three categories: financial assets measured at amortized cost, financial assets measured at fair value through other comprehensive income, and financial assets measured at fair value through profit and loss. The Group has classified its financial assets that are equity instruments to financial assets measured at fair value through profit and loss. The selection of the appropriate category is made based on both the Group's business model for managing the financial asset and on the contractual cash flow characteristics of the asset.

The Group's business model for managing financial assets is defined on a portfolio level. The business model must be observable on a practical level by the way the business is managed. The cash flows of financial assets measured at amortized cost are solely payments of principal and interest. These assets are held within a business model that has an objective to hold assets to collect contractual cash flows. Financial assets measured at fair value through other comprehensive income have cash flows that are solely payments of principal and interest and these assets are held within a business model that has an objective that is achieved both by holding financial assets to collect contractual cash flows and selling financial assets. Financial assets measured at fair value through profit and loss are assets that do not fall in either of these two categories. In addition to the classification as described above, the accounting for financial assets is impacted if the financial asset is part of a hedging relationship (see below the section on Hedge accounting).

All purchases and sales of financial assets are recorded on the trade date, that is, when the Group commits to purchase or sell the asset. A financial asset is derecognized when substantially all the risks and rewards related to the financial asset have been transferred to a third party that assumes control of the financial asset.

Non-current financial investments

Non-current financial investments include investments in unlisted private equity shares and unlisted venture funds. These equity and debt investments are classified as fair value through profit and loss and are initially recognized and subsequently remeasured at fair value.

Fair value is estimated using a number of methods, including, but not limited to: quoted market rates; the current market value of similar instruments; prices established from a recent arm's-length financing transaction of target companies; and analysis of market prospects and operating performance of target companies, taking into consideration public market comparable companies in similar industry sectors. The Group uses judgment in selecting the appropriate valuation methodology as well as underlying assumptions based on existing market practice and conditions.

Fair value adjustments, foreign exchange gains and losses as well as realized gains and losses from the disposal of these investments are recognized within other operating income and expenses in the consolidated income statement. Weighted average method is used to determine the cost basis of the investments disposed.

Other non-current financial assets

Other non-current financial assets include restricted assets and other receivables, customer and vendor financing related loan receivables and certain other investments of a long-term nature.

Restricted assets and other receivables include restricted bank deposits primarily related to employee benefits as well as other loan receivables. These assets are initially measured at fair value and in subsequent periods at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. For these assets, a loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, recorded as an adjustment to the carrying amount of the investment and recognized in other financial expenses in the consolidated income statement.

Customer- and vendor-related loan receivables are managed in a portfolio with a business model of holding investments to collect principal and interest as well as selling investments. They are initially recognized and subsequently remeasured at fair value determined using the discounted cash flow method. The changes in fair value are recognized in fair value reserve in other comprehensive income. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. Estimated credit loss is typically based on 12-month expected credit loss for existing loans and estimated additional draw-downs during that period; refer to Impairments section for further detail. Loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, and recorded in other financial expenses in the consolidated income statement reducing fair value loss recorded in other comprehensive income. In case a receivable is sold, the impact of expected credit loss is reversed, and the full gain or loss incurred for the sale is recorded in financial income and expenses in the consolidated income statement.

The cash flows of other investments of a long-term nature do not fulfill the criteria of being solely payments of principal and interest. These investments are initially recognized and subsequently remeasured at fair value using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. Fair value adjustments, foreign exchange gains and losses as well as realized gains and losses from the disposal of these investments are mainly recognized within financial income and expenses in the consolidated income statement.

Other current financial assets

Other current financial assets include current part of other non-current financial assets and short-term loan receivables as well as derivative assets that are discussed separately in the Derivative financial instruments section below.

Short-term loan receivables are initially measured at fair value and in subsequent periods measured at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. For these loans, a loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, recorded as an adjustment to the carrying amount of the investment and recognized in other financial expenses in the consolidated income statement.

Trade receivables

Trade receivables arise from contracts with customers and represent an unconditional right to receive the consideration and only the passage of time is required before the consideration is received. The Group sells trade receivables to various financial institutions without recourse in the normal course of business, in order to manage credit risk and working capital cycle, and the business model for managing trade receivables is holding receivables to collect contractual cash flows and selling receivables. Trade receivables are initially recognized and subsequently remeasured at fair value, determined using the discounted cash flow method. The changes in fair value are recognized in fair value reserve in other comprehensive income. The Group applies a simplified approach to recognizing a loss allowance on trade receivables and contract assets based on measurement of lifetime expected credit losses arising from trade receivables and contract assets without significant financing components. Refer to Note 4, Use of estimates and critical accounting judgments, for disclosure of the use of estimates and critical accounting judgments necessary in the estimation of such loss allowances. Loss allowances on trade receivables and contract assets are recognized in other operating expenses in the consolidated income statement. If trade receivables are sold, the difference between the carrying amount derecognized and the consideration received is recognized in financial expenses in the consolidated income statement.

Current financial investments

The Group invests a portion of the corporate cash needed to cover the projected cash outflows of its ongoing business operations in highly liquid, interest-bearing investments. Current financial investments may include investments measured at amortized cost, investments measured at fair value through other comprehensive income and investments measured at fair value through profit and loss.

Corporate cash investments in bank deposits used as collaterals for derivative transactions are initially measured at fair value and in subsequent periods measured at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement.

Corporate cash investments in bank deposits, as well as fixed income and money market securities with initial maturity or put feature longer than three months that have characteristics of solely payments of principal and interest and are not part of structured investments, are managed in a portfolio with a business model of holding investments to collect principal and interest as well as selling investments, and are classified as fair value through other comprehensive income. In this portfolio, investments are executed with the main purpose of collecting contractual cash flows and principal repayments. However, investments are sold from time to time for liquidity management and market risk mitigation purposes.

The fair value of these investments is determined using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. The changes in fair value are recognized in fair value reserve in other comprehensive income. Interest calculated using the effective interest method, as well as foreign exchange gains and losses, are recognized in financial income and expenses in the consolidated income statement. When an investment is disposed of, the related accumulated fair value changes are derecognized from other comprehensive income and recognized in financial income and expenses in the consolidated income statement. The FIFO method is used to determine the cost basis of fixed income securities being disposed of.

Due to the high credit quality of the Group's investment portfolio, the estimated credit loss is normally based on 12-month expected credit loss. Loss allowance is calculated on a quarterly basis, recorded in other financial expenses in the consolidated income statement reducing fair value gains and losses recorded in other comprehensive income.

Corporate cash investments may also include money market funds that do not qualify as cash equivalents, investments acquired for trading purposes, investment structures consisting of securities traded in combination with derivatives with complementing and typically offsetting risk factors and other investments that have cash flows not being solely payments of principal and interest. In this portfolio, investments are executed with the purpose of collecting contractual cash flows and principal repayments as well as for capital appreciation and can be sold at any time.

These investments are initially recognized and subsequently remeasured at fair value determined using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. Fair value adjustments, foreign exchange gains and losses and realized gains and losses are recognized in financial income and expenses in the consolidated income statement.

Cash and cash equivalents

Cash and cash equivalents include cash at bank and in hand as well as highly liquid, fixed income and money market investments that are readily convertible to known amounts of cash with maturities at acquisition of three months or less, as well as bank deposits with maturities or contractual call periods at acquisition of three months or less. Due to the high credit quality and short-term nature of these investments, there is an insignificant risk of change in value. Investments in money market funds that have a risk profile consistent with the aforementioned criteria are also classified as cash equivalents. Investments that have cash flows that are solely payments of principal and interest are measured at amortized cost. All other investments are measured at fair value through profit and loss.

Classification and measurement of financial liabilities

The Group has classified its financial liabilities in the following categories: financial liabilities measured at amortized cost and financial liabilities measured at fair value through profit and loss. The Group classifies derivative liabilities as well as the conditional obligation related to Nokia Shanghai Bell at fair value through profit and loss and all other financial liabilities at amortized cost.

All financial liabilities are initially recognized at fair value and, in case of borrowings and payables, net of transaction costs. Financial liabilities are derecognized when the related obligation is discharged or cancelled or expired. Additionally, a substantial modification of the terms of an existing financial liability is accounted for as a derecognition of the original financial liability and the recognition of a new financial liability. On derecognition of a financial liability, the difference between the carrying amount extinguished and the consideration paid is recognized in interest expenses in the consolidated income statement.

Interest-bearing liabilities

Long-term interest-bearing liabilities are measured at amortized cost using the effective interest method. Short-term interest-bearing liabilities, including the current part of long-term interest-bearing liabilities and collaterals for derivative transactions, are measured at amortized cost using the effective interest method.

Transaction costs, interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement.

Other financial liabilities

Other financial liabilities mainly include a conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. The financial liability related to the conditional obligation is measured based on the expected future cash settlement with any changes recorded in financial income and expenses in the consolidated income statement.

Other financial liabilities also include derivative liabilities that are discussed separately in the Derivative financial instruments section below.

Trade payables

Trade payables are carried at invoiced amount, which is considered to be equal to the fair value due to the short-term nature of the Group's trade payables.

Impairments of financial assets excluding trade receivables and contract assets

Impairment requirements apply to the recognition of a loss allowance for expected credit losses (ECL) on financial assets measured at amortized cost, financial assets measured at fair value through other comprehensive income, financial guarantee contracts and loan commitments. The Group continuously assesses its financial instruments on a forward-looking basis and accounts for the changes in ECL on a quarterly basis using the following method:

$$\blacksquare \text{ ECL} = \text{PD} \times \text{LGD} \times \text{EAD}$$

- Probability of Default (PD) is estimated separately for the centralized investment portfolio and non-centralized investments. The estimate is based on the credit rating profile of these investments as well as specific local circumstances as applicable, unless there are specific events that would indicate that the credit rating would not be an appropriate basis for estimating credit risk at the reporting date.

- For Loss Given Default (LGD), the recovery rate is also estimated separately for centralized investment portfolios and non-centralized investments and is based on the type of investment, specific local circumstances as applicable as well as related collateral arrangements, if any.
- Exposure at Default (EAD) is normally the nominal value of the investment or financial guarantee. For loan commitments, EAD is based on estimated draw-down amounts for the next 12 months.

All the Group's current investments at amortized cost and fair value through other comprehensive income are considered to have low credit risk, and the loss allowance recognized during the period is therefore limited to 12 months' expected losses. Financial instruments that are rated as investment grade are considered to have low credit risk for the purposes of this assessment.

For other non-current financial assets, loans, loan commitments and financial guarantees extended to third parties, the ECL is calculated separately for each significant counterparty using the method described above, including the impact of any collateral arrangements or other credit enhancements to LGD. The estimate is based on 12-month ECL unless there has been a significant increase in credit risk for the specific counterparty since the initial recognition, in which case lifetime ECL is estimated. Breaches of contract, credit rating downgrades and other credit measures are typical indicators that the Group takes into consideration when assessing whether the credit risk on a financial instrument has increased significantly since initial recognition.

The change in the amount of loss allowance for ECL is recognized as an impairment gain or loss in financial income and expenses in the consolidated income statement. For assets carried at amortized cost, the loss allowance is recorded as an adjustment to the carrying amount. For assets carried at fair value through other comprehensive income, the loss allowance is recorded as an adjustment in other comprehensive income instead of adjusting the carrying amount that has already been recorded at fair value. For financial guarantee contracts, the loss allowance is recognized as another liability in the statement of financial position.

Derivative financial instruments

All derivatives are recognized initially at fair value on the date a derivative contract is entered into and subsequently remeasured at fair value. The method of recognizing the resulting gain or loss varies according to whether the derivatives are designated and qualify under hedge accounting.

The cash flows of a hedge are classified as cash flows from operating activities in the consolidated statement of cash flows in case the underlying hedged items relate to the Group's operating activities. When a derivative contract is accounted for as a hedge of an identifiable position relating to financing or investing activities, the cash flows of the contract are classified in the same way as the cash flows of the position being hedged. Certain derivatives are hedging the foreign exchange risk of the Group's cash position and their cash flows are included in foreign exchange adjustment in the consolidated statement of cash flows.

Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss

Foreign exchange forward contracts are valued at market-forward exchange rates. Changes in fair value are measured by comparing these rates with the original contract-forward rate. Currency options are valued as of each reporting date by using the Garman & Kohlhagen option valuation model. Changes in fair value are recognized in the consolidated income statement.

Fair values of forward rate agreements, interest rate options, futures contracts and exchange-traded options are calculated based on quoted market rates as of each reporting date. The discounted cash flow method is used to value interest rate and cross-currency swaps. Changes in fair value are recognized in the consolidated income statement.

For derivatives not designated under hedge accounting but hedging identifiable forecast exposures such as anticipated foreign currency denominated sales and purchases, the gains and losses are recognized in other operating income or expenses in the consolidated income statement. The gains and losses on all other derivatives not designated under hedge accounting are recognized in financial income and expenses in the consolidated income statement.

Embedded derivatives included in contracts are identified and monitored by the Group. For host contracts that are not financial assets containing embedded derivatives that are not closely related, the embedded derivatives are separated and measured at fair value as of each reporting date with changes in fair value recognized in financial income and expenses in the consolidated income statement. For host contracts that are financial assets containing embedded derivatives, the whole contract is measured at fair value as of each reporting date with changes in fair value recognized in financial income and expenses in the consolidated income statement.

Hedge accounting

The Group applies hedge accounting on certain foreign exchange forward contracts, options or option strategies, and interest rate derivatives. Qualifying options and option strategies have zero net premium, or a net premium paid. For option structures, the critical terms of the purchased and written options are the same and the notional amount of the written option component is not greater than that of the purchased option.

In the fair valuation of foreign exchange forward contracts, the Group separates the spot element and the forward element including the impact of foreign currency basis spread and forward points, which is considered as the cost of hedging for foreign exchange forward contracts. In the fair valuation of foreign exchange option contracts, the Group separates the intrinsic value and time value, which is considered as the cost of hedging for foreign exchange option contracts. In the fair valuation of cross-currency swaps, the Group separates the foreign currency basis spread that is considered as the cost of hedging for cross-currency swaps.

Cash flow hedges: hedging of forecast foreign currency denominated sales and purchases

The Group applies cash flow hedge accounting primarily to forecast business foreign exchange exposure that arises from highly probable forecast operative business transactions. The risk management strategy is to hedge material net exposures (identified standard sales exposure minus identified standard costs exposure) by using foreign exchange forwards and foreign exchange options in a layered hedging style that follows defined hedge ratio ranges and hedge maturities in quarterly time buckets. The hedged item must be highly probable and present an exposure to variations in cash flows that could ultimately affect profit or loss.

The Group only designates the spot element of the foreign exchange forward contract as the hedging instrument. Currency options, or option strategies, may also be used for cash flow hedging, in which case the intrinsic value of the option is designated as the hedging instrument. Hedge effectiveness is assessed at inception and quarterly during the hedge relationship to ensure that an economic relationship exists. As the Group only enters in hedge relationships where the critical terms match, the assessment of effectiveness is done on a qualitative basis.

For qualifying foreign exchange forwards and foreign exchange options, the change in fair value that reflects the change in spot exchange rates on a discounted basis is recognized in hedging reserve in other comprehensive income. The changes in the forward element of the foreign exchange forwards and the time value of the options that relate to hedged items are deferred in the cost of hedging reserve in other comprehensive income and are subsequently accounted for in the same way as the spot element or intrinsic value.

In each quarter, the Group evaluates whether the forecast sales and purchases are still expected to occur. If a portion of the hedged cash flow is no longer expected to occur, all related deferred gains or losses are derecognized from other comprehensive income and recognized in other operating income and expenses in the consolidated income statement as hedge accounting criteria is no longer met. If the hedged cash flow ceases to be highly probable, but is still expected to occur, accumulated gains and losses remain in other comprehensive income until the hedged cash flow affects profit or loss.

The Group's risk management objective is to hedge forecast cash flows until the related revenue has been recognized. Each hedge relationship is discontinued during the quarter when the hedge matures, which is also the quarter that it has been designated to hedge. At this point, the accumulated profit or loss of cash flow hedges is recycled to other operating income and expenses in the consolidated income statement. In case the forecast amount of revenue is not recognized during a quarter, the full accumulated profit or loss of cash flow hedges designated for said quarter is still recycled and the portion related to forecast revenue that was not recognized is disclosed as hedge ineffectiveness.

As cash flow hedges primarily mature in the same quarter as the hedged item, there is no significant ineffectiveness resulting from time value of money. The Group will validate the magnitude of the impact of discounting related to the amount of profit or loss recognized in other comprehensive income on a quarterly basis.

The Group has also entered into foreign exchange forwards in relation to forecast sales and purchases that do not qualify as highly probable forecast transactions and hence do not satisfy the requirements for hedge accounting. For these foreign exchange forwards, the gains and losses are recognized in other operating income and expenses in the consolidated income statement.

Cash flow hedges: hedging of future interest cash flows

The Group also applies cash flow hedging to future interest cash flows in foreign currency related to issued bonds. These future interest cash flows are hedged with cross-currency swaps that have been designated partly as fair value hedges and partly as cash flow hedges with the risk related to the risk-free portion of interest cash flows being hedged under fair value hedge accounting and the company-specific credit spread portion being hedged under cash flow hedge accounting. The accumulated profit or loss for the part of these cross-currency swaps designated as cash flow hedges is initially recorded in hedging reserve and recycled to profit or loss at the time when the related interest cash flows are settled. The Group separates the foreign currency basis spread from cross-currency swaps and excludes it from the hedge relationship as cost of hedging that is initially recognized and subsequently measured at fair value and recorded in cost of hedging reserve in other comprehensive income.

Fair value hedges: hedging of foreign exchange exposure

In certain cases, mainly related to long-term construction projects, the Group applies fair value hedge accounting for foreign exchange risk with the objective to reduce the exposure to fluctuations in the fair value of firm commitments due to changes in foreign exchange rates. Changes in the fair value of both spot and forward elements of the derivatives designated and qualifying as fair value hedges, together with any changes in the fair value of the hedged firm commitments attributable to the hedged risk, are recorded in financial income and expenses in the consolidated income statement.

Fair value hedges: hedging of interest rate exposure

The Group applies fair value hedge accounting to reduce exposure to fair value fluctuations of interest-bearing liabilities due to changes in interest rates and foreign exchange rates. The Group uses interest rate swaps and cross-currency swaps aligned with the hedged items to hedge interest rate risk and associated foreign exchange risk.

The Group has entered into long-term borrowings mainly at fixed rate and swapped a portion of them into floating rates in line with a defined target interest profile. The Group aims to mitigate the adverse impacts from interest rate fluctuations by continuously managing net interest exposure resulting from financial assets and liabilities by setting appropriate risk management benchmarks and risk limits. The hedged item is identified as a proportion of the outstanding loans up to the notional amount of the swaps as appropriate to achieve the risk management objective. The Group enters into interest rate swaps that have similar critical terms as the hedged item, such as reference rate, reset dates, payment dates, maturities and notional amount and hence the Group expects that there will be no significant ineffectiveness. The Group has not entered into interest rate swaps where it would be paying fixed rate.

The Group's borrowings are carried at amortized cost. Changes in the fair value of derivatives designated and qualifying as fair value hedges, together with any changes in the fair value of hedged liabilities attributable to the hedged risk, are recorded in financial income and expenses in the consolidated income statement. The Group separates the foreign currency basis spread from cross-currency swaps and excludes it from the hedged risk as cost of hedging that is initially recognized and subsequently measured at fair value and recorded in cost of hedging reserve in other comprehensive income. If a hedge relationship no longer meets the criteria for hedge accounting, hedge accounting ceases, cost of hedging recorded in cost of hedging reserve is immediately expensed and any fair value adjustments made to the carrying amount of the hedged item while the hedge was effective are recognized in financial income and expenses in the consolidated income statement based on the effective interest method.

Hedges of net investments in foreign operations

The Group applies hedge accounting for its foreign currency hedging of selected net investments. Hedged item can be an amount of net assets equal to or less than the carrying amount of the net assets of the foreign operation in the Group consolidated financial statements. The risk management strategy is to protect the euro counter value of the portion of this exposure expected to materialize as non-euro cash repatriation in the foreseeable future.

The Group only designates the spot element of the foreign exchange forward contract as the hedging instrument. Currency options, or option strategies, may also be used for net investment hedging, in which case the intrinsic value of the option is designated as the hedging instrument. Hedge effectiveness is assessed at inception and quarterly during the hedge relationship to ensure that an economic relationship exists. As the Group only enters in hedge relationships where the critical terms match, the assessment of effectiveness is done on a qualitative basis with no significant ineffectiveness expected.

For qualifying foreign exchange forwards, foreign exchange options and option strategies, the change in fair value that reflects the change in spot exchange rates is recognized in translation differences within consolidated shareholders' equity. The changes in the forward element of foreign exchange forwards as well as the changes in the time value of options (collectively known as the "cost of hedging") is recognized in cost of hedging reserve in other comprehensive income. The cost of hedging at the date of designation of the foreign exchange forward or option contract as a hedging instrument is amortized to financial income and expenses in the consolidated income statement over the duration of the contract. Hence, in each reporting period, the change in fair value of forward element of the foreign exchange forward contract or the time value of the option contract is recorded in cost of hedging reserve, while the amortization amount is reclassified from cost of hedging reserve to profit or loss.

Accumulated changes in fair value from qualifying hedges are derecognized from translation differences within consolidated shareholders' equity on the disposal of all or part of a foreign subsidiary by sale, liquidation, repayment of share capital or abandonment. The cumulative amount or proportionate share of changes in the fair value of qualifying hedges deferred in translation differences is recognized as income or expense on disposal.

Provisions

Provisions are recognized when the Group has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation and a reliable estimate of the amount can be made. When the Group expects a provision to be reimbursed, the reimbursement is recognized as an asset only when the reimbursement is virtually certain. The Group assesses the adequacy of its existing provisions and adjusts the amounts as necessary based on actual experience and changes in facts and circumstances as of each reporting date. For descriptions of different classes of provisions, refer to Note 29, Provisions.

Contingent liabilities

The Group discloses ongoing legal matters that relate to possible obligations whose existence will be confirmed by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of the Group. These matters are assessed continually to determine whether an outflow of resources embodying economic benefits has become probable so as to recognize a provision.

Treasury shares

The Group recognizes its own equity instruments that are acquired (treasury shares) as a reduction of equity at cost of acquisition. When cancelled or reissued, the acquisition cost of treasury shares is recognized in retained earnings or other distributable reserves of the equity.

Dividends

Until 2018, dividends proposed by the Board of Directors were recognized in the consolidated financial statements when they were approved by the shareholders at the Annual General Meeting. From 2019 onwards, and applicable for the first time for distribution of funds for 2018, dividends and capital repayments are recognized in the consolidated financial statements when the Board of Directors has approved the quarterly payment in accordance with the authorization granted by Annual General Meeting.

3. New and amended standards and interpretations

On January 1, 2020, the Group adopted the following amendments to the accounting standards issued by the IASB and endorsed by the EU with no material impact on the Group's consolidated financial statements:

- Amendments to IFRS 3, Definition of a Business;
- Amendments to IFRS 7, IFRS 9 and IAS 39, Interest Rate Benchmark Reform;
- Amendments to IAS 1 and IAS 8, Definition of Material; and
- Amendments to References to the Conceptual Framework in IFRS Standards.

The Group has not early adopted any new and amended standards and interpretations that have been issued but are not yet effective. The new and amended standards and interpretations issued by the IASB that are effective in future periods are not expected to have a material impact on the consolidated financial statements of the Group when adopted. The Group intends to adopt these new and amended standards and interpretations, if applicable, when they become effective and are endorsed by the EU.

4. Use of estimates and critical accounting judgments

The preparation of financial statements requires use of management judgment in electing and applying accounting policies as well as making estimates and assumptions about the future. These judgments, estimates and assumptions may have a significant effect on the amounts recognized in the financial statements.

The estimates and assumptions used in determining the carrying amounts of assets and liabilities are based on historical experience, expected outcomes and various other factors that were available when these consolidated financial statements were prepared, and they are believed to be reasonable under the circumstances. The estimates and assumptions are reviewed continually and revised if changes in circumstances occur, or as a result of new information or more experience. As estimates and assumptions inherently contain a varying degree of uncertainty, actual outcomes may differ resulting in adjustments to the carrying amounts of assets and liabilities in the subsequent periods.

The accounting matters presented in this note are determined to involve the most difficult, subjective or complex judgments, or are considered as key sources of estimation uncertainty.

COVID-19

In 2020, the global economy and financial markets have been severely affected by the COVID-19 pandemic. While the direct impact of COVID-19 on the Group's financial performance and financial position has been primarily related to temporary factory closures in the first half of the year, the uncertainty related to the duration of the pandemic and the pace and shape of the economic recovery that follows has made it even more challenging to make estimates and assumptions about the future, increasing the risks that the actual results will differ significantly from those estimated. As always, the estimates and assumptions used in determining the carrying amounts of assets and liabilities as of the reporting date reflect the best and latest information available at the time and are considered reasonable under the circumstances.

Due to the high market volatility experienced particularly in the first half of the year as a result of the impact of COVID-19, the Group has throughout the year closely monitored the valuation of those assets where the measurement is to a large extent based on unobservable inputs, such as venture fund investments and certain pension assets, and has concluded the valuation of these assets as of December 31, 2020, is appropriate.

In addition, the Group considered the impact of COVID-19 in its annual goodwill impairment test and the assessment of recoverability of its deferred tax assets, and while it recorded an impairment loss on goodwill related to Fixed Networks operating segment and derecognized its deferred tax assets related to Finland, the reasons for both of these events were considered unrelated to the current COVID-19 situation. For more information on deferred tax assets and goodwill impairment test, refer to Note 12, Income taxes, and Note 17, Impairment, respectively.

Revenue recognition

Critical accounting judgment

Accounting for contract modifications

A significant part of the Group's business is conducted under framework agreements with no fixed commitment on the overall project scope. The accounting treatment of subsequent purchase commitments received from the customer in the form of new purchase orders is a critical judgment. Subsequent purchase orders may be deemed either to represent separate contracts or to represent a modification of the existing contract, which requires combination with the original contract for accounting purposes.

The decision whether to segregate or combine subsequent purchase orders can have a direct impact on the amount of revenue recognized in a given period for arrangements with multiple performance obligations including material rights as the transaction price is allocated to the performance obligations identified within the contract.

Determining and allocating the transaction price

The Group enters into complex customer arrangements, some of which are non-committed framework agreements that contain complex discounting structures as well as customer pricing that varies depending on the different needs of each customer. The appropriate identification and allocation of discounts and other forms of variable consideration as well as determination of the standalone selling price of each performance obligation are critical judgments that have a direct impact on the timing and amount of revenue recognized. The determination of standalone selling prices of existing performance obligations and of unexercised customer options to purchase additional goods or services will also impact the Group's determination whether a non-committed part of the contract contains material rights that must be accounted for within the context of the contract. Identified material rights are accounted for as a performance obligation within the contract and the Group will allocate part of the transaction price to it with the relative standalone selling price method.

Identifying distinct performance obligations and determining when the performance obligation is satisfied

The Group regularly enters into agreements with customers comprising multiple performance obligations, which include a variety of products, services and software that the Group offers. The identification of distinct performance obligations within these types of arrangements is considered a critical judgment as inappropriate identification of performance obligations could lead to the recognition of revenue in an incorrect period or for an inaccurate amount.

Pension and other post-employment benefit obligations and expenses

Key source of estimation uncertainty

The determination of pension and other post-employment benefit obligations and expenses for defined benefit plans is dependent on a number of estimates and assumptions, including the discount rate, future mortality rate, annual rate of increase in future compensation levels, and healthcare costs trend rates and usage of services in the United States where the majority of our post-employment healthcare plans are maintained. Changes in assumptions and actuarial estimates may materially affect the benefit obligation, future expense and future cash flow. Based on these estimates and assumptions, as of December 31, 2020, defined benefit obligations amount to EUR 23 501 million (EUR 24 780 million in 2019) and the fair value of plan assets amounts to EUR 25 688 million (EUR 26 297 million in 2019).

Critical accounting judgment

Where a surplus on a defined benefit scheme arises, the Group analyzes the recoverability of the surplus through either a refund or through reduction of future contributions in determining whether it is necessary to restrict the amount of the surplus that is recognized. The Group has two plans in the US, one plan in the UK and one in Belgium with material surplus positions with a combined surplus of EUR 6 147 million as of December 31, 2020 (EUR 5 794 million in 2019). The Group has made the judgment that limits to recoverability at the reporting date apply to one of the plans in the US and all other surpluses meet the requirements of recoverability. For the US plan where recoverability has been determined to be limited, the resulting asset ceiling limitation is recorded at EUR 1 125 million as of December 31, 2020 (EUR 975 million in 2019).

Refer to Note 27, Pensions and other post-employment benefits.

Income taxes

Critical accounting judgment

The Group uses judgment in determining the extent to which deferred tax assets can be recognized. The recognition of deferred tax assets is based on the assessment of whether it is probable that sufficient taxable profit will be available in the future to utilize the deductible temporary differences, unused tax losses and unused tax credits before the unused tax losses and unused tax credits expire. This assessment requires estimates of the future financial performance of a particular legal entity or a tax group that has recognized the deferred tax asset.

A significant portion of the Group's recognized deferred tax assets relate to unused tax losses, tax credits and deductible temporary differences in the United States which amounted of EUR 753 million as of December 31, 2020 (EUR 1 076 million in 2019). In addition, as of December 31, 2020, the Group has EUR 33 620 million (EUR 20 426 million in 2019) of temporary differences, tax losses carry forward and tax credits for which no deferred tax assets are recognized due to uncertainty of utilization. The majority of these unrecognized deferred tax assets relate to France and Finland.

Refer to Note 12, Income taxes, for further details on income taxes.

Leases

Critical accounting judgment

The Group uses judgment when it evaluates the lease term. Many of the Group's more significant leasehold properties include options to extend the lease term or to terminate the lease prior to the expiration of the lease. These options provide the Group with the financial flexibility needed to align its global portfolio of commercial and industrial real estate properties to meet the changing occupancy needs of its various businesses. This financial flexibility is reflected in the measurement of the right-of-use assets and lease liabilities that the Group records for its leasehold properties to the extent that management concludes that any lease extension options are not reasonably certain to be exercised.

In its assessment whether lease extension and termination options are reasonably certain to be exercised, management applies judgment, considering all relevant factors that create an economic incentive for the Group to exercise either option. The Group determines that extension of the lease term beyond the non-cancellable lease term is reasonably certain when the leased property is significantly customized or specialized for the Group's specific use, the Group has made significant leasehold improvements that it seeks to recover over the lease term, or lease payments in the optional renewal or break period are significantly lower than the expected future market rent levels. After the commencement date of the lease, the Group reassesses the lease term only if there is a significant event or change in circumstances that is within its control and affects its ability to exercise or not to exercise the option. As of December 31, 2020, the Group has potential (undiscounted) future lease payments of EUR 468 million (EUR 560 million in 2019) relating to extension options not expected to be exercised and EUR 51 million (EUR 79 million in 2019) relating to termination options expected to be exercised that are not included in the lease liability.

Refer to Note 16, Leases, for further details on leases.

Goodwill recoverability

Key source of estimation uncertainty

The recoverable amounts of the groups of CGUs are based on fair value less costs of disposal that is determined using a level 3 fair value measurement based on a discounted cash flow calculation. The cash flow projections used in calculating the recoverable amounts are based on financial plans approved by management covering an explicit forecast period of three years. Seven additional years of cash flow projections subsequent to the explicit forecast period reflect a gradual progression towards the steady state cash flow projections modeled in the terminal year. Estimation and judgment are required in determining the components of the recoverable amount calculation, including among others the discount rates, the terminal growth rates and the operating profits in the terminal year. The discount rates reflect current assessments of the time value of money and relevant market risk premiums reflecting risks and uncertainties for which the future cash flow estimates have not been adjusted. The terminal growth rate assumptions reflect long-term average growth rates for the industry and economies in which the groups of CGUs operate.

In 2020, the Group has considered the effects of the ongoing COVID-19 pandemic when estimating future cash flows, revenue growth rates, gross margins and operating margins and these considerations have been reflected in the goodwill impairment test performed. The Group conducted the goodwill impairment test based on a long-range plan prepared in the fourth quarter of 2020 and concluded that the carrying amount exceeded the recoverable amount for its Fixed Networks group of CGUs. As a result, the Group recorded a non-cash impairment charge of EUR 200 million to reduce the goodwill within its Fixed Networks operating segment.

Taken in isolation, either of the following changes would cause a further material goodwill impairment in the Fixed Networks operating segment:

- increase in discount rate from 7.4% to 8.4%
- reduction in the operating profit in the terminal year by EUR 25 million

A reasonably possible change in the key assumptions used in the valuation of all other groups of CGUs would not lead to an impairment.

Refer to Note 14, Intangible assets and Note 17, Impairment.

Fair value of level 3 financial assets

Key source of estimation uncertainty

Fair values for level 3 financial assets are determined with valuation techniques using material inputs that are not observable from transactions on active market requiring estimation and judgment both in selecting an appropriate valuation technique as well as in defining appropriate underlying assumptions.

For unlisted venture funds and unlisted shares, the fair value is based on a number of factors including, but not limited to, the current market value of similar instruments; prices established from recent arm's-length transactions; and/or analysis of market prospects and operating performance of target companies with reference to public market comparable companies in similar industry sectors. Changes in these estimates could result in losses in future periods. Based on these estimates and assumptions, the fair value of level 3 financial assets is EUR 727 million (EUR 746 million in 2019), representing 7% of total financial assets measured at fair value on a recurring basis (9% in 2019).

Refer to Note 24, Fair value of financial instruments.

Provisions and legal contingencies

Key source of estimation uncertainty

Estimation is required in determining the value of the obligation. The amount recognized as a provision is based on the best estimate of unavoidable costs required to settle the obligation at the end of the reporting period. When estimating the value, management may be required to consider a range of possible outcomes and their associated probabilities, risks and uncertainties surrounding the events and circumstances as well as making assumptions of the timing of payment. Changes in estimates of timing or amounts of costs required to settle the obligation may become necessary as time passes and/or more accurate information becomes available. While the use of estimates and assumptions by management as a whole may lead to material adjustments to the aggregate balance of provisions, no individual provision estimate on its own is expected to require a material adjustment to the overall carrying amount. Based on these estimates and assumptions, provisions amount to EUR 1 532 million as of December 31, 2020 (EUR 1 209 million in 2019).

Critical accounting judgment

The Group recognizes a provision when it has a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources will be required to settle the obligation and a reliable estimate of the amount can be made. At times, management judgment is required in determining whether it is probable that an outflow of economic benefits will be required to settle the obligation. The Group is regularly subject to various legal proceedings and investigations covering a wide range of matters. Management judgment is required in assessing the probability of different outcomes and a provision is recognized when an unfavorable outcome is deemed probable and the related obligation can be reasonably estimated.

Refer to Note 29, Provisions and Note 30, Commitments, contingencies and legal proceedings.

5. Segment information

The Group has three reportable segments for financial reporting purposes: (1) Networks, (2) Nokia Software and (3) Nokia Technologies. Segment-level information for Group Common and Other is also presented.

Networks reportable segment consists of four aggregated operating segments: (1) Mobile Networks, (2) Global Services, (3) Fixed Networks and (4) IP/Optical Networks. The aggregated operating segments have similar economic characteristics, such as long-term margins; have similar products, production processes, distribution methods and customers; and operate in a similar regulatory environment.

In addition, the Group provides net sales disclosure for the following businesses within the Networks reportable segment: (i) Mobile Access (comprises Mobile Networks and Global Services operating segments), (ii) Fixed Access (comprises Fixed Networks operating segment), (iii) IP Routing (comprises part of IP/Optical Networks operating segment) and (iv) Optical Networks (comprises part of IP/Optical Networks operating segment).

The President and CEO is the chief operating decision-maker and monitors the operating results of operating and reportable segments for the purpose of assessing performance and making decisions about resource allocation. Key financial performance measures of the segments include primarily net sales and segment operating profit. The evaluation of segment performance and allocation of resources is based on segment operating profit⁽¹⁾.

Accounting policies of the segments are the same as those described in Note 2, Significant accounting policies. Inter-segment revenues and transfers are accounted for as if the revenues were to third parties, that is, at current market prices. Certain costs and revenue adjustments are not allocated to the segments⁽¹⁾.

Segment descriptions

Networks

Networks comprises Mobile Networks, Global Services, Fixed Networks and IP/Optical Networks operating segments.

The Mobile Networks operating segment focuses on mobile radio including macro radio, small cells and cloud-native radio solutions for communication service providers and enterprises.

The Global Services operating segment provides a wide range of professional services with multi-vendor capabilities, covering network planning and optimization, network implementation, systems integration as well as company-wide managed services.

The Fixed Networks operating segment provides copper and fiber access products, solutions and services. The portfolio allows for a customized combination of technologies that brings fiber to the most economical point for the customer.

The IP/Optical Networks operating segment provides IP routing and optical transport systems, each with its own software and services to build high-capacity network infrastructure for the internet and global connectivity.

Nokia Software

The Nokia Software operating segment offers the cloud core software portfolio in addition to software applications spanning customer experience management, network operations and management, communications and collaboration, policy and charging, as well as cloud, IoT, security, and analytics platforms that enable digital services providers and enterprises to accelerate innovation, monetize services, and optimize their customer experience.

Nokia Technologies

The Nokia Technologies operating segment, building on decades of innovation and R&D leadership in technologies used in virtually all mobile devices used today, is expanding Nokia patent licensing business, reintroducing the Nokia brand to smartphones through brand licensing, and establishing a technology licensing business. The majority of net sales and related costs and expenses attributable to licensing and patenting the patent portfolio is recorded in Nokia Technologies, while each reportable segment separately records its own research and development expenses.

Group Common and Other

Group Common and Other includes Alcatel-Lucent Submarine Networks and Radio Frequency Systems, both of which are managed as separate entities. In addition, Group Common and Other includes Nokia Bell Labs' operating expenses, as well as certain corporate-level and centrally managed operating expenses.

(1) Segment results exclude costs related to the acquisition of Alcatel-Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Segment information

EURm	Networks	Nokia (1) Software	Nokia Technologies	Group Common and Other	Eliminations	Segment total	Unallocated items (2)	Total
Continuing operations								
2020								
Net sales to external customers	16 847	2 656	1 388	963	–	21 854	(2)	21 852
Net sales to other segments	5	–	14	19	(38)	–	–	–
Depreciation and amortization	(557)	(81)	(32)	(55)	–	(725)	(407)	(1 132)
Goodwill impairment	–	–	–	–	–	–	(200)	(200)
Operating profit/(loss)	935	507	1 164	(525)	–	2 081	(1 196)	885
Share of results of associated companies and joint ventures	25	–	1	(4)	–	22	–	22
2019								
Net sales to external customers	18 207	2 767	1 473	897	–	23 344	(29)	23 315
Net sales to other segments	2	–	14	55	(71)	–	–	–
Depreciation and amortization	(566)	(85)	(31)	(54)	–	(736)	(924)	(1 660)
Operating profit/(loss)	665	589	1 239	(490)	–	2 003	(1 518)	485
Share of results of associated companies and joint ventures	12	–	–	–	–	12	–	12
2018								
Net sales to external customers	17 403	2 713	1 486	978	–	22 580	(17)	22 563
Net sales to other segments	1	–	15	47	(63)	–	–	–
Depreciation and amortization	(383)	(65)	(21)	(46)	–	(515)	(940)	(1 455)
Operating profit/(loss)	773	450	1 203	(246)	–	2 180	(2 239)	(59)
Share of results of associated companies and joint ventures	12	–	–	–	–	12	–	12

(1) Includes Mobile Access net sales of EUR 10 630 million (EUR 11 655 million in 2019 and EUR 11 273 million in 2018), Fixed Access net sales of EUR 1 759 million (EUR 1 881 million in 2019 and EUR 1 980 million in 2018), IP Routing net sales of EUR 2 768 million (EUR 2 921 million in 2019 and EUR 2 545 million in 2018) and Optical Networks net sales of EUR 1 695 million (EUR 1 752 million in 2019 and EUR 1 606 million in 2018).

(2) Comprises costs related to the acquisition of Alcatel-Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Reconciliation of total segment operating profit to total operating profit/(loss)

EURm	2020	2019	2018
Total segment operating profit	2 081	2 003	2 180
Restructuring and associated charges	(651)	(502)	(321)
Amortization and depreciation of acquired intangible assets and property, plant and equipment	(407)	(924)	(940)
Impairment of assets, net of impairment reversals	(241)	(29)	(48)
Gain on defined benefit plan amendment	90	168	–
Transaction and related costs, including integration costs	11	(48)	(220)
Release of acquisition-related fair value adjustments to deferred revenue and inventory	(2)	(6)	(16)
Divestment of businesses	(2)	(2)	(39)
Product portfolio strategy costs	–	(163)	(583)
Operating model integration	–	(12)	–
Fair value changes of legacy IPR fund	–	–	(57)
Other	6	–	(15)
Total operating profit/(loss)	885	485	(59)

Information by geographies

Net sales to external customers and non-current assets by country

EURm	Net sales ⁽¹⁾			Non-current assets ⁽²⁾	
	2020	2019	2018	2020	2019
Finland ⁽³⁾	1 480	1 552	1 556	1 382	1 477
United States	6 751	6 609	6 204	4 843	5 505
France	1 444	1 229	1 179	1 857	1 997
India	944	1 348	1 629	170	178
China	906	1 506	1 754	346	400
Other	10 327	11 071	10 241	1 017	1 167
Total	21 852	23 315	22 563	9 615	10 724

(1) Net sales to external customers by country are based on the location of the customer.

(2) Consists of goodwill and other intangible assets, property, plant and equipment and right-of-use assets.

(3) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

No single customer represents 10% or more of revenues.

6. Discontinued operations

Discontinued operations include the continuing financial effects of the HERE business and the D&S business. The Group sold its HERE digital mapping and location services business to a German automotive industry consortium comprised of AUDI AG, BMW Group and Daimler AG in a transaction that was completed on December 4, 2015. The Group sold substantially all of its Devices & Services business to Microsoft in a transaction that was completed on April 25, 2014. The timing and amount of financial effects are largely dependent upon external factors such as final outcomes of uncertain tax positions.

Results of discontinued operations

EURm	2020	2019	2018
Net sales	—	—	—
Cost of sales	—	—	—
Gross profit	—	—	—
Research and development expenses	—	—	—
Selling, general and administrative expenses	(2)	(6)	(9)
Other operating income and expenses	2	(1)	17
Operating profit/(loss)	—	(7)	8
Financial income and expenses	(4)	(5)	81
(Loss)/profit before tax	(4)	(12)	89
Income tax benefit/(expense)	1	(1)	125
(Loss)/profit for the year, ordinary activities⁽¹⁾	(3)	(13)	214
Gain on the sale, net of tax ⁽²⁾	—	6	—
(Loss)/profit for the year	(3)	(7)	214

(1) In 2018, the results of discontinued operations mostly relate to a resolution reached in the tax dispute concerning the applicability of withholding tax in respect of payments by Nokia India Private Limited to Nokia Corporation for the supply of operating software in D&S business as well as a release of uncertain tax positions related to HERE business.

(2) In 2019, an addition of EUR 7 million to and a deduction of EUR 1 million from gain on the sale were recognized related to D&S business and HERE business, respectively, due to tax indemnification.

Cash flows from discontinued operations

EURm	2020	2019	2018
Net cash from operating activities	6	(7)	(33)
Net cash from investing activities	7	9	10
Net cash flow for the period	13	2	(23)

7. Revenue recognition

Management has determined that the Group's geographic areas depict how the nature, amount, timing and uncertainty of revenue and cash flows are affected by economic factors. The Group's primary customer base consists of companies that operate on a country-specific or a regional basis. Although the Group's technology cycle is similar around the world, different countries and regions are inherently in a different stage of that cycle, often influenced by macroeconomic conditions specific to those countries and regions.

Each reportable segment, as described in Note 5, Segment information, consists of customers that operate in all geographic areas. No reportable segment has a specific revenue concentration in any geographic area other than Nokia Technologies, which is included within Europe.

Net sales to external customers by region⁽¹⁾

EURm	2020	2019	2018
Asia Pacific	3 847	4 556	4 081
Europe	6 620	6 620	6 489
Greater China	1 376	1 843	2 165
Latin America	995	1 472	1 380
Middle East & Africa	1 893	1 876	1 874
North America	7 121	6 948	6 574
Total	21 852	23 315	22 563

(1) Net sales to external customers by region are based on the location of the customer.

Contract assets and contract liabilities

Contract asset balances decrease upon reclassification to trade receivables when the Group's right to payment becomes unconditional. Contract liability balances decrease when the Group satisfies the related performance obligations and revenue is recognized. There were no material cumulative adjustments to revenue recognized arising from changes in transaction prices, changes in measures of progress or changes in estimated variable consideration.

During the year, the Group recognized EUR 2.1 billion (EUR 1.9 billion in 2019) of revenue that was included in the current contract liability balance at the beginning of the period.

Order backlog

As of December 31, 2020, the aggregate amount of the transaction price allocated to partially or wholly unsatisfied performance obligations arising from fixed contractual commitments amounted to EUR 16.6 billion (EUR 18.8 billion in 2019). Management has estimated that these unsatisfied performance obligations will be recognized as revenue as follows:

	2020	2019
Within 1 year	68%	69%
2-3 years	31%	27%
More than 3 years	1%	4%
Total	100%	100%

The estimated timing of the satisfaction of these performance obligations is subject to change owing to factors beyond the Group's control such as customer and network demand, market conditions and, in some cases, restrictions imposed by the weather or other factors impacting project logistics. Revenue recognized in the reporting period from performance obligations satisfied (or partially satisfied) in previous periods (for example, due to changes in transaction price) was not material.

Completed Contracts

In April 2014, the Group entered into an agreement to license certain technology patents and patent applications owned by the Group on the effective date of that agreement, on a non-exclusive basis, to a licensee, for a period of 10 years (the "License Agreement"). Contemporaneously and under the terms of the License Agreement, the Group issued to the licensee an option to extend the technology patent license for the remaining life of the licensed patents. The Group received all cash consideration due for the sale of the 10-year license and option upon closing of the License Agreement. Management has determined that, upon transition to IFRS 15, Revenue from Contracts with Customers, the License Agreement is a completed contract. As such, in accordance with the transition requirements of the standard, the Group continues to apply its prior revenue accounting policies, based on IAS 18, Revenue, and related interpretations, to the License Agreement. Under those policies, the Group is recognizing revenue over the term of the License Agreement.

As of December 31, 2020, the balance of deferred revenue related to the License Agreement of EUR 515 million (EUR 670 million in 2019), recognized in deferred revenue in the consolidated statement of financial position, is expected to be recognized as revenue through 2024.

8. Expenses by nature

EURm	2020	2019	2018
Continuing operations			
Personnel expenses ⁽¹⁾	7 310	7 360	8 029
Cost of material	6 016	8 148	7 544
Project subcontracting and other customer contract expenses	4 887	4 003	3 782
Depreciation and amortization	1 132	1 660	1 455
IT services	343	362	491
Impairment charges	241	38	55
Other	1 188	1 496	1 533
Total operating expenses⁽²⁾	21 117	23 067	22 889

(1) The comparative amounts for 2019 and 2018 have been adjusted to reflect a revised amount of restructuring expenses. Refer to Note 9, Personnel expenses.

(2) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2019 and 2018 have been recast accordingly. Refer to Note 2, Significant accounting policies.

Operating expenses include government grant income and R&D tax credits of EUR 98 million (EUR 83 million in 2019 and EUR 124 million in 2018) most of which have been recognized in the consolidated income statement as a deduction against research and development expenses.

Restructuring charges by function⁽¹⁾

EURm	2020	2019	2018
Cost of sales	245	227	115
Research and development expenses	189	105	119
Selling, general and administrative expenses	67	117	77
Total restructuring charges	501	449	311

(1) Restructuring charges include defined benefit plan curtailment income and expenses.

9. Personnel expenses

EURm	2020	2019	2018
Continuing operations			
Salaries and wages ⁽¹⁾⁽²⁾	6 055	6 094	6 517
Share-based payment expense ⁽³⁾	76	77	62
Pension and other post-employment benefit expense, net ⁽⁴⁾	362	242	465
Social security costs ⁽¹⁾	817	947	985
Total	7 310	7 360	8 029

(1) The comparative amounts for salaries and wages and social security expenses have been increased by EUR 141 million and EUR 28 million, respectively, in 2019, and by EUR 161 million and EUR 33 million, respectively, in 2018, to reflect a revised amount of restructuring expenses.

(2) Includes termination benefits.

(3) Presented net of related social costs, refer to Note 26, Share-based payments. Includes EUR 76 million (EUR 77 million in 2019 and EUR 62 million in 2018) for equity-settled awards.

(4) Includes net gain on pension plan amendments, curtailments and settlements of EUR 58 million (EUR 131 million net gain in 2019 and net loss of EUR 52 million in 2018).

The average number of employees is 92 039 (98 322 in 2019 and 103 083 in 2018).

10. Other operating income and expenses

EURm	2020	2019	2018
Continuing operations			
Other operating income⁽¹⁾			
Gains from unlisted venture funds	80	87	162
Foreign exchange gain on hedging forecasted sales and purchases, net	5	—	—
Profit on sale of property, plant and equipment	3	18	21
Subsidies and government grants	3	8	8
Change in the loss allowance and impairment losses on trade receivables, net	—	28	—
Other	59	96	76
Total	150	237	267
Other operating expenses⁽¹⁾			
Goodwill impairment	(200)	—	—
Change in the loss allowance and impairment losses on trade receivables, net	(171)	—	(45)
Losses and expenses related to unlisted venture funds	(19)	(36)	(118)
Retirements and loss on sale of property, plant and equipment	(10)	(27)	(52)
Changes in provisions	(5)	(47)	(13)
Foreign exchange loss on hedging forecasted sales and purchases, net	—	(88)	(27)
Other	(68)	(67)	(57)
Total	(473)	(265)	(312)

(1) In 2020, the Group reclassified certain items of income and expenses from other operating income and expenses to the functions. The comparative amounts for 2019 and 2018 have been recast accordingly. Refer to Note 2, Significant accounting policies.

11. Financial income and expenses

EURm	2020	2019	2018
Continuing operations			
Financial income			
Interest income on financial investments	21	31	39
Interest income on financing components of other contracts	38	42	37
Other financial income ⁽¹⁾	97	92	9
Total	156	165	85
Financial expenses			
Interest expense on interest-bearing liabilities	(127)	(99)	(105)
Interest expense on financing components of other contracts ⁽²⁾	(83)	(172)	(162)
Interest expense on lease liabilities ⁽³⁾	(25)	(28)	–
Net interest expense on defined benefit plans	–	(9)	(15)
Net fair value losses on investments at fair value through profit and loss	–	(2)	(1)
Net fair value losses on hedged items under fair value hedge accounting	(122)	(133)	(7)
Net fair value gains on hedging instruments under fair value hedge accounting	118	141	9
Net foreign exchange losses	(8)	(106)	(100)
Other financial expenses ⁽⁴⁾⁽⁵⁾	(73)	(98)	(17)
Total	(320)	(506)	(398)

(1) In 2020, includes income of EUR 79 million (EUR 64 million in 2019) due to a change in the fair value of the financial liability related to Nokia Shanghai Bell; refer to Note 33, Significant partly-owned subsidiaries.

(2) In 2020, includes an interest expense of EUR 31 million (EUR 94 million in 2019 and EUR 66 million in 2018) related to the sale of receivables.

(3) Interest expense on lease liabilities is presented in financial income and expenses as a result of the adoption of IFRS 16, Leases, in the beginning of 2019.

(4) In 2020, includes an increase in loss allowance of EUR 58 million related to loans extended to an emerging market customer. Refer to Note 37, Subsequent events.

(5) In 2019, includes an impairment of EUR 64 million related to a loan extended to certain emerging market customer recognized upon contract exit.

12. Income taxes

Components of the income tax expense

EURm	2020	2019	2018
Continuing operations			
Current tax	(295)	(367)	(530)
Deferred tax	(2 961)	229	341
Total	(3 256)	(138)	(189)

Income tax reconciliation

Reconciliation of the difference between income tax computed at the statutory rate in Finland of 20% and income tax recognized in the consolidated income statement:

EURm	2020	2019	2018
Income tax (expense)/benefit at statutory rate	(149)	(31)	72
Permanent differences	90	53	(22)
Non-creditable withholding taxes	(37)	(31)	(24)
Income taxes for prior years	26	(13)	26
Effect of different tax rates of subsidiaries operating in other jurisdictions	(39)	(8)	(18)
Effect of deferred tax assets not recognized ⁽¹⁾	(3 202)	(99)	(205)
Benefit arising from previously unrecognized deferred tax assets	105	29	46
Net increase in uncertain tax positions	(12)	(6)	(43)
Change in income tax rates	(12)	(30)	(45)
Income taxes on undistributed earnings	(26)	(2)	26
Other	–	–	(2)
Total	(3 256)	(138)	(189)

(1) In 2020, includes a derecognition of deferred tax assets related to Finland and in 2018 relates primarily to foreign withholding tax credits in Finland.

Income tax liabilities and assets include a net EUR 149 million liability (EUR 154 million in 2019) relating to uncertain tax positions with inherently uncertain timing of cash outflows.

Prior period income tax returns for certain Group companies are under examination by local tax authorities. The Group has ongoing tax investigations in various jurisdictions, including the United States, Canada, India, Brazil and South Korea. The Group's business and investments, especially in emerging market countries, may be subject to uncertainties, including unfavorable or unpredictable tax treatment. Management judgment and a degree of estimation are required in determining the tax expense or benefit. Even though management does not expect that any significant additional taxes in excess of those already provided for will arise as a result of these examinations, the outcome or actual cost of settlement may vary materially from estimates.

Deferred tax assets and liabilities

EURm	2020			2019		
	Deferred tax assets	Deferred tax liabilities	Net balance	Deferred tax assets	Deferred tax liabilities	Net balance
Tax losses carried forward and unused tax credits ⁽¹⁾	720	–		1 301	–	
Undistributed earnings	–	(104)		–	(83)	
Intangible assets and property, plant and equipment ⁽¹⁾	1 020	(291)		3 257	(279)	
Right-of-use assets	–	(197)		2	(221)	
Defined benefit pension assets	3	(1 233)		55	(1 150)	
Other non-current assets	27	(40)		62	(53)	
Inventories	120	(8)		216	(24)	
Other current assets	98	(46)		164	(32)	
Lease liabilities	164	(3)		220	–	
Defined benefit pension and other post-employment liabilities	1 045	(7)		1 006	(29)	
Other non-current liabilities	–	–		32	–	
Provisions	251	(86)		213	(51)	
Other current liabilities	200	(63)		182	(126)	
Other temporary differences	5	(13)		99	(27)	
Total before netting	3 653	(2 091)	1 562	6 809	(2 075)	4 734
Netting of deferred tax assets and liabilities	(1 831)	1 831	–	(1 685)	1 685	–
Total after netting	1 822	(260)	1 562	5 124	(390)	4 734

(1) The decrease in deferred tax assets in 2020 compared to 2019 is primarily related to derecognition of deferred tax assets in Finland.

Movements in the net deferred tax balance during the year:

EURm	2020	2019	2018
As of January 1	4 734	4 561	4 169
Adoption of new IFRS standards ⁽¹⁾	–	(1)	19
Recognized in income statement, continuing operations	(2 961)	229	341
Recognized in income statement, discontinued operations	1	–	29
Recognized in other comprehensive income	(115)	(84)	(57)
Recognized in equity	2	(7)	6
Acquisitions through business combinations and disposals	4	–	–
Translation differences	(103)	36	54
As of December 31	1 562	4 734	4 561

(1) In 2019, adoption of IFRS 16, Leases. In 2018, adoption of IFRS 9, Financial Instruments, and IFRS 15, Revenue from Contracts with Customers.

Amount of temporary differences, tax losses carried forward and tax credits for which no deferred tax asset was recognized due to uncertainty of utilization:

EURm	2020	2019
Temporary differences	14 258	1 716
Tax losses carried forward	19 021	18 609
Tax credits	341	101
Total	33 620	20 426

The Group continually evaluates the probability of utilizing its deferred tax assets and considers both favorable and unfavorable factors in its assessment. Deferred tax assets are recognized to the extent it is probable that future taxable profit will be available against which the unused tax losses, unused tax credits and deductible temporary differences can be utilized in the relevant jurisdictions. A significant portion of the Group's recognized deferred tax assets relate to unused tax losses, tax credits and deductible temporary differences in the United States which amounted of EUR 753 million as of December 31, 2020 (EUR 1 076 million in 2019). The Group has an established pattern of sufficient tax profitability to conclude that it is probable that the Group will be able to utilize the deferred tax assets in the United States.

At December 31, 2020, the Group has concluded based on its assessment that it is not probable that it will be able to utilize the unused tax losses, unused tax credits and deductible temporary differences in Finland in the foreseeable future. This assessment was done primarily based on the historical performance. Consequently, the Group derecognized EUR 2 918 million deferred tax assets related to Finland. The recent years' cumulative profitability in Finland, excluding certain integration costs related to the acquisition of Alcatel-Lucent, is changing from a cumulative profit position to a cumulative loss position based on the assessment made at the end of 2020. When an entity has a history of recent losses in a certain jurisdiction, the entity recognizes a deferred tax asset arising from unused losses or tax credits only to the extent the entity has sufficient taxable temporary differences or there is convincing other evidence that sufficient tax profit will be available against which the unused tax losses or unused tax credits can be utilized in the future. Positive evidence of future taxable profits may be assigned less weight in assessing the appropriateness of recording a deferred tax asset when there is other unfavorable evidence such as cumulative losses, which are considered strong evidence that future taxable profits may not be available. The Group continues to assess the realizability of deferred tax assets including in particular its actual profit record in upcoming periods and may re-recognize deferred tax assets related to Finland if pattern of tax profitability is re-established.

The majority of the unrecognized temporary differences, tax losses and tax credits, relate to France and Finland. Based on the pattern of losses in the past years in France and cumulative profitability as of the end of 2020 in Finland, and in the absence of convincing other evidence of sufficient taxable profit in the future years, it is uncertain whether these deferred tax assets can be utilized in the foreseeable future. A significant portion of the French unrecognized deferred tax assets are indefinite in nature and available against future French tax liabilities, subject to a limitation of 50% of annual taxable profits. The majority of Finnish unrecognized deferred tax assets are not subject to expiry and are available against future Finnish tax liabilities.

Expiry of tax losses carried forward and unused tax credits:

EURm	2020			2019		
	Recognized	Unrecognized	Total	Recognized	Unrecognized	Total
Tax losses carried forward						
Within 10 years	163	2 364	2 527	2 181	1 609	3 790
Thereafter	7	–	7	–	6	6
No expiry	1 810	16 657	18 467	1 728	16 994	18 722
Total	1 980	19 021	21 001	3 909	18 609	22 518
Tax credits						
Within 10 years	29	326	355	251	88	339
Thereafter	36	2	38	237	2	239
No expiry	206	13	219	13	11	24
Total	271	341	612	501	101	602

The Group has undistributed earnings of EUR 645 million (EUR 1 104 million in 2019) for which a deferred tax liability has not been recognized as these earnings will not be distributed in the foreseeable future.

13. Earnings per share

	2020	2019	2018
	EURm	EURm	EURm
Profit or loss attributable to equity holders of the parent			
Continuing operations	(2 520)	14	(554)
Discontinued operations	(3)	(7)	214
(Loss)/profit for the year	(2 523)	7	(340)
	000s shares	000s shares	000s shares
Weighted average number of shares outstanding	5 612 418	5 599 912	5 588 020
Effect of potentially dilutive shares			
Performance shares	19 780	24 072	20 577
Restricted shares and other	3 884	2 390	3 656
Stock options	–	1	224
Total effect of potentially dilutive shares	23 664	26 463	24 457
Adjusted weighted average number of shares	5 636 082	5 626 375	5 612 477
Earnings per share	EUR	EUR	EUR
Basic earnings per share			
Continuing operations	(0.45)	0.00	(0.10)
Discontinued operations	0.00	0.00	0.04
(Loss)/profit for the year	(0.45)	0.00	(0.06)
Diluted earnings per share			
Continuing operations	(0.45)	0.00	(0.10)
Discontinued operations	0.00	0.00	0.04
(Loss)/profit for the year	(0.45)	0.00	(0.06)

Basic earnings per share is calculated by dividing the profit or loss attributable to equity holders of the parent by the weighted average number of shares outstanding during the year. Diluted earnings per share is calculated by adjusting the profit or loss attributable to equity holders of the parent, and the weighted average number of shares outstanding, for the effects of all dilutive potential ordinary shares. Potential ordinary shares are excluded from the calculation of diluted earnings per share when they are determined to be antidilutive.

In 2020 and 2018, the effect of potentially dilutive shares was excluded from the calculation of diluted earnings per share as it was determined to be antidilutive due to the loss from continuing operations.

14. Intangible assets

EURm	Goodwill	Other	Total
Acquisition cost as of January 1, 2019	6 360	9 424	15 784
Translation differences	75	82	157
Additions	–	52	52
Disposals and retirements	–	(92)	(92)
Acquisition cost as of December 31, 2019	6 435	9 466	15 901
Accumulated amortization and impairment charges as of January 1, 2019	(908)	(6 071)	(6 979)
Translation differences	–	(41)	(41)
Impairment charges	–	(12)	(12)
Disposals and retirements	–	71	71
Amortization	–	(984)	(984)
Accumulated amortization and impairment charges as of December 31, 2019	(908)	(7 037)	(7 945)
Net book value as of January 1, 2019	5 452	3 353	8 805
Net book value as of December 31, 2019	5 527	2 429	7 956
Acquisition cost as of January 1, 2020	6 435	9 466	15 901
Translation differences	(331)	(359)	(690)
Additions	–	39	39
Acquisitions through business combinations ⁽¹⁾	78	72	150
Disposals and retirements	–	(31)	(31)
Acquisition cost as of December 31, 2020	6 182	9 187	15 369
Accumulated amortization and impairment charges as of January 1, 2020	(908)	(7 037)	(7 945)
Translation differences	–	256	256
Impairment charges	(200)	(9)	(209)
Disposals and retirements	–	28	28
Amortization	–	(472)	(472)
Accumulated amortization and impairment charges as of December 31, 2020	(1 108)	(7 234)	(8 342)
Net book value as of January 1, 2020	5 527	2 429	7 956
Net book value as of December 31, 2020	5 074	1 953	7 027

(1) The Group acquired 100% ownership interest in Elenion Technologies. Goodwill was allocated to the IP/Optical Networks operating segment.

Net book value of other intangible assets by type of asset⁽¹⁾:

EURm	2020	2019
Customer relationships	1 401	1 788
Patents and licenses	232	264
Technologies and IPR&D	155	160
Tradenames and trademarks	90	145
Other	75	72
Total	1 953	2 429

(1) The largest movements are due to amortization and translation differences, with the exception of Technologies and IPR&D, which increased due to acquired technology of EUR 72 million in 2020.

As of December 31, 2020, the weighted average for the remaining amortization periods is approximately five years for customer relationships, six years for patents and licenses, three years for technologies and IPR&D, two years for tradenames and trademarks and one year for other.

15. Property, plant and equipment

EURm	Land, buildings and constructions	Machinery, equipment and other	Assets under construction	Total
Acquisition cost as of January 1, 2019	1 219	2 863	91	4 173
Translation differences	17	22	–	39
Additions	63	339	143	545
Reclassifications	28	62	(90)	–
Disposals and retirements	(60)	(268)	(1)	(329)
Acquisition cost as of December 31, 2019	1 267	3 018	143	4 428
Accumulated depreciation as of January 1, 2019	(386)	(1 997)	–	(2 383)
Translation differences	(8)	(16)	–	(24)
Impairment charges	–	(4)	–	(4)
Disposals and retirements	33	257	–	290
Depreciation	(90)	(361)	–	(451)
Accumulated depreciation as of December 31, 2019	(451)	(2 121)	–	(2 572)
Net book value as of January 1, 2019	833	866	91	1 790
Net book value as of December 31, 2019	816	897	143	1 856
Acquisition cost as of January 1, 2020	1 267	3 018	143	4 428
Translation differences	(63)	(102)	(4)	(169)
Additions	36	290	123	449
Acquisitions through business combinations	–	2	–	2
Reclassifications	61	64	(125)	–
Disposals and retirements	(36)	(137)	–	(173)
Acquisition cost as of December 31, 2020	1 265	3 135	137	4 537
Accumulated depreciation as of January 1, 2020	(451)	(2 121)	–	(2 572)
Translation differences	33	72	–	105
Disposals and retirements	22	128	–	150
Depreciation	(86)	(351)	–	(437)
Accumulated depreciation as of December 31, 2020	(482)	(2 272)	–	(2 754)
Net book value as of January 1, 2020	816	897	143	1 856
Net book value as of December 31, 2020	783	863	137	1 783

16. Leases

Right-of-use assets

Right-of-use assets represent the Group's right to use the underlying leased assets.

EURm	Buildings	Other	Total
Acquisition cost as of January 1, 2019	898	77	975
Net additions ⁽¹⁾	150	44	194
Acquisition cost as of December 31, 2019	1 048	121	1 169
Accumulated depreciation as of January 1, 2019	–	–	–
Impairment charges	(32)	–	(32)
Depreciation	(177)	(48)	(225)
Accumulated depreciation as of December 31, 2019	(209)	(48)	(257)
Net book value as of January 1, 2019	898	77	975
Net book value as of December 31, 2019	839	73	912
Acquisition cost as of January 1, 2020	1 048	121	1 169
Net additions ⁽¹⁾	89	59	148
Retirements	(31)	–	(31)
Acquisition cost as of December 31, 2020	1 106	180	1 286
Accumulated depreciation as of January 1, 2020	(209)	(48)	(257)
Impairment charges	(32)	–	(32)
Retirements	31	–	31
Depreciation	(176)	(47)	(223)
Accumulated depreciation as of December 31, 2020	(386)	(95)	(481)
Net book value as of January 1, 2020	839	73	912
Net book value as of December 31, 2020	720	85	805

(1) Net additions comprise new lease contracts as well as modifications and remeasurements of existing lease contracts.

Amounts recognized in the income statement

EURm	2020	2019
Depreciation expense of right-of-use assets	(223)	(225)
Expenses relating to short-term leases	(22)	(26)
Interest expense on lease liabilities	(25)	(28)
Income from subleasing leasehold and freehold properties ⁽¹⁾	4	9
Gains arising from sale and leaseback transactions	–	9
Total recognized in the income statement⁽²⁾	(266)	(261)

(1) Sublease income comprises rent income from operating subleases and financial income on the net investment in the lease related to finance subleases.

(2) Total recognized in the income statement excludes impairment of right-of-use assets, which is presented in Note 17, Impairment, and deferred taxes discussed in Note 12, Income taxes.

Amounts reported in the statement of cash flows

EURm	2020	2019
Payment of principal portion of lease liabilities	(234)	(221)
Interest portion of lease liabilities	(25)	(28)
Total cash outflow for leases	(259)	(249)

The maturity analysis for lease liabilities is presented in Note 36, Financial risk management. Commitments related to future lease contracts are presented in Note 30, Commitments, contingencies and legal proceedings.

17. Impairment

Goodwill

The Group has allocated goodwill to the operating segments corresponding to groups of cash-generating units (CGUs) that are expected to benefit from goodwill in line with the Group's operational and reporting structure. Refer to Note 5, Segment information.

Allocation of goodwill

The following table presents the allocation of goodwill to groups of CGUs as of December 31:

EURm	2020	2019
Mobile Networks	729	776
Fixed Networks	609	856
Global Services	958	1 020
IP/Optical Networks	1 865	1 914
Nokia Software	914	961

Recoverable amounts

The recoverable amounts of the groups of CGUs were based on fair value less costs of disposal that was determined using a level 3 fair value measurement based on a discounted cash flow calculation. The cash flow projections used in calculating the recoverable amounts were based on financial plans approved by management covering an explicit forecast period of three years.

Seven additional years of cash flow projections subsequent to the explicit forecast period reflect a gradual progression towards the steady state cash flow projections modeled in the terminal year. The terminal growth rate assumptions reflect long-term average growth rates for the industries and economies in which the groups of CGUs operate. The discount rates reflect current assessments of the time value of money and relevant market risk premiums reflecting risks and uncertainties for which the future cash flow estimates have not been adjusted. Other key variables in future cash flow projections include assumptions on estimated sales growth, gross margin and operating margin. All cash flow projections are consistent with market participant assumptions.

Terminal growth rate and post-tax discount rate applied in the impairment test for the groups of CGUs:

Key assumption %	2020	2019	2020	2019
	Terminal growth rate		Post-tax discount rate	
Mobile Networks	1.2	1.1	8.0	8.4
Fixed Networks	0.8	1.1	7.4	7.6
Global Services	1.1	0.9	7.6	8.0
IP/Optical Networks	1.4	1.4	7.9	8.2
Nokia Software	1.5	1.5	7.0	7.6

Based on the long-range plan prepared in the fourth quarter of 2020, the Group conducted an impairment test and concluded that the carrying amount exceeded the recoverable amount for its Fixed Networks group of CGUs. As a result, the Group recorded a non-cash impairment charge of EUR 200 million within other operating expenses to reduce the goodwill within its Fixed Networks operating segment.

The results of the impairment test indicate adequate headroom for other groups of CGUs.

Impairment charges by asset category

EURm	2020	2019	2018
Goodwill	200	—	—
Other intangible assets	9	12	16
Property, plant and equipment	—	4	39
Right-of-use assets ⁽¹⁾	32	20	—
Investments in associated companies and joint ventures	4	2	—
Financial assets	1	64	—
Total	246	102	55

(1) The Group adopted IFRS 16, Leases, on January 1, 2019. In 2019, a EUR 20 million impairment charge is presented net of onerous lease contract provision releases.

In 2020, the Group recognized an impairment charge of EUR 200 million related to the goodwill held within the Fixed Networks operating segment.

In 2019, upon contract exit the Group recognized an impairment charge of EUR 64 million related to loans extended to a certain emerging market customer. Other impairments recorded by the Group in 2020, 2019 and 2018 are immaterial.

18. Inventories

EURm	2020	2019 ⁽¹⁾
Raw materials and semi-finished goods	552	636
Finished goods	940	1 258
Contract work in progress	750	1 042
Total	2 242	2 936

(1) The Group has changed the classification of inventories from previous presentation to better reflect the nature of the inventories.

The cost of inventories recognized as an expense during the year and included in the cost of sales is EUR 6 115 million (EUR 8 181 million in 2019 and EUR 7 569 million in 2018).

Movements in allowances for excess and obsolete inventory for the years ended December 31:

EURm	2020	2019	2018
As of January 1	505	521	432
Charged to income statement	71	83	153
Deductions ⁽¹⁾	(96)	(99)	(64)
As of December 31	480	505	521

(1) Deductions include utilization and releases of allowances.

19. Prepaid expenses and accrued income

Non-current

EURm	2020	2019
R&D tax credits and other indirect tax receivables	129	156
Deposits	47	58
Other	41	78
Total	217	292

Current

EURm	2020	2019
R&D tax credits, VAT and other indirect tax receivables	483	543
Divestment-related receivables	23	33
Deposits	19	20
Other	325	312
Total	850	908

20. Shares of the Parent Company

Shares and share capital

Parent Company has one class of shares. Each share entitles the holder to one vote at general meetings. The shares have no par value nor is there a minimum or maximum share capital or number of shares under the Articles of Association of Nokia Corporation. As of December 31, 2020, the share capital amounted to EUR 245 896 461.96 (EUR 245 896 461.96 in 2019) and consisted of 5 653 886 159 (5 640 536 159 in 2019) issued and fully paid shares.

Treasury shares

As of December 31, 2020, the number of Parent Company shares held by the Group companies was 36 389 799 (34 954 869 in 2019) representing 0.6% (0.6% in 2019) of the share capital and total voting rights.

In 2020, under the authorization held by the Board of Directors, the Parent Company issued 13 350 000 new shares without consideration to itself to fulfill the company's obligation under the Nokia Equity Programs.

In 2020, under the authorization held by the Board of Directors, the Parent Company issued 11 915 070 treasury shares to employees, including certain members of the Group Leadership Team, as settlement under Parent Company equity-based incentive plans and the employee share purchase plan. The shares were issued without consideration and in accordance with the rules of the plans.

Reconciliation of the number of shares outstanding at the beginning and at the end of the period

Number of shares 000s	2020	2019	2018
As of January 1	5 605 581	5 593 162	5 579 517
Settlement of share-based payments	11 915	12 396	13 221
Stock options exercised	–	23	424
As of December 31	5 617 496	5 605 581	5 593 162

Authorizations given to the Board of Directors

Authorization to issue shares and special rights entitling to shares

At the Annual General Meeting held on May 27, 2020, the shareholders authorized the Board of Directors to issue a maximum of 550 million shares through one or more issues of shares or special rights entitling to shares. The Board of Directors is authorized to issue either new shares or shares held by the Parent Company. The authorization included the right for the Board of Directors to resolve on all the terms and conditions of such share and special rights issuances, including issuance in deviation from the shareholders' pre-emptive rights. The authorization may be used to develop the Parent Company's capital structure, diversify the shareholder base, finance or carry out acquisitions or other arrangements, settle the Parent Company's equity-based incentive plans, or for other purposes resolved by the Board of Directors. The authorization is effective until October 7, 2021 and terminated the previous authorizations to issue shares and special rights entitling to shares.

Authorization to repurchase shares

At the Annual General Meeting held on May 27, 2020, the shareholders authorized the Board of Directors to repurchase a maximum of 550 million shares. The amount corresponds to less than 10% of the total number of Parent Company's shares. Shares may be repurchased to be cancelled, held to be reissued, transferred further or for other purposes resolved by the Board. The Board shall resolve on all other matters related to the repurchase of Nokia shares. The authorization is effective until October 7, 2021, and terminated the previous authorization to repurchase shares.

21. Translation differences, fair value and other reserves

EURm	Translation differences	Fair value and other reserves			
		Pension remeasurements	Hedging reserve	Cost of hedging reserve	Fair value reserve
As of January 1, 2018	(932)	838	37	(10)	(23)
Foreign exchange translation differences	444	–	–	–	–
Net investment hedging losses	(66)	–	–	3	–
Remeasurements of defined benefit plans	–	293	–	–	–
Net fair value losses	–	–	(28)	(8)	(116)
Transfer to income statement	(37)	–	(30)	23	78
Other (decrease)/increase	(1)	6	–	–	–
As of December 31, 2018	(592)	1 137	(21)	8	(61)
Foreign exchange translation differences	259	–	–	–	–
Net investment hedging losses	(40)	–	–	(6)	–
Remeasurements of defined benefit plans	–	319	–	–	–
Net fair value losses	–	–	(17)	(34)	(101)
Transfer to income statement	1	–	32	18	107
Other increase	–	1	–	–	–
As of December 31, 2019	(372)	1 457	(6)	(14)	(55)
Foreign exchange translation differences	(1 231)	–	–	–	–
Net investment hedging gains	307	–	–	1	–
Remeasurements of defined benefit plans	–	484	–	–	–
Net fair value gains/(losses)	–	–	13	(13)	(175)
Transfer to income statement	–	–	(5)	16	208
Other decrease	(1)	–	–	–	–
Movement attributable to non-controlling interests	2	(1)	–	–	–
As of December 31, 2020	(1 295)	1 940	2	(10)	(22)

Translation differences consist of foreign exchange differences arising from translation of foreign operations into euro, the presentation currency of the consolidated financial statements as well as gains and losses related to hedging of net investments in foreign operations.

Pension remeasurements reserve includes actuarial gains and losses as well as return on plan assets and changes in the effect of the asset ceiling, excluding amounts recognized in net interest, related to the Group's defined benefit plans.

Hedging reserve includes the change in fair value that reflects the change in spot exchange rates for certain foreign exchange forward contracts that are designated as cash flow hedges to the extent that the hedge is effective.

Cost of hedging reserve includes forward element of foreign exchange forward contracts and the time value of foreign exchange options related to cash flow hedging of forecasted foreign currency sale and purchase transactions. Additionally, cost of hedging reserve includes the difference between the change in fair value of forward element of foreign exchange forward contracts and the time value of option contracts and the amortization of forward element of foreign exchange forward contracts and time value of option contracts related to net investment hedging. Cost of hedging reserve also includes changes in fair value from foreign currency basis spread related to fair value hedging of foreign currency denominated bonds.

Fair value reserve includes the changes in fair value of financial instruments that are managed in a portfolio with a business model of holding financial instruments to collect contractual cash flows including principal and interest as well as selling financial instruments. The fair values recorded in fair value reserve for these instruments are reduced by amounts of loss allowances.

For more information on the accounting for items recognized in translation differences, fair value and other reserves, refer to Note 2, Significant accounting policies.

22. Other comprehensive income

EURm	2020			2019			2018		
	Gross	Tax	Net	Gross	Tax	Net	Gross	Tax	Net
Pension remeasurements									
Remeasurements of defined benefit plans	624	(140)	484	414	(95)	319	388	(90)	298
Net change during the year	624	(140)	484	414	(95)	319	388	(90)	298
Translation differences									
Exchange differences on translating foreign operations	(1 232)	1	(1 231)	259	–	259	443	1	444
Transfer to income statement	–	–	–	1	–	1	(42)	–	(42)
Net change during the year	(1 232)	1	(1 231)	260	–	260	401	1	402
Net investment hedges⁽¹⁾									
Net investment hedging gains/(losses)	266	42	308	(58)	12	(46)	(79)	16	(63)
Transfer to income statement	–	–	–	–	–	–	6	(1)	5
Net change during the year	266	42	308	(58)	12	(46)	(73)	15	(58)
Cash flow and other hedges⁽²⁾									
Net fair value gains/(losses)	1	(1)	–	(64)	13	(51)	(44)	8	(36)
Transfer to income statement	14	(3)	11	62	(12)	50	(9)	2	(7)
Net change during the year	15	(4)	11	(2)	1	(1)	(53)	10	(43)
Financial assets at fair value through other comprehensive income									
Net fair value losses	(213)	38	(175)	(126)	25	(101)	(144)	28	(116)
Transfer to income statement on loss allowance	229	(46)	183	40	(8)	32	33	(8)	25
Transfer to income statement on disposal	31	(6)	25	94	(19)	75	66	(13)	53
Net change during the year	47	(14)	33	8	(2)	6	(45)	7	(38)
Other increase	3	–	3	–	–	–	1	–	1
Total	(277)	(115)	(392)	622	(84)	538	619	(57)	562

(1) In 2020, income tax related to net investment hedging gains includes EUR 94 million related to the derecognition of deferred tax assets in Finland. For more information, refer to Note 12, Income taxes.

(2) Includes movements in cash flow hedging reserve and related cost of hedging reserve.

23. Interest-bearing liabilities

Issuer/borrower	Instrument	Currency	Nominal (million)	Final maturity	Carrying amount EURm ⁽⁵⁾	
					2020	2019
Nokia Corporation	1.00% Senior Notes ⁽¹⁾⁽²⁾	EUR	350	March 2021	350	499
Nokia Corporation	3.375% Senior Notes	USD	500	June 2022	417	445
Nokia Corporation	2.00% Senior Notes	EUR	750	March 2024	762	766
Nokia Corporation	EIB R&D Loan ⁽³⁾	EUR	500	February 2025	500	–
Nokia Corporation	NIB R&D Loan ⁽⁴⁾	EUR	250	May 2025	250	250
Nokia Corporation	2.375% Senior Notes ⁽¹⁾	EUR	500	May 2025	497	–
Nokia Corporation	2.00% Senior Notes	EUR	750	March 2026	762	765
Nokia Corporation	4.375% Senior Notes	USD	500	June 2027	448	452
Nokia of America Corporation	6.50% Senior Notes	USD	74	January 2028	61	66
Nokia Corporation	3.125% Senior Notes ⁽¹⁾	EUR	500	May 2028	497	–
Nokia of America Corporation	6.45% Senior Notes	USD	206	March 2029	169	185
Nokia Corporation	6.625% Senior Notes	USD	500	May 2039	541	517
Nokia Corporation and various subsidiaries	Other liabilities				322	332
Total					5 576	4 277

- (1) The Group issued EUR 500 million 2.375% Senior Notes due 2025 and EUR 500 million 3.125% Senior Notes due 2028 under its EUR 5 billion Euro Medium-Term Note Programme in May 2020. The proceeds of the new notes were partially used to redeem EUR 150 million of the 1.00% Senior Notes due 2021.
- (2) In January 2021, Nokia exercised its issuer call option to redeem 1.00% Senior Notes due March 2021 for the full amount of EUR 350 million. The redemption date for the notes was February 15, 2021. Refer to Note 37, Subsequent events.
- (3) The Group drew a EUR 500 million loan from the European Investment Bank (EIB) in February 2020.
- (4) The loan from the Nordic Investment Bank (NIB) is repayable in three equal annual installments in 2023, 2024 and 2025.
- (5) Carrying amount includes EUR 235 million (EUR 138 million in 2019) of fair value gains related to discontinued fair value hedge accounting relationships that are amortized over the life of the respective Senior Notes.

The Group's significant credit facilities and funding programs as of December 31:

Committed / uncommitted	Financing arrangement	Currency	Nominal (million)	Utilized (million)	
				2020	2019
Committed	Revolving Credit Facility ⁽¹⁾	EUR	1 500	–	–
Uncommitted	Finnish Commercial Paper Programme	EUR	750	–	–
Uncommitted	Euro-Commercial Paper Programme	EUR	1 500	–	–
Uncommitted	Euro Medium Term Note Programme ⁽²⁾	EUR	5 000	2 850	2 000
Total				2 850	2 000

- (1) The Group exercised its option to extend the maturity date of the Revolving Credit Facility in June 2020. Subsequent to the extension, the facility has its maturity in June 2025 with a one-year extension option remaining, except for EUR 88 million having its maturity in June 2024.
- (2) All euro-denominated bonds have been issued under the Euro Medium Term Note Programme.

All borrowings and credit facilities presented in the tables above are senior unsecured and have no financial covenants.

To manage interest rate and foreign exchange risks related to the Group's interest-bearing liabilities, the Group has designated the following cross-currency swaps as hedges under both fair value hedge accounting and cash flow hedge accounting as of December 31:

Entity	Instrument ⁽¹⁾	Currency	Maturity	Notional (million) ⁽²⁾		Fair values EURm	
				2020	2019	2020	2019
Nokia Corporation	Cross-currency swaps	USD	June 2022	500	500	(48)	(11)
Nokia Corporation	Cross-currency swaps	USD	June 2027	250	500	(28)	(18)
Nokia Corporation	Cross-currency swaps	USD	May 2039	250	400	(78)	(20)
Total						(154)	(49)

- (1) All cross-currency swaps are fixed-to-floating swaps.
- (2) In 2020 and 2019, the Group unwound EUR/USD cross-currency swaps and re-entered into equivalent swaps with different pricing levels to retain both foreign exchange and interest rate risk positions otherwise unchanged. Hedge accounting was discontinued and new hedge relationships were defined for the new EUR/USD cross-currency swaps.

Changes in lease liabilities, interest-bearing liabilities and associated derivatives arising from financing activities:

EURm	Long-term interest-bearing liabilities	Short-term interest-bearing liabilities	Derivatives held to hedge long-term borrowings ⁽¹⁾	Lease liabilities ⁽²⁾	Total
As of January 1, 2019	2 826	994	57	1 066	4 943
Cash flows	253	40	20	(221)	92
Non-cash changes:					
Changes in foreign exchange rates	43	1	(25)	–	19
Changes in fair value	131	–	(142)	–	(11)
Reclassification between long-term and short-term	738	(738)	–	–	–
Net additions ⁽³⁾	–	–	–	194	194
Other ⁽⁴⁾	(6)	(5)	140	(9)	120
As of December 31, 2019	3 985	292	50	1 030	5 357
Cash flows	1 401	(83)	(52)	(234)	1 032
Non-cash changes:					
Acquisitions through business combinations	10	30	–	–	40
Changes in foreign exchange rates	(133)	(7)	123	(37)	(54)
Changes in fair value	102	–	(102)	–	–
Reclassification between long-term and short-term	(350)	350	–	–	–
Net additions ⁽³⁾	–	–	–	147	147
Other ⁽⁴⁾	–	(21)	135	4	118
As of December 31, 2020	5 015	561	154	910	6 640

(1) Includes derivatives designated in fair value and cash flow hedge accounting relationships as well as derivatives not designated in hedge accounting relationship but hedging identifiable long-term borrowing exposure.

(2) Includes non-current and current lease liabilities.

(3) Net additions comprise new lease contracts as well as modifications and remeasurements of existing lease contracts.

(4) In 2020, includes EUR 135 million (EUR 138 million in 2019) cash inflow from unwind settlements of certain interest rate derivatives held to hedge long-term borrowings that is included in interest paid in the consolidated statement of cash flows.

24. Fair value of financial instruments

Financial assets and liabilities recorded at fair value are categorized based on the amount of unobservable inputs used to measure their fair value. Three hierarchical levels are based on an increasing amount of judgment associated with the inputs used to derive fair valuation for these assets and liabilities, level 1 being market values for exchange traded products, level 2 being primarily based on quotes from third-party pricing services, and level 3 requiring most management judgment. At the end of each reporting period, the Group categorizes its financial assets and liabilities to the appropriate level of fair value hierarchy. Items carried at fair value in the following table are measured at fair value on a recurring basis.

EURm	Carrying amounts							Fair value ⁽¹⁾	
	Amortized cost	Fair value through profit or loss			Fair value through other comprehensive income			Total	Total
		Level 1	Level 2	Level 3	Level 1	Level 2	Level 3		
2020									
Non-current financial investments	–	31	–	714	–	–	–	745	745
Other non-current financial assets	115	–	99	5	–	87	–	306	306
Other current financial assets including derivatives	22	–	169	8	–	15	–	214	214
Trade receivables	–	–	–	–	–	5 503	–	5 503	5 503
Current financial investments	134	–	882	–	–	105	–	1 121	1 121
Cash and cash equivalents	4 333	–	2 607	–	–	–	–	6 940	6 940
Total financial assets	4 604	31	3 757	727	–	5 710	–	14 829	14 829
Long-term interest-bearing liabilities	5 015	–	–	–	–	–	–	5 015	5 140
Other long-term financial liabilities	–	–	–	19	–	–	–	19	19
Short-term interest-bearing liabilities	561	–	–	–	–	–	–	561	561
Other short-term financial liabilities including derivatives	–	–	318	420	–	–	–	738	738
Trade payables	3 174	–	–	–	–	–	–	3 174	3 174
Total financial liabilities	8 750	–	318	439	–	–	–	9 507	9 632

EURm	Carrying amounts							Fair value ⁽¹⁾	
	Amortized cost	Fair value through profit or loss			Fair value through other comprehensive income			Total	Total
		Level 1	Level 2	Level 3	Level 1	Level 2	Level 3		
2019									
Non-current financial investments	–	–	–	740	–	–	–	740	740
Other non-current financial assets	165	–	171	6	–	103	–	445	430
Other current financial assets including derivatives	46	–	81	–	–	37	–	164	164
Trade receivables	–	–	–	–	–	5 025	–	5 025	5 025
Current financial investments	42	–	51	–	–	4	–	97	97
Cash and cash equivalents	4 090	–	1 820	–	–	–	–	5 910	5 910
Total financial assets	4 343	–	2 123	746	–	5 169	–	12 381	12 366
Long-term interest-bearing liabilities	3 985	–	–	–	–	–	–	3 985	4 056
Other long-term financial liabilities	–	–	10	20	–	–	–	30	30
Short-term interest-bearing liabilities	292	–	–	–	–	–	–	292	292
Other short-term financial liabilities including derivatives	–	–	164	639	–	–	–	803	803
Trade payables	3 786	–	–	–	–	–	–	3 786	3 786
Total financial liabilities	8 063	–	174	659	–	–	–	8 896	8 967

(1) The following fair value measurement methods are used for items not carried at fair value: The fair values of long-term interest-bearing liabilities, including current part, are primarily based on quotes from third-party pricing services (level 2). The fair values of other assets and liabilities, including loan receivables and loans payable, are primarily based on discounted cash flow analysis (level 2). The fair value is estimated to equal the carrying amount for short-term financial assets and financial liabilities due to limited credit risk and short time to maturity. Refer to Note 2, Significant accounting policies.

Lease liabilities are not included in the fair value of financial instruments.

The level 1 category includes financial assets and liabilities that are measured in whole by reference to published quotes in an active market. A financial instrument is regarded as quoted in an active market if quoted prices are readily and regularly available from an exchange, and those prices represent actual and regularly occurring market transactions on an arm's-length basis. This category includes only exchange traded products.

The level 2 category includes financial assets and liabilities measured using a valuation technique based on assumptions that are supported by prices from observable current market transactions. These include assets and liabilities with fair values based on quotes from third-party pricing services, financial assets with fair values based on broker quotes and assets that are valued using the Group's own valuation models whereby the material assumptions are market observable. The majority of the Group's listed bonds and other securities, over-the-counter derivatives, trade receivables and certain other products are included within this category.

The level 3 financial assets category includes a large number of investments in unlisted equities and unlisted venture funds, including investments managed by NGP Capital specializing in growth-stage investing. The fair value of level 3 investments is determined using one or more valuation techniques where the use of the market approach generally consists of using comparable market transactions, while the use of the income approach generally consists of calculating the net present value of expected future cash flows. For unlisted funds, the selection of appropriate valuation techniques by the fund managing partner may be affected by the availability and reliability of relevant inputs. In some cases, one valuation technique may provide the best indication of fair value while in other circumstances multiple valuation techniques may be appropriate.

The inputs generally considered in determining the fair value of level 3 investments include the original transaction price, recent transactions in the same or similar instruments, completed or pending third-party transactions in the underlying investment or comparable issuers, subsequent rounds of financing, recapitalizations or other transactions undertaken by the issuer, offerings in the equity or debt capital markets, and changes in financial ratios or cash flows, adjusted as appropriate for liquidity, credit, market and/or other risk factors. The fair value may be adjusted to reflect illiquidity and/or non-transferability, with the amount of such discount estimated by the managing partner in the absence of market information.

The level 3 investments are remeasured for each reporting date taking into consideration any changes in estimates, projections and assumptions, as well as any changes in economic and other relevant conditions. The majority of the venture funds invest in digital health, software and enterprise sectors and, even though as of December 31, 2020 an elevated degree of uncertainty related to unobservable inputs prevails in the current market conditions caused by COVID-19 outbreak, the quantitative impact on the fair values of venture fund investments is considered limited. Level 3 investments include approximately 40 separate venture funds investing in hundreds of individual companies in various sectors and geographies. Hence, specific estimates and assumptions used by managing partners due to the lack of observable inputs do impact the fair value of individual investments, but no individual input has a significant impact on the aggregated fair value of level 3 investments.

Level 3 financial liabilities include a conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. The fair value of the liability is measured based on the expected future cash settlement. The measurement of the financial liability involves estimation of the option exercise price and the distribution of excess cash balances upon exercise. Unobservable valuation inputs include certain financial performance metrics of Nokia Shanghai Bell. No individual input has a significant impact on the total fair value of the level 3 financial liability. Refer to Note 33, Significant partly-owned subsidiaries.

Reconciliation of the opening and closing balances of level 3 financial assets and liabilities:

EURm	Level 3 financial assets	Level 3 financial liabilities
As of January 1, 2019	688	(707)
Net gains in income statement	49	35
Additions	90	–
Deductions	(79)	1
Other movements	(2)	12
As of December 31, 2019	746	(659)
Net gains in income statement	19	94
Additions	49	–
Deductions	(85)	2
Transfers out of level 3	(5)	126
Other movements	3	(2)
As of December 31, 2020	727	(439)

The gains and losses from venture fund and similar investments categorized in level 3 are included in other operating income and expenses. The gains and losses from other level 3 financial assets and liabilities are recorded in financial income and expenses. A net gain of EUR 102 million (net gain of EUR 73 million in 2019) related to level 3 financial instruments held at December 31, 2020 was included in the profit and loss during 2020.

25. Derivative financial instruments

EURm	Assets		Liabilities	
	Fair value ⁽¹⁾	Notional ⁽²⁾	Fair value ⁽¹⁾	Notional ⁽²⁾
2020				
Hedges on net investment in foreign subsidiaries				
Foreign exchange forward contracts	1	1 423	(3)	559
Cash flow hedges				
Foreign exchange forward contracts	34	933	(16)	736
Currency options bought	1	108	–	–
Currency options sold	–	–	–	6
Fair value hedges				
Foreign exchange forward contracts	83	1 340	(14)	588
Firm commitments	19	468	(101)	1 105
Cash flow and fair value hedges⁽³⁾				
Cross-currency swaps	–	–	(154)	815
Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss				
Foreign exchange forward contracts	29	3 716	(16)	3 917
Currency options bought	2	171	–	–
Other derivatives	–	–	–	9
Total	169	8 159	(304)	7 735
2019				
Hedges on net investment in foreign subsidiaries				
Foreign exchange forward contracts	36	3 807	(2)	517
Cash flow hedges				
Foreign exchange forward contracts	7	660	(18)	749
Currency options bought	1	343	–	–
Fair value hedges				
Foreign exchange forward contracts	7	697	(7)	549
Firm commitments	6	606	(2)	255
Cash flow and fair value hedges⁽³⁾				
Cross-currency swaps	–	–	(49)	1 246
Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss				
Foreign exchange forward contracts	17	3 491	(72)	8 070
Currency options bought	7	654	–	–
Other derivatives	–	–	(7)	84
Total	81	10 258	(157)	11 470

(1) Included in other current financial assets and other financial liabilities in the consolidated statement of financial position.

(2) Includes the gross amount of all notional values for contracts that have not yet been settled or cancelled. The amount of notional value outstanding is not necessarily a measure or indication of market risk as the exposure of certain contracts may be offset by that of other contracts.

(3) Cross-currency swaps have been designated partly as fair value hedges and partly as cash flow hedges.

26. Share-based payments

The Group has several equity-based incentive programs for executives and other eligible employees. The programs consist of performance share plans, restricted share plans and employee share purchase plans. The equity-based incentive grants are generally conditional on continued employment as well as the fulfillment of the performance and other conditions determined in the relevant plan rules. In 2020, the share-based payment expense, including social security costs, for all equity-based incentive grants in the consolidated income statement amounts to EUR 76 million (EUR 77 million in 2019 and EUR 62 million in 2018).

Active share-based payment plans by instrument

	Performance shares		Restricted shares	
	Number of performance shares outstanding at target	Weighted average grant date fair value EUR ⁽¹⁾	Number of restricted shares outstanding	Weighted average grant date fair value EUR ⁽¹⁾
As of January 1, 2018	60 516 243		5 568 702	
Granted	36 943 251	4.39	1 479 350	4.47
Forfeited	(4 146 246)		(1 431 215)	
Vested ⁽²⁾	(10 169 717)		(2 034 789)	
As of December 31, 2018	83 143 531		3 582 048	
Granted	31 979 747	4.02	2 060 342	4.18
Forfeited	(4 964 055)		(451 540)	
Vested ⁽²⁾	(18 933 700)		(1 915 675)	
As of December 31, 2019	91 225 523		3 275 175	
Granted	38 753 394	2.63	3 830 700	3.06
Forfeited	(4 752 172)		(1 100 107)	
Vested ⁽²⁾	(25 754 552)		(1 478 175)	
As of December 31, 2020⁽³⁾	99 472 193		4 527 593	

(1) The fair values for the 2017-2019 performance shares and all restricted shares are estimated based on the grant date market price of the Nokia share less the present value of dividends expected to be paid during the vesting period. The fair value for the 2020 performance shares is estimated based on the dividend-adjusted price of the Nokia share at the settlement date of the plan and the target payout levels.

(2) Vested performance shares at target are multiplied by the confirmed payout (% of target) to calculate the total number of Nokia shares settlement.

(3) Includes 31 549 004 performance shares for the Performance Share Plan 2018 and 380 567 Restricted Shares that vested on January 1, 2021.

Performance shares

In 2020, the Group administered four global performance share plans, the Performance Share Plans of 2017, 2018, 2019 and 2020. The performance shares represent a commitment by the Group to deliver Nokia shares to eligible participants at a future point in time, subject to the fulfillment of predetermined criteria.

The 2020 Performance Share Plan is a three-year plan where the Group's actual total shareholder return ("TSR") is compared to the target TSR to determine the number of Nokia shares that will be delivered at settlement. TSR is calculated based on the growth in the Nokia share price plus any dividends paid during the plan period. The 2020 Performance Share Plan does not include a minimum payout guarantee.

Global performance share plans as of December 31, 2020:

Plan	Performance shares outstanding at target	Confirmed payout (% of target)	Performance period	Restriction period	Settlement year
2017	-	29	2017-2018	2019	2020
2018	31 549 004	57	2018-2019	2020	2021
2019	29 358 795	-	2019-2021	N/A	2022
2020	38 564 394	-	2020-2023	N/A	2023

For the 2017, 2018 and 2019 performance share plans, the number of performance shares at target is the amount of performance shares granted to an individual that will be settled if the target performance, with respect to the performance criteria, is achieved. Any additional payout beyond the minimum amount will be determined based on the financial performance against the established performance criteria during the applicable performance periods. At maximum performance, the settlement amounts to two times the amount at target. Until the Nokia shares are delivered, the participants do not have any shareholder rights, such as voting or dividend rights, associated with the performance shares. The performance share grants are generally forfeited if the employment relationship with the Group terminates prior to vesting.

The 2019 performance share plan has a three-year performance period (2019-2021). The number of performance shares to be settled would be determined with reference to the performance targets during the performance period. Under the 2019 performance share plan, the performance criteria are: earnings per share (diluted), free cash flow and revenue relative to market (market share). The criteria exclude costs related to the acquisition of Alcatel-Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

The Performance Share Plan 2019 includes a minimum payout guarantee for performance shares granted to non-executive participants, such that 25% of the performance shares granted will settle, regardless of the satisfaction of the applicable performance criteria. Performance shares granted to executive participants under the Performance Share Plan 2019 do not include a minimum payout guarantee.

Restricted shares

In 2020, the Group administered four global restricted share plans: The Restricted Share Plans 2017, 2018, 2019 and 2020. Restricted shares are granted on a limited basis for purposes related to retention and recruitment of individuals deemed critical to the Group's future success. The vesting schedule for the plans follow a tranche vesting schedule whereby each plan vests in three equal tranches on the first, second and the third anniversary of the award subject to continued employment with the Group. Restricted Share Plan participants do not have any shareholder rights, such as voting or dividend rights, until the Nokia shares are delivered. The restricted share grants are generally forfeited if the employment relationship with the Group terminates prior to vesting of the applicable tranche or tranches.

Employee share purchase plan

The Group offers a voluntary Employee Share Purchase Plan to its employees. Participating employees make contributions from their net salary to purchase Nokia shares on a monthly basis during a 12-month savings period. The Group intends to deliver one matching share for every two purchased shares the employee holds as of the end of the Plan cycle. In 2020, 6 340 859 matching shares were issued as a settlement to the participants of the Employee Share Purchase Plan 2019 (4 524 101 matching shares issued under the 2018 Plan in 2019 and 3 980 286 matching shares issued under the 2017 Plan in 2018).

Legacy equity compensation programs

Stock options

In 2020, the Group no longer administered any global stock option plan. The last stock option plan administered by the Group was the Stock Option Plan 2011. The last stock options under this Plan were granted in 2013. The final subscription period ended on December 27, 2019. Each stock option entitled the holder to subscribe for one new Nokia share. The stock options were non-transferable and could be exercised for shares only. Shares were eligible for dividends for the financial year in which the share subscription took place. Other shareholder rights commenced on the date on which the subscribed shares were entered in the Trade Register. The stock option grants were generally forfeited if the employment relationship with the Group was terminated.

Reconciliation of stock options outstanding and exercisable:

	Outstanding		Exercisable	
	Number of shares	Weighted average exercise price EUR	Number of options	Weighted average exercise price EUR
As of January 1, 2018	447 500	2.07	447 500	2.07
Exercised	(424 500)	2.06		5.07
As of December 31, 2018	23 000	2.35	23 000	2.35
Exercised	(23 000)	2.35		5.34
As of December 31, 2019	–	–	–	–
As of December 31, 2020	–	–	–	–

27. Pensions and other post-employment benefits

The Group maintains a number of post-employment plans in various countries including both defined benefit and defined contribution plans. The Group's defined benefit plans comprise significant pension programs and schemes as well as material other post-employment benefit plans providing post-employment healthcare and life insurance coverage to certain employee groups. Defined benefit plans expose the Group to various risks such as investment risk, interest rate risk, life expectancy risk, and regulatory/compliance risk. The characteristics and extent of these risks vary depending on the legal, fiscal, and economic requirements in each country. The amount recognized in the consolidated income statement related to defined benefit plans was EUR 153 million (EUR 31 million in 2019 and EUR 234 million in 2018).

The Group also participates in defined contribution plans, multi-employer and insured plans for which the Group contributions are recognized as expense in the consolidated income statement in the period to which the contributions relate. In a defined contribution plan, the Group's legal or constructive obligation is limited to the amount that it agrees to contribute to the fund. The amount recognized in the consolidated income statement related to defined contribution plans was EUR 209 million (EUR 220 million in 2019 and EUR 246 million in 2018).

Defined benefit plans

The total net defined benefit asset is EUR 992 million (EUR 487 million net defined benefit asset in 2019) consisting of net pension and other post-employment benefit liabilities of EUR 4 046 million (EUR 4 343 million in 2019) and net pension and other post-employment benefit assets of EUR 5 038 million (EUR 4 830 million in 2019).

The Group's most significant defined benefit pension plans are in the United States, Germany, and the United Kingdom. Together they account for 91% (92% in 2019) of the Group's total defined benefit obligation and 91% (91% in 2019) of the Group's total plan assets.

The defined benefit obligations, the fair value of plan assets, the effects of the asset ceiling and the net defined benefit balance as of December 31:

EURm	2020				2019			
	Defined benefit obligation	Fair value of plan assets	Effects of asset ceiling	Net defined benefit balance	Defined benefit obligation	Fair value of plan assets	Effects of asset ceiling	Net defined benefit balance
United States ⁽¹⁾	(17 379)	20 328	(1 125)	1 824	(18 774)	21 023	(975)	1 274
Germany	(2 847)	1 244	—	(1 603)	(2 808)	1 232	—	(1 576)
United Kingdom	(1 231)	1 716	—	485	(1 147)	1 612	—	465
Other	(2 044)	2 400	(70)	286	(2 051)	2 430	(55)	324
Total	(23 501)	25 688	(1 195)	992	(24 780)	26 297	(1 030)	487

(1) The comparative amounts for defined benefit obligation and fair value of plan assets have been changed for 2019 by EUR 117 million to reflect the December benefit payments paid out in January.

United States

The Group has significant defined benefit pension plans and a significant post-employment welfare benefit plan (Opeb) providing post-employment healthcare benefits and life insurance coverage in the United States. The pension plans include both traditional service-based programs as well as cash-balance plans. Salaried, non-union-represented employees are covered by a cash-balance program. All other legacy programs, including legacy service-based programs, were frozen by December 31, 2009. For former employees who, when actively employed, were represented by a union, the Group maintains two defined benefit pension plans, both of which are traditional service-based programs. The larger of the two, which represents 98% of the obligation, is a closed plan. The post-employment plans provide welfare benefits for certain retired former employees. Pursuant to an agreement with the Communications Workers of America (CWA) and the International Brotherhood of Electrical Workers (IBEW) unions, the Group provides post-employment healthcare benefits and life-insurance coverage for employees formerly represented by these two unions. That agreement was renewed in 2020 and the contract expires on December 31, 2027.

Germany

The Group maintains two primary plans in Germany which cover the majority of active employees: the cash-balance plan Beitragsorientierter Altersversorgungs Plan (BAP) for the Group's former Nokia employees and a similar cash-balance program (AVK Basis-/Matchingkonto) for the Group's former Alcatel-Lucent employees. Individual benefits are generally dependent on eligible compensation levels, ranking within the Group and years of service. These plans are partially funded defined benefit pension plans, the benefits being subject to a minimum return guaranteed by the Group. The funding vehicle for the BAP plan is the NSN Pension Trust e.V. The trust is legally separate from the Group and manages the plan assets in accordance with the respective trust agreements.

All other plans have been frozen or closed in prior years and replaced by the cash-balance plans. Benefits are paid in annual installments, as monthly retirement pension, or as a lump sum on retirement in an amount equal to accrued pensions and guaranteed interest.

United Kingdom

The Group maintains one primary plan in the UK, "Nokia Retirement Plan for former NSN & ALU employees", which is the result of the 2019 merger of the legacy Nokia plan where the plan was merged and members' benefits were transferred to the legacy Alcatel-Lucent plan. The combined plan consists of both money purchase sections with Guaranteed Minimum Pension (GMP) underpin and final salary sections. All final salary sections are closed to future benefit accrual: the legacy Nokia plan closed on April 30, 2012 and the legacy Alcatel-Lucent plan on April 30, 2018. Individual benefits for final salary sections are dependent on eligible compensation levels and years of service. For the money purchase sections with GMP underpin, individual benefits are dependent on the greater of the value of GMP at retirement date or the pension value resulting from the individual's invested funds. The Trust manages all investments for the combined pension plan.

Impact on the consolidated financial statements

Movements in the defined benefit obligation, fair value of plan assets and the impact of the asset ceiling

The movements in the present value of the defined benefit obligation for the years ended December 31:

EURm	2020				2019			
	United States pension	United States Opeb	Other pension	Total	United States pension ⁽¹⁾	United States Opeb	Other pension	Total
As of January 1	(16 449)	(2 325)	(6 006)	(24 780)	(16 086)	(2 384)	(5 609)	(24 079)
Current service cost	(118)	—	(93)	(211)	(66)	—	(87)	(153)
Interest expense	(375)	(54)	(83)	(512)	(553)	(79)	(121)	(753)
Past service cost ⁽²⁾	(55)	89	29	63	(46)	167	19	140
Settlements	—	—	10	10	—	—	149	149
Total	(548)	35	(137)	(650)	(665)	88	(40)	(617)
Remeasurements:								
Gain/(loss) from change in demographic assumptions	202	20	66	288	759	49	5	813
(Loss)/gain from change in financial assumptions	(1 427)	(203)	(377)	(2 007)	(1 677)	(231)	(483)	(2 391)
Experience gain/(loss)	30	85	(15)	100	37	39	(5)	71
Total	(1 195)	(98)	(326)	(1 619)	(881)	(143)	(483)	(1 507)
Translation differences	1 451	196	125	1 772	(335)	(53)	(92)	(480)
Contributions from plan participants	—	(92)	(29)	(121)	—	(105)	(25)	(130)
Benefits paid	1 401	260	245	1 906	1 518	284	242	2 044
Other	—	(15)	6	(9)	—	(12)	1	(11)
Total	2 852	349	347	3 548	1 183	114	126	1 423
As of December 31	(15 340)	(2 039)	(6 122)	(23 501)	(16 449)	(2 325)	(6 006)	(24 780)

(1) The comparative amounts for defined benefit obligation and fair value of plan assets have been changed for opening balance of 2019 by EUR 124 million and for ending balance of 2019 by EUR 117 million to reflect the December benefit payments paid out in January.

(2) Consists of curtailment due to global restructuring, special termination benefits for certain US employees and extension of US retiree healthcare benefits related to US union negotiations for formerly represented employees.

Present value of obligations includes EUR 16 959 million (EUR 17 899 million in 2019) of wholly funded obligations, EUR 5 412 million (EUR 5 660 million in 2019) of partly funded obligations and EUR 1 130 million (EUR 1 221 million in 2019) of unfunded obligations.

The movements in the fair value of plan assets for the years ended December 31:

EURm	2020				2019			
	United States pension	United States Opeb	Other pension	Total	United States pension ⁽¹⁾	United States Opeb	Other pension	Total
As of January 1	20 560	464	5 273	26 297	19 343	397	4 863	24 603
Interest income	480	8	77	565	674	11	108	793
Administrative expenses and interest on asset ceiling	(19)	—	(7)	(26)	(18)	—	(7)	(25)
Settlements	—	—	(15)	(15)	—	—	(158)	(158)
Total	461	8	55	524	656	11	(57)	610
Remeasurements:								
Return on plan assets, excluding amounts included in interest income	2 227	16	233	2 476	1 834	43	414	2 291
Total	2 227	16	233	2 476	1 834	43	414	2 291
Translation differences	(1 832)	(41)	(139)	(2 012)	386	9	111	506
Contributions:								
Employers	26	6	67	99	27	14	57	98
Plan participants	—	92	29	121	—	105	25	130
Benefits paid	(1 401)	(260)	(152)	(1 813)	(1 518)	(284)	(139)	(1 941)
Section 420 Transfer ⁽²⁾	(160)	160	—	—	(169)	169	—	—
Other	(12)	14	(6)	(4)	1	—	(1)	—
Total	(3 379)	(29)	(201)	(3 609)	(1 273)	13	53	(1 207)
As of December 31	19 869	459	5 360	25 688	20 560	464	5 273	26 297

(1) The comparative amounts for defined benefit obligation and fair value of plan assets have been changed for opening balance of 2019 by EUR 124 million and for ending balance of 2019 by EUR 117 million to reflect the December benefit payments paid out in January.

(2) Section 420 Transfer. Refer to 'Future cash flows' section below.

The movements in the impact of the asset ceiling limitation for the years ended December 31:

EURm	2020				2019			
	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of January 1	(975)	–	(55)	(1 030)	(573)	–	(54)	(627)
Interest expense	(27)	–	–	(27)	(24)	–	–	(24)
Remeasurements:								
Change in asset ceiling, excluding amounts included in interest expense	(216)	–	(17)	(233)	(370)	–	–	(370)
Translation differences	93	–	2	95	(8)	–	(1)	(9)
As of December 31	(1 125)	–	(70)	(1 195)	(975)	–	(55)	(1 030)

Net balances as of December 31:

EURm	2020				2019			
	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of December 31	3 404	(1 580)	(832)	992	3 136	(1 861)	(788)	487

Asset ceiling limitation

The Group may recognize the surplus of a pension plan to the amount of economic benefit that the entity can realize, either through a refund or as a reduction in future contributions. The most significant limitation of asset recognition for the Group is from the overfunded US formerly union represented pension plan. All other countries where asset ceiling limits apply are not considered material. Movements in asset ceiling limitation are recognized directly in the consolidated statement of comprehensive income, excluding amounts included in interest expense. The Group recognized an asset ceiling limitation in the amount of EUR 1 195 million (EUR 1 030 million in 2019).

Recognized in the income statement

Recognized in the consolidated income statement for the years ended December 31:

EURm	2020	2019	2018
Current service cost ⁽¹⁾	211	153	163
Past service cost ⁽¹⁾	(63)	(140)	52
Net Interest ⁽²⁾	–	9	15
Settlements ⁽¹⁾	5	9	–
Other	–	–	4
Total	153	31	234

(1) Included in operating expenses within the consolidated income statement.

(2) Included in financial expenses within the consolidated income statement.

Recognized in other comprehensive income

Recognized in other comprehensive income for the years ended December 31:

EURm	2020	2019	2018
Return on plan assets, excluding amounts included in interest income	2 476	2 291	(987)
Gain from change in demographic assumptions	288	813	80
(Loss)/gain from change in financial assumptions	(2 007)	(2 391)	1 298
Experience gain	100	71	79
Change in asset ceiling, excluding amounts included in interest expense	(233)	(370)	(82)
Total	624	414	388

Actuarial assumptions and sensitivity analysis

Actuarial assumptions

Assumptions regarding future mortality are set based on actuarial advice in accordance with published statistics and experience in each country.

The discount rates and mortality tables used for the significant plans:

	2020	2019	2020
	Discount rate %		Mortality table
United States	1.9	2.8	Pri-2012 w/MP-2020
Germany	0.4	0.8	mortality projection scale
United Kingdom ⁽¹⁾	1.3	1.9	Heubeck 2018G
Total weighted average for all countries	1.7	2.5	CMI 2019

(1) Tables are adjusted with 1.5% long-term rate of improvement.

The principal actuarial weighted average assumptions used for determining the defined benefit obligation:

%	2020	2019
Discount rate for determining present values	1.7	2.5
Annual rate of increase in future compensation levels	1.9	1.9
Pension growth rate	0.3	0.3
Inflation rate	1.8	1.9
Healthcare costs trend rate assumed for next year ⁽¹⁾	4.9	6.1
Healthcare cost trend rate assumed for next year (excluding post-employment dental benefits) ⁽¹⁾	5.0	6.2
Terminal growth rate ⁽¹⁾	4.4	4.4
Year that the rate reaches the terminal growth value ⁽¹⁾	2028	2028
Weighted average duration of defined benefit obligations	11 yrs	10 yrs.

(1) Actuarial assumptions used for determining the defined benefit obligation - United States.

Sensitivity analysis

When calculating the sensitivity of the defined benefit obligation to significant actuarial assumptions, the present value of the defined benefit obligation is calculated using the projected unit credit method. The sensitivity analyses are based on a change in an assumption while holding all other assumptions constant and may not be representative of the actual impact of changes. If more than one assumption is changed simultaneously, the combined impact of changes would not necessarily be the same as the sum of the individual changes. If the assumptions change to a different level compared with that presented, the effect on the defined benefit obligation may not be linear. Increases and decreases in the principal assumptions, which are used in determining the defined benefit obligation, do not have a symmetrical effect on the defined benefit obligation primarily due to the compound interest effect created when determining the net present value of the future benefit.

The sensitivity of the defined benefit obligation to changes in the principal assumptions:

	Change in assumption	Increase in assumption ⁽¹⁾ EURm	Decrease in assumption ⁽¹⁾ EURm
Discount rate for determining present values	1.0%	2 240	(2 749)
Annual rate of increase in future compensation levels	1.0%	(127)	111
Pension growth rate	1.0%	(551)	438
Inflation rate	1.0%	(596)	501
Healthcare cost trend rate	1.0%	(20)	19
Life expectancy	1 year	(978)	908

(1) Positive movement indicates a reduction in the defined benefit obligation; a negative movement indicates an increase in the defined benefit obligation.

Investment strategies

The overall pension investment objective of the Group is to preserve or enhance the pension plans' funded status through the implementation of an investment strategy that maximizes return within the context of minimizing funded status risk. In formulating the asset allocation for the plans, multiple factors are considered, including, but not limited to, the long-term risk and return expectations for a variety of asset classes as well as current and multi-year projections of the pension plans' demographics, benefit payments, contributions and funded status. Local trustee boards are responsible for conducting Asset-Liability studies, when appropriate; overseeing the investment of plan assets; and monitoring and managing associated risks under company oversight and in accordance with local law. The results of the Asset-Liability framework are implemented on a plan level.

The Group's pension investment managers may use derivative financial instruments including futures contracts, forward contracts, options and interest rate swaps to manage market risk. The performance and risk profile of investments is regularly monitored on a standalone basis as well as in the broader portfolio context. One risk is a decline in the plan's funded status as a result of the adverse performance of plan assets and/or defined benefit obligations. The application of the Asset-Liability Model study focuses on minimizing such risks.

Disaggregation of plan assets

	2020				2019			
EURm	Quoted	Unquoted	Total	%	Quoted	Unquoted	Total	%
Equity securities ⁽¹⁾	1 198	110	1 308	5	1 039	114	1 153	4
Fixed income securities ⁽¹⁾	18 666	139	18 805	73	19 294	133	19 427	74
Insurance contracts	—	793	793	3	—	841	841	3
Real estate ⁽¹⁾	101	1 094	1 195	5	103	1 095	1 198	5
Short-term investments ⁽¹⁾⁽²⁾	738	173	911	4	902	75	977	4
Private equity and other	130	2 546	2 676	10	131	2 570	2 701	10
Total	20 833	4 855	25 688	100	21 469	4 828	26 297	100

(1) The comparative amounts for 2019 have been changed to reflect a revised classification within one pension trust as follows: quoted equity securities increased by EUR 76 million, unquoted equity securities increased by EUR 114 million, unquoted fixed income securities increased by EUR 20 million, quoted real estate increased by EUR 103 million, unquoted real estate decreased by EUR 340 million and quoted short-term investments increased by EUR 27 million.

(2) The comparative amounts for defined benefit obligation and fair value of plan assets have been changed for 2019 by EUR 117 million to reflect the December benefit payments paid out in January.

Most short-term investments including cash, equities and fixed-income securities have quoted market prices in active markets. Equity securities represent investments in equity funds and direct investments, which have quoted market prices in an active market. Fixed income securities represent investments in government and corporate bonds, as well as investments in bond funds, which have quoted market prices in an active market. Fixed income securities may also comprise investments in funds and direct investments. Insurance contracts are customary pension insurance contracts structured under domestic law in the respective countries. Real estate investments are investments in commercial properties or real estate funds, which invest in a diverse range of real estate properties. Short-term investments are liquid assets or cash, which are being held for a short period of time, with the primary purpose of controlling the tactical asset allocation. Private equity and other includes commodities as well as alternative investments, including derivative financial instruments.

United States plan assets

United States plan asset target and actual allocation range of the pension and Opeb trust by asset category as of December 31, 2020:

%	Pension target allocation range	Percentage of plan assets	Opeb target allocation	Percentage of post-employment plan assets
Equity securities	0 - 6	3	47	47
Fixed income securities	77 - 87	80	15	15
Real estate	4 - 8	5	—	—
Short-term investments	—	—	38	38
Private equity and other	6 - 13	12	—	—
Total	100	100	100	100

The majority of the Group's United States pension plan assets are held in a master pension trust. The Opeb plan assets are held in two separate trusts. The Pension & Benefits Investment Committee formally approves the target allocation ranges every few years on the completion of the asset-liability study by external advisors and internal investment management. The overall United States pension plan asset portfolio, as of December 31, 2020, reflects a balance of investments split of approximately 20/80 between equity, including alternative investments for this purpose, and fixed income securities.

Future cash flows

Contributions

Group contributions to the pension and other post-employment benefit plans are made to facilitate future benefit payments to plan participants. The funding policy is to meet minimum funding requirements as set forth in the employee benefit and tax laws, as well as any such additional amounts as the Group may determine appropriate. Contributions are made to benefit plans for the sole benefit of plan participants. Employer contributions expected to be paid in 2021 total EUR 83 million.

United States pension plans

Funding methods

Funding requirements for the three United States qualified defined benefit pension plans are determined by the applicable statutes, namely the Employee Retirement Income Security Act of 1974 (ERISA), the Internal Revenue Code of 1986, and regulations issued by the Internal Revenue Service (IRS). In determining funding requirements, ERISA allows assets to be either market value or an average value over a period of time; and liabilities to be based on spot interest rates or average interest rates over a period of time. For the non-represented, represented and formerly represented pension plans, the Group does not foresee any future funding requirement for regulatory funding purposes, given the plans' asset allocation and the level of assets compared to liabilities.

Post-employment healthcare benefits for both non-represented and formerly union represented retirees are capped for those who retired on or before March 1, 1990. The benefit obligation associated with this group of retirees is 94% of the total United States retiree healthcare obligation as of December 31, 2020. The US government's Medicare program is the primary payer for those aged 65 and older, comprising almost all uncapped retirees.

Section 420 transfers

Section 420 of the U.S. Internal Revenue Code (Section 420) allows for the transfer of pension assets in excess of specified thresholds above the plan's funding obligation (excess pension assets) to a retiree health benefits account, a retiree life insurance account, or both, maintained within the pension plan and to use the assets in such accounts to pay for, or to reimburse the employer for the cost of providing, applicable health or life insurance benefits, each as defined in Section 420, for retired employees, and with respect to health benefits, their spouses and dependents. Employers making such transfers are required to continue to provide healthcare benefits or life insurance coverage, as the case may be, for a certain period of time (cost maintenance period) at levels prescribed by regulations.

For retirees who, when actively employed, were represented by the CWA or the IBEW, the Group expects to fund the entire current retiree healthcare and group life insurance obligations with Section 420 transfers from excess pension assets in the formerly represented pension plan. This is considered as a refund from the pension plan when setting the asset ceiling. For retirees who were not represented by the CWA or IBEW (non-represented retirees), the Group expects to be able to fund some portion of the current retiree group life insurance obligation with Section 420 transfers from excess pension assets in the non-represented pension plan. Section 420 is currently set to expire on December 31, 2025.

Benefit payments

The following table summarizes expected benefit payments from the pension plans and other post-employment benefit plans until 2030. Actual benefit payments may differ from expected benefit payments.

EURm	Direct benefit payments						Total
	US Pension			US Opeb		Other countries	
	Management	Occupational	Supplemental plans	Formerly union represented	Non-union represented		
2021	1 061	264	23	111	50	288	1 797
2022	941	224	23	101	51	272	1 612
2023	900	212	22	87	52	329	1 602
2024	860	199	22	73	52	283	1 489
2025	819	187	21	63	53	290	1 433
2026-2030	3 526	761	97	298	269	1 489	6 440

Benefits are paid from plan assets where there is sufficient funding available to the plan to cover the benefit obligation. Any payments in excess of the plan assets are paid directly by the Group. Direct benefit payments expected to be paid in 2021 total EUR 97 million.

28. Accrued expenses, deferred revenue and other liabilities

Non-current

EURm	2020	2019
Deferred revenue ⁽¹⁾	460	615
Salaries, wages and social charges	45	45
Other	36	52
Total	541	712

Current

EURm	2020	2019
Deferred revenue ⁽¹⁾	155	155
Salaries, wages and social charges	1 362	1 236
VAT and other indirect taxes	337	359
Discount accruals ⁽²⁾	747	385
Accrued expenses related to customer projects	475	496
Other	645	692
Total	3 721	3 323

(1) Non-current deferred revenue of EUR 460 million (EUR 615 million in 2019) and current deferred revenue of EUR 155 million (EUR 155 million in 2019) relates to an IP licensing contract which was determined to be a completed contract as defined in the transition guidance of IFRS 15, Revenue from Contracts with Customers.

(2) Discount accruals represent customer credits without any outstanding future performance obligations.

Other accruals include accrued logistics, research and development, IT, interest and royalty expenses, as well as various amounts that are individually insignificant.

29. Provisions

EURm	Restructuring	Warranty	Litigation	Environmental	Project losses	Divestment-related	Material liability	Other	Total
As of January 1, 2020	377	167	75	127	50	51	81	281	1 209
Translation differences	(2)	–	(8)	(7)	(2)	–	(1)	(34)	(54)
Reclassification	–	–	–	–	–	–	–	8	8
Charged to income statement:									
Additions	503	201	25	7	244	–	143	54	1 177
Reversals	(49)	(23)	(6)	–	(2)	(2)	(56)	(43)	(181)
Total charged to income statement	454	178	19	7	242	(2)	87	11	996
Utilized during year ⁽¹⁾	(388)	(125)	(13)	(14)	(14)	–	(37)	(36)	(627)
As of December 31, 2020	441	220	73	113	276	49	130	230	1 532
Non-current	263	20	14	88	161	43	33	114	736
Current	178	200	59	25	115	6	97	116	796

(1) The utilization of restructuring provision includes items transferred to accrued expenses, of which EUR 81 million remained in accrued expenses as of December 31, 2020.

Restructuring provision

The Group provides for the estimated cost to restructure when a detailed formal plan of restructuring has been completed, approved by management, and announced. Restructuring costs consist primarily of personnel restructuring charges. The other main components are costs associated with exiting real estate locations, and costs of terminating certain other contracts directly linked to the restructuring. As of December 31, 2020, the restructuring provision amounted to EUR 441 million including personnel and other restructuring costs. The provision consists primarily of amounts related to the announcements made by the Group on April 6, 2016 and October 25, 2018. The majority of the restructuring cash outflows is expected to occur over the next two years.

Warranty provision

The Group provides for the estimated liability to repair or replace products under standard warranty at the time revenue is recognized. The provision is an estimate based on historical experience of the level of repairs and replacements. Cash outflows related to the warranty provision are generally expected to occur within the next 18 months.

Litigation provision

The Group provides for the estimated future settlements related to litigation based on the probable outcome of the claims. Cash outflows related to the litigation provision are inherently uncertain and generally occur over several periods. For a presentation of certain legal matters potentially affecting the Group, refer to Note 30, Commitments, contingencies and legal proceedings.

Environmental provision

The Group provides for estimated costs of environmental remediation relating to soil, groundwater, surface water or sediment contamination when the Group becomes obliged, legally or constructively, to rectify the environmental damage, or to perform restorative work. The environmental provision includes estimated costs to sufficiently clean and refurbish contaminated sites, to the extent necessary and, where necessary, continue surveillance at sites where the environmental remediation exposure is less significant. Cash outflows related to the environmental liability are inherently uncertain and generally occur over several periods.

Project loss provision

The Group provides for onerous contracts based on the lower of the expected cost of fulfilling the contract and the expected cost of terminating the contract. An onerous contract is a contract in which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it. Project loss provisions relate to contracts with customers and are evaluated at a contract level. The majority of the project loss provision utilization is expected to occur over the next two years.

Divestment-related provision

The Group provides for indemnifications it is required to make to the buyers of its disposed businesses. Cash outflows related to the divestment-related provision are inherently uncertain.

Material liability provision

The Group recognizes the estimated liability for non-cancellable purchase commitments for inventory in excess of forecasted requirements at each reporting date. Cash outflows related to the material liability provision are expected to occur over the next 12 months.

Other provisions

The Group provides for various legal and constructive obligations such as indirect tax provisions, employee-related provisions other than restructuring provisions and asset retirement obligations. Cash outflows related to other provisions are generally expected to occur over the next two years.

30. Commitments, contingencies and legal proceedings

Contractual obligations

Payments due for contractual obligations as of December 31, 2020, by due date:

EURm	Within 1 year	Between 1 and 3 years	Between 3 and 5 years	More than 5 years	Total
Purchase obligations ⁽¹⁾	2 780	159	109	4	3 052

(1) Includes inventory purchase obligations, service agreements and outsourcing arrangements.

Additionally, the Group has committed lease contracts that have not yet commenced as of December 31, 2020. The future lease payments for these non-cancellable lease contracts are EUR 4 million within one year, EUR 71 million within two to five years and EUR 106 million thereafter

Guarantees and other contingent commitments

EURm	2020	2019
Contingent liabilities on behalf of Group companies		
Guarantees issued by financial institutions		
Commercial guarantees ⁽¹⁾	1 107	1 190
Non-commercial guarantees	450	531
Corporate guarantees ⁽²⁾		
Commercial guarantees ⁽¹⁾	453	969
Non-commercial guarantees	53	54
Financing commitments		
Customer finance commitments ⁽³⁾	180	303
Venture fund commitments ⁽⁴⁾	189	244
Other contingent liabilities and financing commitments⁽⁵⁾		
Other guarantees and financing commitments	11	15

(1) In commercial guarantees, the Group reports guarantees that are issued in the normal course of business to the Group's customers for the performance of the Group's obligations under supply agreements, including tender bonds, performance bonds and warranty bonds.

(2) In corporate guarantees, the Group reports guarantees with primary obligation that have been issued to the Group's customers and other third parties.

(3) Customer finance commitments are available under loan facilities negotiated with customers. Availability of the facility is dependent upon the borrower's continuing compliance with the agreed financial and operational covenants, and compliance with other administrative terms of the facility. The loan facilities are primarily available to fund capital expenditure relating to purchases of network infrastructure equipment and services. Refer to Note 36, Financial risk management.

(4) As a limited partner in NGP Capital and certain other funds making technology-related investments, the Group is committed to capital contributions and entitled to cash distributions according to the respective partnership agreements and underlying fund activities.

(5) Other contingent liabilities and financing commitments exclude committed lease contracts that have not yet commenced and purchase obligations.

The amounts in the table above represent the maximum principal amount of commitments and contingencies, and these amounts do not reflect management's expected outcomes.

Legal matters

A number of Group companies are and will likely continue to be subject to various legal proceedings and investigations that arise from time to time, including proceedings regarding intellectual property, product liability, sales and marketing practices, commercial disputes, employment and wrongful discharge, antitrust, securities, health and safety, environmental, tax, international trade, privacy matters and compliance. As a result, the Group may incur substantial costs that may not be covered by insurance and could affect business and reputation. While management does not expect any of the legal proceedings it is currently aware of to have a material adverse effect on the Group's financial position, litigation is inherently unpredictable and the Group may in the future incur judgments or enter into settlements that could have a material adverse effect on its profitability and cash flows.

Litigation and proceedings

Mass labor litigation in Brazil

The Group is defending against a number of labor claims in various Brazilian labor courts. Plaintiffs are former employees whose contracts were terminated after the Group exited from certain managed services contracts. The claims mainly relate to payments made under, or in connection with, the terminated labor contracts. The Group has closed the majority of the court cases through settlement or judgment.

Asbestos litigation in the United States

The Group is defending approximately 300 asbestos-related matters, at various stages of litigation. The claims are based on premises liability, products liability, and contractor liability. The claims also involve plaintiffs allegedly diagnosed with various diseases, including but not limited to asbestosis, lung cancer, and mesothelioma.

Securities Class Action

A litigation was filed on April 19, 2019, against the Group and certain executives in the United States relating to allegations of the Group making false and misleading statements and omissions concerning its progress of integration of Alcatel-Lucent, including compliance practices identified during the integration process and disclosed in the Group's Annual Report on Form 20-F filed on March 21, 2019. The complaint was subsequently amended to include allegations of the Group making false and misleading statements and omissions concerning the Group's readiness for the transition to fifth generation wireless technology.

Intellectual property rights litigation

Daimler litigations

In March 2019, the Group commenced patent infringement proceedings against Daimler in Germany. The Group has asserted ten Nokia patents relevant to the 3G and 4G cellular standards in three German regional courts against Daimler's connected cars. Two Nokia patents have been held to be infringed by Daimler and injunctions granted. The Group has not sought to enforce either of these injunctions and the litigations, including appeals, remain ongoing. In November 2020, one of the cases was stayed pending a referral to the Court of Justice of the European Union on questions relating to standard essential patent litigation.

Continental US litigation

In May 2019, Continental Automotive Systems filed a lawsuit in the United States against the Group and three other defendants relating to an alleged breach of FRAND obligations and a refusal to license component suppliers. In September 2020, all antitrust and state law claims were dismissed in a district court in favour of the Group and other defendants. Continental has filed a notice of appeal.

Lenovo

In September and October 2019, the Group commenced patent infringement proceedings against Lenovo in Germany, India and the United States, with additional proceedings filed in the US International Trade Commission (USITC) and Brazil in July 2020. Across these actions, there are 19 Nokia patents in suit, covering video coding technologies used in Lenovo's laptop, PC and tablet products. In September 2020, a district court in the United States issued an order staying all deadlines until the determination of the USITC investigation becomes final. In September 2020, a regional court in Germany ruled that Lenovo was infringing one of Nokia's standard essential patents and issued an injunction. In October 2020, Nokia enforced the injunction against Lenovo. A higher regional court in Germany stayed that enforcement pending the outcome of the appeal. In December 2020, Lenovo filed an action in the United States against the Group asserting various claims alleging breach of RAND obligations and seeking that these patents be declared unenforceable.

31. Notes to the consolidated statement of cash flows

EURm	2020	2019	2018
Adjustments for⁽¹⁾			
Depreciation and amortization	1 132	1 660	1 455
Share-based payments	76	81	68
Impairment charges	246	102	55
Restructuring charges ⁽²⁾	454	397	238
Profit from non-current investments	(61)	(50)	(44)
Profit on sale of property, plant and equipment, net	(3)	(15)	(16)
Share of results of associated companies and joint ventures	(26)	(12)	(12)
Financial income and expenses	167	283	232
Income tax expense	3 254	140	64
(Gain)/loss on the sale of businesses	—	(4)	24
Other operating income and expenses	28	45	29
Total	5 267	2 627	2 093

(1) Includes continuing and discontinued operations.

(2) Adjustments represent the non-cash portion of the restructuring charges recognized in the consolidated income statement.

The Group had no material non-cash investing or financing transactions in any of the years presented.

32. Principal Group companies

The Group's significant subsidiaries as of December 31, 2020:

Company name	Country of incorporation	Parent holding %	Group ownership interest %
Nokia Solutions and Networks Oy	Finland	100.0	100.0
Nokia of America Corporation	United States	—	100.0
Nokia Shanghai Bell Co., Ltd. ⁽¹⁾	China	—	50.0
Nokia Technologies Oy	Finland	100.0	100.0
Nokia Solutions and Networks India Private Limited	India	—	100.0
Nokia Solutions and Networks B.V.	Netherlands	—	100.0
Nokia Solutions and Networks Japan G.K.	Japan	—	100.0
Alcatel-Lucent International S.A.	France	—	100.0
Nokia Solutions and Networks Branch Operations Oy	Finland	—	100.0
Alcatel Submarine Networks S.A.S.	France	—	100.0
Nokia Solutions and Networks do Brasil Telecomunicações Ltda.	Brazil	—	100.0
Alcatel-Lucent Participations S.A.	France	—	100.0
Nokia Solutions and Networks Korea Ltd.	South Korea	—	100.0
Nokia Spain, S.A.	Spain	—	100.0
Nokia UK Limited	United Kingdom	—	100.0
Nokia Canada Inc.	Canada	—	100.0
Nokia Solutions and Networks Italia S.p.A.	Italy	—	100.0
Nokia Solutions and Networks GmbH & Co. KG	Germany	—	100.0
Nokia Solutions and Networks Australia Pty Ltd	Australia	—	100.0
Alcatel-Lucent S.A.S.	France	—	100.0
Nokia Solutions and Networks Limited Liability Company	Russian Federation	—	100.0

(1) Nokia Shanghai Bell Co., Ltd. is the parent company of the Nokia Shanghai Bell Group of which the Nokia Group owns 50% plus one share with China Huaxin, an entity controlled by the Chinese government, holding the remaining ownership interests. Refer to Note 33, Significant partly-owned subsidiaries.

33. Significant partly-owned subsidiaries

The Group holds an ownership interest of 50% plus one share in Nokia Shanghai Bell's parent company, Nokia Shanghai Bell Co., Ltd. (NSB), with China Huaxin Post & Telecommunication Economy Development Center (China Huaxin) holding the remaining ownership interests. The Group applied judgment to conclude that it is able to control NSB based on an assessment of various factors including the ability to nominate key management personnel, decision-making related to the management of NSB operations and the Group's exposure to variable returns from NSB.

In 2017, the Group entered into a contractual arrangement providing China Huaxin with the right to fully transfer its ownership interest in NSB to the Group and the Group with the right to purchase China Huaxin's ownership interest in NSB in exchange for a future cash settlement. To reflect this, the Group derecognized the non-controlling interest balance related to NSB and recognized a financial liability based on the estimated future cash settlement.

The financial liability is measured based on the expected future cash settlement to acquire the non-controlling interest in NSB. The measurement of the financial liability is complex as it involves estimation of the option exercise price and the distribution of excess cash balances upon exercise. The Group decreased the value of the financial liability to reflect a change in estimate of the future cash settlement resulting in the recognition of a EUR 79 million gain (EUR 64 million in 2019) in financial income and expenses. As of December 31, 2020, the expected future cash settlement amounted to EUR 420 million (EUR 639 million in 2019).

Financial information for the Nokia Shanghai Bell Group⁽¹⁾:

EURm	2020	2019
Summarized income statement		
Net sales ⁽²⁾	1 376	2 013
Operating loss	(3)	(26)
Loss for the year	(14)	(47)
Loss for the year attributable to:		
Equity holders of the parent	(14)	(47)
Non-controlling interests ⁽³⁾	–	–
Summarized statement of financial position		
Non-current assets	577	651
Non-current liabilities	(150)	(192)
Non-current net assets	427	459
Current assets ⁽⁴⁾	1 984	2 669
Current liabilities	(1 228)	(1 637)
Current net assets	756	1 032
Net assets⁽⁵⁾	1 183	1 491
Non-controlling interests ⁽³⁾	–	–
Summarized statement of cash flows		
Net cash from operating activities	189	125
Net cash used in investing activities	(26)	(87)
Net cash (used in)/from financing activities ⁽⁶⁾	(376)	38
Net (decrease)/increase in cash and cash equivalents	(213)	76

(1) Financial information for the Nokia Shanghai Bell Group is presented before eliminations of intercompany transactions with the rest of the Group but after eliminations of intercompany transactions between entities within the Nokia Shanghai Bell Group.

(2) Includes EUR 104 million (EUR 100 million in 2019) net sales to other Group entities.

(3) Based on the contractual arrangement with China Huaxin, the Group does not recognize any non-controlling interest in NSB.

(4) Includes a total of EUR 604 million (EUR 819 million in 2019) of cash and cash equivalents and current financial investments.

(5) The distribution of the profits of NSB requires the passing of a special resolution by more than two-thirds of its shareholders, subject to a requirement that at least 50% of the after-tax distributable profits are distributed as dividends each year.

(6) Includes EUR 144 million dividend paid to China Huaxin in 2020.

34. Investments in associated companies and joint ventures

EURm	2020	2019
Net carrying amount as of January 1	165	145
Translation differences	(10)	3
Acquisitions and additions ⁽¹⁾	68	13
Disposals and deductions	(7)	–
Impairments ⁽²⁾	(4)	(2)
Share of results ⁽²⁾	26	12
Dividends	(5)	(6)
Net carrying amount as of December 31	233	165

(1) In 2020, the Group acquired an ownership interest in HMD global Oy as a result of the equity conversion of the convertible loan. For more information, refer to Note 35, Related party transactions.

(2) In 2020, impairments and share of results are presented in the share of results of associated companies and joint ventures line in the consolidated income statement.

Shareholdings in associated companies and joint ventures comprise investments in unlisted companies.

35. Related party transactions

The Group has related party transactions with pension funds, associated companies and joint ventures, and the management and the Board of Directors. Transactions and balances with companies over which the Group exercises control are eliminated on consolidation. Refer to Note 2, Significant accounting policies, and Note 32, Principal Group companies.

Transactions with pension funds

The Group has borrowings of EUR 43 million (EUR 69 million in 2019) from Nokia Unterstützungsgesellschaft mbH, the Group's German pension fund, a separate legal entity. The loan bears interest at the rate of 6% per annum and its duration is pending until further notice by the loan counterparties even though they have the right to terminate the loan with a 90-day notice. In 2020, an amendment in the loan agreement was reached allowing an off-set to the loan balance of contributions, interest and benefit payments paid. The loan is included in short-term interest-bearing liabilities in the consolidated statement of financial position. For more information on the Group's pension plans, refer to Note 27, Pensions and other post-employment benefits.

Transactions with associated companies and joint ventures

EURm	2020	2019	2018
Share of results	22	12	12
Dividend income	5	6	1
Share of shareholders' equity	233	165	145
Sales	115	153	167
Purchases	(177)	(193)	(159)
Trade receivables	31	22	58
Trade payables	(26)	(38)	(32)

The Group has a financing commitment of EUR 6 million (EUR 10 million in 2019) to an associated company.

In 2016, the Group engaged in a strategic agreement with HMD global Oy based on which the Group determined that it exercised significant influence over HMD global Oy despite holding no voting power in it. The agreement covers branding rights and intellectual property licensing to grant HMD global Oy an exclusive global license to create Nokia-branded mobile phones and tablets for ten years. In 2019, the Group granted a convertible loan of EUR 60 million to HMD global Oy containing both a mandatory equity conversion element, as well as a call option held by the Group, to convert the loan into equity interest in HMD global Oy. In 2020, the Group acquired an ownership interest in HMD global Oy as a result of the equity conversion of the convertible loan and recorded an investment in associated companies of EUR 63 million.

Management compensation

Compensation information for the President and CEO:

EUR	Base salary/fee	Cash incentive payments	Share-based payment expenses ⁽¹⁾	Pension expenses	Total
2020					
Pekka Lundmark, from August 1, 2020	541 667	573 068	1 063 164	211 050	2 388 949
Rajeev Suri, until July 31, 2020 ⁽²⁾	759 365	945 697	1 276 825	341 591	3 323 478
2019					
Rajeev Suri	1 300 000	637 163	2 265 547	353 846	4 556 556
2018					
Rajeev Suri	1 050 000	873 862	1 978 268	312 607	4 214 737

(1) Represents the expense for all outstanding equity grants recorded during the year.

(2) Upon stepping down from his role as CEO, the Group recorded termination benefits, EUR 5 122 317, for Rajeev Suri according to terms of his exit agreement.

Total remuneration awarded to the Group Leadership Team for their time as members of the Group Leadership Team:

EURm	2020	2019	2018
Short-term benefits	27	24	23
Post-employment benefits ⁽¹⁾	2	1	1
Share-based payments	9	8	6
Termination benefits ⁽²⁾	10	–	5
Total	48	33	35

(1) The members of the Group Leadership Team participate in the local retirement programs applicable to employees in the country where they reside.

(2) Includes both termination payments and payments made under exceptional contractual arrangements for lapsed equity awards.

Board of Directors' compensation

The annual remuneration paid to the members of the Board of Directors, as decided by the Annual General Meetings in the respective years:

	2020			2019			2018		
	Annual fee ⁽¹⁾	Meeting fees ⁽²⁾	Shares received ⁽³⁾	Annual fee ⁽¹⁾	Meeting fees	Shares received ⁽³⁾	Annual fee ⁽¹⁾	Meeting fees	Shares received ⁽³⁾
	EUR	EUR	number	EUR	EUR	number	EUR	EUR	number
Sari Baldauf, Chair	440 000	5 000	48 523	185 000	12 000	16 261	160 000	—	12 636
Kari Stadigh, Vice Chair	185 000	11 000	20 401	160 000	12 000	14 063	160 000	10 000	12 636
Bruce Brown ⁽⁴⁾	190 000	22 000	20 953	190 000	27 000	16 700	190 000	24 000	15 005
Thomas Dannenfeldt ⁽⁵⁾	175 000	—	19 299	—	—	—	—	—	—
Jeanette Horan ⁽⁵⁾	175 000	20 000	19 299	175 000	22 000	15 382	175 000	20 000	13 820
Louis R. Hughes	—	—	—	—	22 000	—	175 000	24 000	13 820
Edward Kozel ⁽⁵⁾⁽⁶⁾	195 000	17 000	21 504	195 000	20 000	17 140	195 000	22 000	15 400
Jean C. Monty	—	—	—	—	—	—	—	14 000	—
Elizabeth Nelson ⁽⁵⁾	175 000	17 000	19 299	175 000	25 000	15 382	175 000	17 000	13 820
Olivier Piou	—	11 000	—	175 000	14 000	15 382	185 000	11 000	14 610
Risto Siilasmaa	—	—	—	440 000	—	38 675	440 000	—	34 749
Søren Skou	160 000	11 000	17 644	160 000	—	14 063	—	—	—
Carla Smits-Nusteling ⁽⁵⁾	190 000	17 000	20 953	190 000	20 000	16 700	190 000	16 000	15 005
Total	1 885 000	131 000		2 045 000	174 000		2 045 000	158 000	

(1) Annual fees consist of Board member fees and Committee chair and member fees.

(2) Meeting fees include all meeting fees paid for the term that ended at the Annual General Meeting held on May 27, 2020, and meeting fees accrued and paid in 2020 for the term that began at the same meeting.

(3) Approximately 40% of each Board member's annual compensation is paid in Nokia shares purchased from the market, and the remaining approximately 60% is paid in cash.

(4) Annual fees include EUR 30 000 for Bruce Brown as Chair of the Personnel Committee.

(5) Annual fees include EUR 30 000 for Carla Smits-Nusteling as Chair and EUR 15 000 for Thomas Dannenfeldt, Jeanette Horan, Edward Kozel and Elizabeth Nelson as members of the Audit Committee.

(6) Annual fees include EUR 20 000 for Edward Kozel as Chair of the Technology Committee.

Transactions with the Group Leadership Team and the Board of Directors

No loans were granted to the members of the Group Leadership Team and the Board of Directors in 2020, 2019 or 2018.

Terms of termination of employment of the President and CEO

Rajeev Suri stepped down from his position as President and CEO on July 31, 2020. Nokia's Board of Directors appointed Pekka Lundmark as President and CEO of Nokia and he started in his new role on August 1, 2020.

The President and CEO, Pekka Lundmark, may terminate his service agreement at any time with 12 months' prior notice. The President and CEO would either continue to receive salary and benefits during the notice period or, at Nokia's discretion, a lump sum of equivalent value. Additionally, the President and CEO would be entitled to any short- or long-term incentives that would normally vest during the notice period. Any unvested equity awards would be forfeited after termination.

In the event that the President and CEO terminates his service agreement based on a final arbitration award demonstrating Nokia's material breach of the service agreement, he is entitled to a severance payment equaling up to 12 months of compensation (including annual base salary, benefits and target incentive). Any unvested equity awards would be forfeited after termination.

36. Financial risk management

General risk management principles

We have a systematic and structured approach to risk management. Key risks and opportunities are primarily identified against business targets either in business operations or as an integral part of strategy and financial planning. Risk management covers strategic, operational, financial and hazard risks. Key risks and opportunities are analyzed, managed and monitored as part of business performance management with the support of risk management personnel and the centralized Enterprise Risk Management function. The principles documented in the Nokia Enterprise Risk Management Policy, which is approved by the Audit Committee of the Board, require risk management and its elements to be integrated into key processes. One of the core principles is that the business or function head is also the risk owner, although all employees are responsible for identifying, analyzing and managing risks, as appropriate, given their roles and duties. Our overall risk management concept is based on managing the key risks that would prevent us from meeting our objectives, rather than solely focusing on eliminating risks. In addition to the principles defined in the Nokia Enterprise Risk Management Policy, specific risk management implementation, including financial risk management, is reflected in other key policies and operating procedures.

Financial risks

The objective for treasury activities is to guarantee sufficient funding at all times and to identify, evaluate and manage financial risks. Treasury activities support this aim by mitigating the adverse effects on the profitability of the underlying business caused by fluctuations in the financial markets, and by managing the capital structure by balancing the levels of liquid assets and financial borrowings. Treasury activities are governed by the Nokia Treasury Policy approved by the Group President and CEO, which provides principles for overall financial risk management and determines the allocation of responsibilities for financial risk management activities. Operating procedures approved by the Group CFO cover specific areas such as foreign exchange risk, interest rate risk, credit risk and liquidity risk as well as the use of derivative financial instruments in managing these risks. The Group is risk averse in its treasury activities.

Financial risks are divided into market risk covering foreign exchange risk and interest rate risk; credit risk covering business-related credit risk and financial credit risk; and liquidity risk.

Market risk

Foreign exchange risk

The Group operates globally and is exposed to transaction and translation foreign exchange risks. The objective of foreign exchange risk management is to mitigate adverse impacts from foreign exchange fluctuations on the Group profitability and cash flows. Treasury applies a global portfolio approach to manage foreign exchange risks within approved guidelines and limits.

Transaction risk arises from foreign currency denominated assets and liabilities together with foreign currency denominated future cash flows. Transaction exposures are managed in the context of various functional currencies of Group companies. Material transactional foreign exchange exposures are hedged, unless hedging would be uneconomical due to market liquidity and/or hedging cost. Exposures are defined using transaction nominal values. Exposures are mainly hedged with derivative financial instruments, such as foreign exchange forward contracts and foreign exchange options with most of the hedging instruments having a duration of less than a year.

Layered hedging approach is typically used for hedging of highly probable forecast foreign currency denominated cash flows with quarterly hedged items defined based on set hedge ratio ranges for each successive quarter. Hedged items defined for successive quarters are hedged with foreign exchange forward contracts and foreign exchange options with a hedge ratio of 1:1. Hedging levels are adjusted on a monthly basis including hedging instrument designation and documentation as appropriate. In case hedges exceed the hedge ratio range for any specific quarter, the hedge portfolio for that specific quarter is adjusted accordingly.

In certain cases, mainly related to long-term construction projects, the Group applies fair value hedge accounting for foreign exchange risk with the objective to reduce the exposure to fluctuations in the fair value of the related firm commitments due to changes in foreign exchange rates. Exposures are mainly hedged with foreign exchange forward contracts with most of the hedging instruments having a duration of less than a year. The Group continuously manages the portfolio of hedging instruments to ensure appropriate alignment with the portfolio of hedged items at a hedging ratio of 1:1.

As the Group has entities where the functional currency is other than the euro, the shareholders' equity is exposed to fluctuations in foreign exchange rates. Changes in shareholders' equity caused by movements in foreign exchange rates are shown as currency translation differences in the consolidated financial statements. The risk management strategy is to protect the euro counter value of the portion of this exposure expected to materialize as foreign currency repatriation cash flows in the foreseeable future. Exposures are mainly hedged with derivative financial instruments, such as foreign exchange forward contracts and foreign exchange options with most of the hedging instruments having a duration of less than a year.

Hedged items are defined based on conservative expectations of repatriation cash flows based on a range of considerations. Net investment exposures are reviewed, hedged items designated, and hedging levels adjusted at minimum on a quarterly basis with a hedge ratio of 1:1. Additionally, hedging levels are adjusted whenever there are significant events impacting expected repatriation cash flows.

The foreign exchange risk arising from foreign currency denominated interest-bearing liabilities is primarily hedged using cross-currency swaps that are also used to manage the Group's interest rate profile (refer to the interest rate risk section below).

Notional amounts in currencies that represent a significant portion of the currency mix in outstanding financial instruments and other hedged items as of December 31:

EURm	USD	GBP	CNY	JPY
2020				
Foreign exchange exposure designated as hedged item for cash flow hedging, net ⁽¹⁾	313	238	–	369
Foreign exchange exposure designated as hedged item for fair value hedging for FX risk, net ⁽²⁾	705	(52)	–	–
Foreign exchange exposure designated as hedged item for net investment hedging ⁽³⁾	392	136	746	–
Foreign exchange exposure from interest-bearing liabilities ⁽⁴⁾	(1 207)	–	–	–
Foreign exchange exposure from items on the statement of financial position, excluding interest-bearing liabilities, net	88	(148)	(894)	130
Other foreign exchange derivatives, carried at fair value through profit and loss, net ⁽⁵⁾	(324)	120	714	(95)
EURm	USD	GBP	CNY	INR
2019				
Foreign exchange exposure designated as hedged item for cash flow hedging, net ⁽¹⁾	628	379	–	–
Foreign exchange exposure designated as hedged item for fair value hedging for FX risk, net ⁽²⁾	423	(70)	–	–
Foreign exchange exposure designated as hedged item for net investment hedging ⁽³⁾	2 547	93	981	346
Foreign exchange exposure from interest-bearing liabilities ⁽⁴⁾	(1 314)	–	–	–
Foreign exchange exposure from items on the statement of financial position, excluding interest-bearing liabilities, net	(2 855)	(81)	(868)	(294)
Other foreign exchange derivatives, carried at fair value through profit and loss, net ⁽⁵⁾	2 607	86	711	346

(1) Includes foreign exchange exposure from forecasted cash flows related to sales and purchases. In some currencies, especially the US dollar, the Group has substantial foreign exchange exposures in both estimated cash inflows and outflows. These underlying exposures have been hedged.

(2) Includes foreign exchange exposure from contractual firm commitments. These underlying exposures have been substantially hedged.

(3) Includes net investment exposures in foreign operations. These underlying exposures have been hedged.

(4) Includes interest-bearing liabilities that have been hedged with cross-currency swaps and foreign exchange forwards. Refer to Note 23, Interest-bearing liabilities.

(5) Items on the statement of financial position are hedged by a portion of foreign exchange derivatives not designated in a hedge relationship and carried at fair value through profit and loss.

The methodology for assessing foreign exchange risk exposures: Value-at-Risk

The Group uses the Value-at-Risk (VaR) methodology to assess exposures to foreign exchange risks. The VaR-based methodology provides estimates of potential fair value losses in market risk-sensitive instruments as a result of adverse changes in specified market factors, at a specified confidence level over a defined holding period. The Group calculates the foreign exchange VaR using the Monte Carlo method, which simulates random values for exchange rates in which the Group has exposures and takes the non-linear price function of certain derivative instruments into

account. The VaR is determined using volatilities and correlations of rates and prices estimated from a sample of historical market data, at a 95% confidence level, using a one-month holding period. To put more weight on recent market conditions, an exponentially weighted moving average is performed on the data with an appropriate decay factor. This model implies that, within a one-month period, the potential loss will not exceed the VaR estimate in 95% of possible outcomes. In the remaining 5% of possible outcomes, the potential loss will be at minimum equal to the VaR figure and, on average, substantially higher. The VaR methodology relies on a number of assumptions, which include the following: risks are measured under average market conditions, changes in market risk factors follow normal distributions, future movements in market risk factors are in line with estimated parameters and the assessed exposures do not change during the holding period. Thus, it is possible that, for any given month, the potential losses at a 95% confidence level are different and could be substantially higher than the estimated VaR.

The VaR calculation includes foreign currency denominated monetary financial instruments, such as current financial investments, loans and trade receivables, cash, loans and trade payables; foreign exchange derivatives carried at fair value through profit and loss that are not in a hedge relationship and are mostly used to hedge the statement of financial position foreign exchange exposure; and foreign exchange derivatives designated as forecasted cash flow hedges, fair value hedges and net investment hedges as well as the exposures designated as hedged items for these hedge relationships.

The VaR figures for the Group's financial instruments, which are sensitive to foreign exchange risks, are presented in the Total VaR column and the simulated impact to financial statements presented in profit, other comprehensive income (OCI) and cumulative translation adjustment (CTA) columns in the table below.

EURm	2020				2019			
	Simulated impact on financial statements				Simulated impact on financial statements			
	Total VaR	Profit	OCI	CTA	Total VaR	Profit	OCI	CTA
As of December 31	9	15	21	–	8	10	18	–
Average for the year	9	18	30	–	11	10	22	1
Range for the year	6-18	8-32	15-41	0-0	7-25	4-17	13-31	0-4

Interest rate risk

The Group is exposed to interest rate risk either through market value fluctuations of items on the consolidated statement of financial position (price risk) or through changes in interest income or expenses (refinancing or reinvestment risk). Interest rate risk mainly arises through interest-bearing liabilities and assets. Estimated future changes in cash flows and the structure of the consolidated statement of financial position also expose the Group to interest rate risk.

The objective of interest rate risk management is to mitigate adverse impacts arising from interest rate fluctuations on the consolidated income statement, cash flow, and financial assets and liabilities while taking into consideration the Group's target capital structure and the resulting net interest rate exposure. The Group has entered into long-term borrowings mainly at fixed rates and swapped a portion of them into floating rates, in line with a defined target interest profile. The Group has not entered into interest rate swaps where it would be paying fixed rates. The Group aims to mitigate the adverse impacts from interest rate fluctuations by continuously managing net interest rate exposure arising from financial assets and liabilities, by setting appropriate risk management benchmarks and risk limits.

Interest rate profile of items under interest rate risk management including the Group's net cash and current financial investments as well as related derivatives as of December 31:

EURm	2020		2019	
	Fixed rate	Floating rate ⁽¹⁾	Fixed rate	Floating rate ⁽¹⁾
Current financial investments	104	1 017	4	93
Cash and cash equivalents	324	6 616	80	5 830
Interest-bearing liabilities	(4 687)	(889)	(3 872)	(405)
Financial assets and liabilities before derivatives	(4 259)	6 744	(3 788)	5 518
Interest rate derivatives	661	(661)	1 197	(1 197)
Financial assets and liabilities after derivatives	(3 598)	6 083	(2 591)	4 321

(1) All cash equivalents and derivative transaction-related collaterals with initial maturity of three months or less are considered floating rate for the purposes of interest rate risk management.

Treasury monitors and manages interest rate exposure centrally. The Group uses selective sensitivity analyses to assess and measure interest rate exposure arising from interest-bearing assets, interest-bearing liabilities and related derivatives. Sensitivity analysis determines an estimate of potential fair value changes in market risk-sensitive instruments by varying interest rates in currencies in which the Group has material amounts of financial assets and liabilities while keeping all other variables constant. Sensitivities to credit spreads are not reflected in the numbers.

The Group's sensitivity to interest rate exposure in the investment and debt portfolios is presented in the fair value column in the table below with simulated impact to financial statements presented in profit and OCI columns.

EURm	2020			2019		
	Impact on fair value	Impact on profit	Impact on OCI	Impact on fair value	Impact on profit	Impact on OCI
Interest rates – increase by 100 basis points	190	1	4	112	1	2
Interest rates – decrease by 50 basis points	(100)	(1)	(2)	(58)	(1)	(1)

Effects of hedge accounting on the financial position and performance

The Group is using several types of hedge accounting programs to manage its foreign exchange and interest rate risk exposures; refer to Note 2, Significant accounting policies. The effect of these programs on the Group's financial position and performance as of December 31:

EURm	Cash flow hedges (FX forwards and options) ⁽¹⁾	Net investment hedges (FX forwards and options) ⁽¹⁾	Fair value hedges (FX forwards) ⁽¹⁾	Fair value and cash flow hedges (IR swaps and cross-currency swaps) ⁽¹⁾
2020				
Carrying amount of hedging instruments	19	(2)	69	(154)
Notional amount of hedging instruments	(787)	(1 620)	(636)	815
Notional amount of hedged items	787	1 620	635	(815)
Change in intrinsic value of hedging instruments since January 1	33	265	79	118
Change in value of hedged items used to determine hedge effectiveness	(35)	(265)	(87)	(116)
2019				
Carrying amount of hedging instruments	(10)	34	1	(51)
Notional amount of hedging instruments	(1 029)	(4 106)	(348)	1 246
Notional amount of hedged items	1 043	4 106	351	(1 246)
Change in intrinsic value of hedging instruments since January 1	(31)	(51)	(4)	132
Change in value of hedged items used to determine hedge effectiveness	32	51	3	(133)

(1) No significant ineffectiveness has been recorded during the periods presented and economic relationships have been fully effective.

The most significant foreign exchange hedging instruments under cash flow, net investment and fair value hedge accounting as of December 31:

	Currency	Instrument	Fair value (EURm)	Weighted average hedged rate	Maturity breakdown of net notional amounts (EURm)(1)				
					Total	Within 3 months	Between 3 and 12 months	Between 1 and 3 years	Beyond 3 years
2020									
Cash flow hedge accounting									
	GBP	FX Forwards	(0)	0.8951	(163)	(42)	(97)	(24)	—
	GBP	FX Options	1	0.9262	(75)	(24)	(47)	(4)	—
	JPY	FX Forwards	7	122.0685	(185)	(47)	(138)	—	—
	JPY	FX Options	0	128.3026	(19)	—	(19)	—	—
	KRW	FX Forwards	(2)	1 347.3221	(132)	(29)	(103)	—	—
	KRW	FX Options	0	1 412.5000	(7)	(7)	—	—	—
	PLN	FX Forwards	(2)	4.4876	153	46	107	—	—
	USD	FX Forwards	17	1.1809	(268)	(64)	(204)	—	—
Net investment hedge accounting									
	CNY	FX Forwards	4	7.9625	(746)	(746)	—	—	—
	GBP	FX Forwards	(1)	0.9061	(136)	(136)	—	—	—
	INR	FX Forwards	(1)	89.8000	(182)	(182)	—	—	—
	USD	FX Forwards	(6)	1.2158	(392)	(392)	—	—	—
Fair value hedge accounting for FX risk									
	USD	FX Forwards	70	1.1490	(705)	(114)	(66)	(487)	(38)
2019									
Cash flow hedge accounting									
	GBP	FX Forwards	(8)	0.8780	(207)	(53)	(126)	(28)	—
	GBP	FX Options	1	0.9058	(172)	(40)	(99)	(33)	—
	JPY	FX Forwards	(2)	122.1697	(167)	(44)	(123)	—	—
	KRW	FX Forwards	(1)	1 310.0412	(129)	(15)	(114)	—	—
	KRW	FX Options	0	1 336.2500	(46)	(31)	(15)	—	—
	PLN	FX Forwards	2	4.2926	139	45	94	—	—
	USD	FX Forwards	0	1.1171	(280)	0	(280)	—	—
	USD	FX Options	0	1.1489	(125)	(67)	(58)	—	—
Net investment hedge accounting									
	CNY	FX Forwards	0	7.8003	(981)	(981)	—	—	—
	INR	FX Forwards	6	78.4807	(346)	(346)	—	—	—
	USD	FX Forwards	28	1.1076	(2 547)	(2 547)	—	—	—
Fair value hedge accounting for FX risk									
	USD	FX Forwards	0	1.1082	(423)	(171)	(270)	18	—

(1) Negative notional amounts indicate that hedges sell currency and positive notional amounts indicate that hedges buy currency.

For information on the impact of hedge accounting on equity, refer to Note 21, Fair value and other reserves. For information on hedging instruments used for fair value and cash flow hedge accounting related to the Group's interest-bearing liabilities, refer to Note 23, Interest-bearing liabilities. For information on derivative instruments, refer to Note 25, Derivative financial instruments.

Other market risk

In certain emerging market countries, there are local exchange control regulations that provide for restrictions on making cross-border transfers of funds as well as other regulations that impact the Group's ability to control its net assets in those countries.

Credit risk

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Group. Credit risk arises from credit exposures to customers, including outstanding receivables, financial guarantees and committed transactions, as well as financial institutions, including bank and cash, fixed income and money market investments, and derivative financial instruments. Credit risk is managed separately for business-related and financial credit exposures.

Business-related credit risk

The Group aims to ensure the highest possible quality in trade receivables and contract assets as well as customer or third-party loan receivables. The Credit Risk Management Standard Operating Procedure, approved by the Group CFO, lays out the framework for the management of the business-related credit risks. The Credit Risk Management Standard Operating Procedure sets out that credit decisions are based on credit evaluation in each business, including credit rating and limits for larger exposures, according to defined principles. Group level limit approvals are required for material credit exposures. Credit risks are monitored in each business and, where appropriate, mitigated on case by case basis with the use of letters of credit, collaterals, sponsor guarantees, credit insurance, and sale of selected receivables.

The Group applies a simplified approach to recognizing a loss allowance on trade receivables and contract assets based on measurement of lifetime expected credit losses arising from trade receivables without significant financing components. Based on quantitative and qualitative analysis, the Group has determined that the credit risk exposure arising from its trade receivables is low risk. Quantitative analysis focuses on historical loss rates, historic and projected sales and the corresponding trade receivables, and overdue trade receivables including indicators of any deterioration in the recovery expectation. Qualitative analysis focuses on all relevant conditions, including customer credit rating, country credit rating and political situation, to improve the accuracy of estimating lifetime expected credit losses. In 2020, the Group recognized impairment losses of 1.1% of net sales (0.6% in 2019).

Credit exposure is measured as the total of trade receivables, contract assets and loans outstanding from customers and committed credits. Trade receivables do not include any major concentrations of credit risk by customer. The top three customers account for 10.5%, 5.1% and 4.6% (4.6%, 4.3% and 3.8% in 2019) of trade receivables, contract assets and loans due from customers and other third parties as of December 31, 2020. The top three credit exposures by country account for 24.0%, 9.6% and 8.6% (12.4%, 11.4% and 9.7% in 2019) of the Group's trade receivables, contract assets and loans due from customers and other third parties as of December 31, 2020. The 24.0% credit exposure relates to trade receivables in the United States (12.4% in 2019 from China).

The Group has provided loss allowances on trade receivables, contract assets and loans due from customers and other third parties not past due based on an analysis of debtors' credit ratings and credit histories. The Group establishes loss allowances that represent an estimate of expected losses at the end of the reporting period. All trade receivables, contract assets and loans due from customers are considered on an individual basis to determine the loss allowances. The total of trade receivables, contract assets and loans due from customers is EUR 7 124 million (EUR 6 936 million in 2019) as of December 31, 2020.

The aging of trade receivables, contract assets and customer finance loans is as of December 31:

EURm	Current	Past due 1-30 days	Past due 31-180 days	Past due More than 180 days	Total
As of December 31, 2020					
Trade receivables	5 190	93	199	320	5 802
Contract assets	1 080	—	—	—	1 080
Customer financing related loan receivables	178	—	—	64	242
Total	6 448	93	199	384	7 124
As of December 31, 2019					
Trade receivables	4 364	156	306	345	5 171
Contract assets	1 489	—	—	—	1 489
Customer financing related loan receivables	224	—	17	35	276
Total	6 077	156	323	380	6 936

Movements in loss allowances, all of which relate to trade receivables, for the years ended December 31:

EURm	2020	2019	2018
As of January 1	147	195	192
Charged to income statement	183	41	86
Deductions ⁽¹⁾	(30)	(89)	(83)
As of December 31	300	147	195

(1) Deductions include utilization and releases of allowances.

The Group's exposure to credit risk related to customer financing as of December 31:

EURm	2020	2019
Loan commitments given undrawn	180	303
Outstanding customer financing related loan receivables	242	276
Total	422	579

For customer financing related loan receivables, the credit loss estimate is typically based on a 12-month expected credit loss for outstanding loans and estimated additional draw-downs during this period. The loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, derecognized from other comprehensive income and recognized in other financial expenses in the consolidated income statement. Loss allowance for customer financing-related loan receivables was EUR 134 million (EUR 76 million in 2019). The increase in loss allowance balance is EUR 58 million (EUR 69 million in 2019) mainly due to a significant decrease in the credit quality of an emerging market customer. In 2019 the movement in loss allowance balance is mainly due to an impairment related to a certain emerging market customer, refer to Note 17, Impairment.

Financial credit risk

Financial instruments contain an element of risk resulting from changes in the market price due to counterparties becoming less creditworthy or risk of loss due to counterparties being unable to meet their obligations. Financial credit risk is measured and monitored centrally by Treasury. Financial credit risk is managed actively by limiting counterparties to a sufficient number of major banks and financial institutions, and by monitoring the creditworthiness and the size of exposures continuously. Additionally, the Group enters into netting arrangements with all major counterparties, which give the right to offset in the event that the counterparty would not be able to fulfill its obligations. The Group enters into collateral agreements with certain counterparties, which require counterparties to post collateral against derivative receivables.

Investment decisions are based on strict creditworthiness and maturity criteria as defined in the Treasury-related policies and procedures. As a result of this investment policy approach and active management of outstanding investment exposures, the Group has not been subject to any material credit losses in its financial investments in the years presented. The Group did not have any financial investments that were past due but not impaired at December 31. Due to the high credit quality of the Group's financial investments, the expected credit loss for these investments is deemed insignificant.

Outstanding current financial investments, cash equivalents and cash classified by credit rating grades ranked in line with Standard & Poor's rating categories as of December 31:

EURm	Rating ⁽¹⁾	Cash	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years	Total ⁽²⁾⁽³⁾
2020								
	AAA	—	1 411	—	—	—	—	1 411
	AA+ - AA-	895	352	—	—	—	—	1 247
	A+ - A-	1 685	2 593	50	70	155	50	4 603
	BBB+ - BBB-	106	490	100	—	—	—	696
	BB+ - BB-	36	—	1	—	—	—	37
	B+ - B-	26	—	—	—	—	—	26
	CCC+ - CCC-	3	—	—	—	—	—	3
	Non-rated	30	8	—	—	—	—	38
Total		2 781	4 854	151	70	155	50	8 061
2019								
	AAA	—	800	—	—	—	—	800
	AA+ - AA-	663	143	—	—	—	—	806
	A+ - A-	2 007	1 377	20	20	25	—	3 449
	BBB+ - BBB-	445	360	13	—	—	—	818
	BB+ - BB-	8	—	—	—	—	—	8
	B+ - B-	22	—	—	—	—	—	22
	Non-rated	100	3	1	—	—	—	104
Total		3 245	2 683	34	20	25	—	6 007

(1) Bank Parent Company ratings are used here for bank groups. Actual bank subsidiary ratings may differ from the Bank Parent Company rating.

(2) Current financial investments and cash equivalents include bank deposits, structured deposits, investments in money market funds and investments in fixed income instruments.

(3) Instruments that include a call feature have been presented at their final maturities. Instruments that are contractually due beyond three months include EUR 325 million (EUR 77 million in 2019) of instruments that have a call period of less than three months.

The Group has restricted bank deposits primarily related to employee benefits of EUR 107 million (EUR 126 million in 2019) that are presented in other non-current financial assets. The Group has assessed the counterparty credit risk for these financial assets and concluded that expected credit losses are not significant.

Financial assets and liabilities subject to offsetting under enforceable master netting agreements and similar arrangements as of December 31:

EURm	Gross amounts of financial assets/ (liabilities)	Gross amounts of financial liabilities/ (assets) set off in the statement of financial position	Net amounts of financial assets/ (liabilities) presented in the statement of financial position	Related amounts not set off in the statement of financial position		Net amount
				Financial instruments assets/(liabilities)	Cash collateral received/(pledged)	
2020						
Derivative assets	169	—	169	73	89	7
Derivative liabilities	(304)	—	(304)	(153)	(134)	(17)
Total	(135)	—	(135)	(80)	(45)	(10)
2019						
Derivative assets	81	—	81	76	—	5
Derivative liabilities	(157)	—	(157)	(83)	(37)	(37)
Total	(76)	—	(76)	(7)	(37)	(32)

The financial instruments subject to enforceable master netting agreements and similar arrangements are not offset in the consolidated statement of financial position where there is no intention to settle net or realize the asset and settle the liability simultaneously.

Liquidity risk

Liquidity risk is defined as financial distress or extraordinarily high financing costs arising from a shortage of liquid funds in a situation where outstanding debt needs to be refinanced or where business conditions unexpectedly deteriorate and require financing. Transactional liquidity risk is defined as the risk of executing a financial transaction below fair market value or not being able to execute the transaction at all within a specific period of time. The objective of liquidity risk management is to maintain sufficient liquidity, and to ensure that it is readily available without endangering its value in order to avoid uncertainty related to financial distress at all times.

The Group aims to secure sufficient liquidity at all times through efficient cash management and by investing primarily in highly liquid money market investments. Depending on its overall liquidity position, the Group may pre-finance or refinance upcoming debt maturities before contractual maturity dates. The transactional liquidity risk is minimized by entering into transactions where proper two-way quotes can be obtained from the market. The Group aims to ensure flexibility in funding by maintaining committed and uncommitted credit lines. Refer to Note 23, Interest-bearing liabilities.

The following table presents an undiscounted, contractual cash flow analysis for lease liabilities, financial liabilities and financial assets that are presented on the consolidated statement of financial position as well as commitments given and obtained, such as loan commitments and leases committed but not yet commenced. The line-by-line analysis does not directly reconcile with the consolidated statement of financial position.

EURm	Total	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years
2020						
Non-current financial assets						
Other non-current financial assets ⁽¹⁾	188	—	—	66	79	43
Current financial assets						
Other current financial assets excluding derivatives ⁽¹⁾	39	2	37	—	—	—
Current financial investments	1 121	1 020	101	—	—	—
Cash and cash equivalents ⁽²⁾	6 944	6 618	50	70	156	50
Cash flows related to derivative financial assets gross settled:						
Derivative contracts – receipts	7 810	5 873	1 299	599	39	—
Derivative contracts – payments	(7 682)	(5 813)	(1 258)	(573)	(38)	—
Trade receivables	5 802	4 674	974	154	—	—
Non-current financial and lease liabilities						
Long-term interest-bearing liabilities	(5 920)	(39)	(97)	(794)	(2 194)	(2 796)
Long-term lease liabilities	(750)	—	—	(338)	(220)	(192)
Current financial and lease liabilities						
Short-term interest-bearing liabilities	(564)	(552)	(12)	—	—	—
Short-term lease liabilities	(232)	(65)	(167)	—	—	—
Other financial liabilities excluding derivatives ⁽³⁾	(434)	(420)	(14)	—	—	—
Cash flows related to derivative financial liabilities gross settled:						
Derivative contracts – receipts	6 926	4 870	883	525	45	603
Derivative contracts – payments	(6 999)	(4 906)	(882)	(563)	(35)	(613)
Trade payables	(3 174)	(3 049)	(122)	(2)	—	(1)
Commitments given and obtained						
Loan commitments given undrawn ⁽⁴⁾	(180)	(26)	(26)	(128)	—	—
Loan commitments obtained undrawn ⁽⁵⁾	1 482	(1)	(3)	(8)	1 494	—
Leases committed but not yet commenced	(182)	(1)	(3)	(43)	(29)	(106)

(1) Other non-current financial assets and other current financial assets excluding derivatives include mainly customer financing-related loan receivables.

(2) Instruments that include a call feature have been presented at their final maturities. Instruments that are contractually due beyond three months include EUR 325 million of instruments that have a call period of less than three months.

(3) Other financial liabilities include a conditional obligation to China Huaxin presented in the earliest period as the exercise period is open.

(4) Loan commitments given undrawn have been included in the earliest period in which they could be drawn or called.

(5) Loan commitments obtained undrawn have been included based on the period in which they expire. These amounts include related commitment fees.

EURm	Total	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years
2019						
Non-current financial assets						
Other non-current financial assets ⁽¹⁾	252	–	3	115	54	80
Current financial assets						
Other current financial assets excluding derivatives ⁽²⁾	53	21	32	–	–	–
Current financial investments	97	95	2	–	–	–
Cash and cash equivalents ⁽³⁾	5 913	5 835	33	20	25	–
Cash flows related to derivative financial assets gross settled:						
Derivative contracts – receipts	9 660	7 582	1 993	85	–	–
Derivative contracts – payments	(9 639)	(7 548)	(2 005)	(86)	–	–
Trade receivables	5 019	3 873	1 088	58	–	–
Non-current financial and lease liabilities						
Long-term interest-bearing liabilities	(4 990)	(43)	(75)	(1 209)	(1 113)	(2 550)
Long-term lease liabilities	(841)	–	–	(375)	(251)	(215)
Current financial and lease liabilities						
Short-term interest-bearing liabilities	(294)	(212)	(82)	–	–	–
Short-term lease liabilities	(276)	(81)	(195)	–	–	–
Other financial liabilities excluding derivatives ⁽⁴⁾	(646)	(638)	(8)	–	–	–
Cash flows related to derivative financial liabilities gross settled:						
Derivative contracts – receipts	11 725	9 003	828	616	86	1 192
Derivative contracts – payments	(11 517)	(9 078)	(808)	(569)	(43)	(1 019)
Trade payables	(3 786)	(3 653)	(111)	(21)	(1)	–
Commitments given and obtained						
Loan commitments given undrawn ⁽⁵⁾	(303)	(32)	(77)	(194)	–	–
Loan commitments obtained undrawn ⁽⁶⁾	1 971	499	(4)	(11)	(11)	1 498
Leases committed but not yet commenced	(160)	–	–	(11)	(23)	(126)

(1) Other non-current financial assets include long-term customer and vendor financing related loan receivables as well as certain other long-term loan receivables that have been presented in other non-current financial assets in the consolidated statement of financial position. Convertible instruments are presented at their final contractual maturities.

(2) Other current financial assets excluding derivatives include short-term customer and vendor financing-related loan receivables that have been presented in other financial assets in the consolidated statement of financial position.

(3) Instruments that include a call feature have been presented at their final maturities. Instruments that are contractually due beyond three months include EUR 77 million of instruments that have a call period of less than three months.

(4) Other financial liabilities include a conditional obligation to China Huaxin presented in the earliest period as the exercise period is open.

(5) Loan commitments given undrawn have been included in the earliest period in which they could be drawn or called.

(6) Loan commitments obtained undrawn have been included based on the period in which they expire. These amounts include related commitment fees.

37. Subsequent events

Adjusting events after the reporting period

Debt restructuring request of an emerging market customer

In February 2021, one of the Group's emerging market customers commenced negotiations to renegotiate its debt with the aim of avoiding insolvency. Although this event occurred after the reporting period, it confirms that the customer was credit-impaired as of December 31, 2020. As a result, the Group recognized an increase in the allowance for expected credit loss for loans extended to the customer of EUR 58 million in financial expenses. The Group also concluded that the collectability of consideration due from the customer is no longer probable resulting in adjustments in net sales, cost of sales and other operating expenses totaling EUR 34 million.

Non-adjusting events after the reporting period

Changes in organizational structure

In relation to its strategy review, Nokia adopted on January 1, 2021, a new operating model designed to better position the company for changing markets and align with customer needs. The new operating model includes four reportable segments aligned with customer buying behavior: (i) Mobile Networks, (ii) Network Infrastructure, (iii) Cloud and Network Services and (iv) Nokia Technologies. In addition, segment-level information for Group Common and Other is presented. The new operating model is optimized for better accountability and transparency, increased simplicity and improved cost-efficiency.

Bond redemption

In January 2021, Nokia exercised its issuer call option to redeem 1.00% Senior Notes due March 2021 for the full amount of EUR 350 million. The redemption date for the notes was February 15, 2021.

Reports of independent registered public accounting firms

Report of independent registered public accounting firm

To the shareholders and the Board of Directors of Nokia Corporation.

Opinion on the Financial Statements

We have audited the accompanying consolidated statement of financial position of Nokia Corporation and subsidiaries (the "Company") as of 31 December 2020 and the related consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in shareholders' equity and consolidated statement of cash flows for the year ended 31 December 2020 and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of 31 December 2020, and the results of its operations and its cash flows for the year ended 31 December 2020, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board and International Financial Reporting Standards as adopted by the European Union.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of 31 December 2020 based on criteria established in Internal Control — Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated 4 March 2021 expressed an unqualified opinion on the Company's internal control over financial reporting.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Fixed Networks goodwill - Long-Range Plan and terminal year operating profit within the goodwill valuation model— Refer to Notes 2, 4, 14 and 17 to the financial statements

Critical Audit Matter Description

The Company's Goodwill arises mainly from the acquisition of Alcatel Lucent ("ALU") and also includes amounts related to various other acquisitions. The goodwill balance in the Fixed Networks business group is €609 million as of 31 December 2020 and is included in the total goodwill balance of €5,074 million. The Company's evaluation of goodwill for impairment involves the comparison of the recoverable amount of each cash-generating unit ("CGU", which generally align to the business groups) to its carrying value on at least an annual basis, in line with International Accounting Standard ("IAS") 36 *Impairment of Assets*.

Management's discounted future cash flow model consists of an explicit three-year long-range plan and seven additional years of cash flow projections reflecting a gradual progression towards the steady state cashflow projections modeled in the terminal year. The Company's model contains various assumptions, including discount rates and growth rates, and is particularly sensitive to changes in operating profit, a management estimate requiring significant judgment. This sensitivity is especially pronounced in Fixed Networks, and the difference between the carrying amount and the fair value less cost to sell thereof has remained low throughout 2020. Therefore, there is a risk that management's goodwill impairment analysis utilises inappropriate operating profit, specifically in the long-range plan years and the terminal year, for Fixed Networks, resulting in an incorrect impairment conclusion or the recognition of an impairment charge that is too low.

The evaluation of whether the operating profit, both in the long-range plan and terminal year, used by the Company to evaluate goodwill for impairment required a high degree of auditor judgement and increased audit effort, including the need to involve our fair value specialists and an internal industry expert.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to management's estimate of operating profit within the long-range plan and terminal year for Fixed Networks included the following, among others:

- We tested the operating effectiveness of controls over goodwill, specifically focusing on controls related to the determination of the carrying value and fair value as well as controls over forecasting.
- We held discussions with key members of management to understand how the forecast, including key assumptions around operating profit, was derived.
- We utilised our fair value specialists to test the mathematical accuracy of the impairment model, review valuation assumptions, and challenge certain estimates and judgments used in valuing Fixed Networks (including discount rate, terminal growth rates, peer company selection, among others).
- We challenged forecasted operating profit within the terminal year used in estimating the fair value by comparing to (1) historical and forecasted peer company data, (2) historical actual results, and (3) prior period internal forecasts. As operating profit within the long-range plan years is a key input into the determination of operating profit within the terminal year, we also performed these procedures on operating profit within the long-range plan years.
- We read analyst reports to identify supporting or contradictory information in relation to management's operating profit assumptions. All contradictory information was evaluated and incremental inquiries were performed.
- We challenged certain of management's forecasting assumptions based on information provided by an internal industry expert about the outlook for the industry in which Fixed Networks operates.
- We performed a year-over-year trend analysis of forecasted operating profit at the business unit level for Fixed Networks, which is one level below the business group, investigating changes that were potentially inconsistent with our understanding of the business.

Revenue recognition - Determination of standalone selling prices in Nokia Networks and Nokia Software — Refer to Notes 2, 4, and 7 to the financial statements

Critical Audit Matter Description

The Company recognises revenue in accordance with International Financial Reporting Standard 15 *Revenue from Contracts with Customers* from complex contracts that often contain multiple performance obligations, including hardware, software, and services.

The transaction price in the contract is allocated across these performance obligations based on the standalone selling prices identified by management. This identification of standalone selling prices involves significant judgement, involves multiple inputs and calculations and has a direct impact on the timing and amount of revenue recognised. Where there is limited history or experience of selling similar goods or services, such as with 5G equipment in some markets, there is necessarily an increased level of judgement required in making the determination.

Given the level of management judgement involved, performing audit procedures to evaluate the reasonableness of these judgements required a high degree of auditor judgement, and given the differing inputs and calculations across contracts, there was a significant audit effort in obtaining sufficient audit evidence.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the determination of standalone selling prices and the allocation of transaction price included the following, among others:

- We assessed management's accounting policy in relation to allocation of transaction price to determine compliance with IFRS 15 Revenue from Contracts with Customers;
- We tested the operating effectiveness of controls over revenue recognition, specifically focusing on controls related to the determination of standalone selling prices in the largest and most complex contracts;
- We utilised data analytics to identify those contracts with higher levels of risk based on size, complexity and inclusion of new products such as 5G, where there is less objective evidence of standalone selling price. For these contracts we reviewed their terms and obtained management's accounting conclusions to consider whether these were in line with IFRS 15;
- We evaluated the appropriateness of the estimation methods and related inputs used by management for standalone selling prices in the contracts selected by assessing compliance with IFRS 15 and considering the nature of the performance obligations;
- We benchmarked contracts against those with similar customers or for similar transactions to challenge whether the determination of standalone selling price was consistent across the Company;
- We tested the related inputs used by management in their standalone selling price determinations in the contracts selected by assessing evidence related to judgements and calculations and agreeing to supporting audit evidence; and
- We tested the arithmetic accuracy of the allocation of transaction price based on the determination of standalone selling price.

/s/ Deloitte Oy

Helsinki, Finland

March 4, 2021

We have served as the Company's auditor since 2020.

Report of independent registered public accounting firm

To the shareholders and the Board of Directors of Nokia Corporation.

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of Nokia Corporation and subsidiaries (the "Company") as of 31 December 2020, based on criteria established in Internal Control — Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of 31 December 2020, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended 31 December 2020, of the Company and our report dated 4 March 2021, expressed an unqualified opinion on those financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's annual report on internal control over financial reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Deloitte Oy

Helsinki, Finland

March 4, 2021

Report of independent registered public accounting firm

To the Board of Directors and shareholders of Nokia Corporation

Opinion on the Financial Statements

We have audited the consolidated statement of financial position of Nokia Corporation and its subsidiaries (the "Company") as of December 31, 2019, and the related consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in shareholders' equity and consolidated statement of cash flows for each of the two years in the period ended December 31, 2019, including the related notes (collectively referred to as the "consolidated financial statements").

In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2019 in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board and International Financial Reporting Standards as adopted by the European Union.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits of these consolidated financial statements in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers Oy

Helsinki, Finland

March 5, 2020, except for the change in the manner in which the Company accounts for other operating income and expenses discussed in Note 2 to the consolidated financial statements, as to which the date is March 4, 2021.

We served as the Company's auditor from 1987 to 2020.

Other information

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Exhibits

1	<u>Articles of Association of Nokia Corporation (incorporated by reference to Exhibit 1 of our annual report on Form 20-F filed with the Securities and Exchange Commission on March 23, 2017 (File No. 1-13202)).</u>
6	Refer to Note 13, Earnings per share, of our consolidated financial statements included in this annual report on Form 20-F, for information on how earnings per share information was calculated.
8	Refer to Note 32, Principal Group companies, of our consolidated financial statements included in this annual report on Form 20-F, for more information on our significant subsidiaries.
11	<u>Code of Ethics.</u>
12.1	<u>Certification of Pekka Lundmark, President and Chief Executive Officer of Nokia Corporation, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
12.2	<u>Certification of Marco Wiren, Group Chief Financial Officer of Nokia Corporation, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
13	<u>Certification, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>
15.1	<u>Consent of Deloitte Oy.</u>
15.2	<u>Consent of PricewaterhouseCoopers Oy.</u>
101	Interactive Data Files (XBRL – Related Documents).

Glossary

2G (Second Generation Mobile Communications): Also known as GSM (Global System for Mobile Communications): A digital system for mobile communications that is based on a widely-accepted standard and typically operates in the 900 MHz, 1800 MHz and 1900 MHz frequency bands.

3G (Third Generation Mobile Communications): The third generation of mobile communications standards designed for carrying both voice and data generally using WCDMA or close variants. See also WCDMA.

3GPP (The Third Generation Partnership Project): A consortium comprising several standards organizations which develop protocols for mobile telecommunications. The initial goal was to develop a global technical specification for a 3G mobile phone system. Since then, the operations have been extended and today the main focus is on 5G networks.

4G (Fourth Generation Mobile Communications): The fourth generation of mobile communications standards based on LTE, offering IP data connections only and providing true broadband internet access for mobile devices. See also LTE.

5G (Fifth Generation Mobile Communications): The next major phase of mobile telecommunications standards. 5G is a complete redesign of network architecture with the flexibility and agility to support upcoming service opportunities. It delivers higher speeds, higher capacity, extremely low latency and greater reliability.

Access network: A telecommunications network between a local exchange and the subscriber station.

Airframe: Our 5G-ready, end-to-end data center solution that combines the benefits of cloud computing technologies with the requirements of the core and radio telecommunications world. It is available in Rackmount and Open Compute Project (OCP) form factors. This enables the solution to be very scalable: from small distributed latency-optimized data centers to massive centralized hyperscale data center deployment.

AirScale Radio Access: A 5G-ready complete radio access generation that helps operators address the increasing demands of today and tomorrow. The solution comprises: Nokia AirScale Base Station with multiband radio frequency elements and system modules; Nokia AirScale Active Antennas; Cloud RAN with Nokia AirScale Cloud Base Station Server and the cloud-based AirScale RNC (Radio Network Controller) for 3G; Nokia AirScale Wi-Fi; common software; and services which use intelligent analytics and extreme automation to maximize the performance of hybrid networks.

Alcatel-Lucent: Alcatel-Lucent Group, that has been part of the Nokia Group since 2016.

Anyhaul: Mobile transport solution for 5G networks covering microwave, IP, optical and broadband.

Artificial Intelligence (AI): Autonomous and adaptive intelligence of machines, where machines have the ability to perform tasks in complex environments without constant guidance by a user and have the ability to improve performance by learning from experience.

Bandwidth: The width of a communication channel, which affects transmission speeds over that channel.

Base station: A network element in a mobile network responsible for radio transmission and reception to or from the mobile station.

Broadband: The delivery of higher bandwidth by using transmission channels capable of supporting data rates greater than the primary rate of 9.6 Kbps.

Churn: A measure of the number of customers or subscribers who leave their service provider, e.g. a mobile operator, during a given time period.

Cloud: Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort.

CloudBand: Our cloud management and orchestration solutions enabling a unified cloud engine and platform for Network Functions Virtualization (NFV). See also NFV.

Common Software Foundation (CSF): As a coherent software suite, Nokia's cloud-native Common Software Foundation is designed to deliver applications that are hardware- and vendor-agnostic, and easy to deploy, integrate, use and upgrade.

Converged core: Wireless and fixed access convergence within the core. As we move towards a 5G standalone core, service providers will be able to use a common set of control plane functions within the core to manage both wireless and fixed user plane functions. The ability of a unified control plane will simplify operations and provide independent location, scaling and lifecycle management capabilities.

Convergence: The coming together of two or more disparate disciplines or technologies. Convergence types are e.g. IP convergence, fixed-mobile convergence and device convergence.

Core network: A combination of exchanges and the basic transmission equipment that together form the basis for network services.

CSP: Communication service providers.

Customer Experience Management: Software suite used to manage and improve the customer experience, based on customer, device and network insights.

Devices & Services: Our former mobile device business, substantially all of which was sold to Microsoft.

Digital: A signaling technique in which a signal is encoded into digits for transmission.

Discontinued operations: The continuing financial effects of the HERE business and the Devices & Services business. HERE was divested to an automotive consortium and substantially all of the Devices & Services business was sold to Microsoft.

Ecosystem: An industry term to describe the increasingly large communities of mutually beneficial partnerships that participants such as hardware manufacturers, software providers, developers, publishers, entertainment providers, advertisers and ecommerce specialists form in order to bring their offerings to market. At the heart of the major ecosystems in the mobile devices and related services industry is the operating system and the development platform upon which services are built.

ETSI (European Telecommunications Standards Institute): Standards produced by the ETSI contain technical specifications laying down the characteristics required for a telecommunications product.

Fixed Networks: Our Fixed Networks business group provides copper and fiber access products, solutions, and services.

Fixed Wireless Access (FWA): Uses wireless networks to connect fixed locations such as homes and businesses with broadband services.

Future X: A network architecture - a massively distributed, cognitive, continuously adaptive, learning and optimizing network connecting humans, senses, things, systems, infrastructure, processes.

G.fast: A fixed broadband technology able to deliver up to 1Gbps over very short distances (for example, for in-building use, also called "Fiber-to-the-Building"). Launched in 2014, G.fast uses more frequencies and G.fast Vectoring techniques to achieve higher speeds.

Global Services: Our Global Services business group provides a broad variety of services to communication service providers and enterprises ranging from network infrastructure services, professional services and managed operations to network cognitive services and analytics.

GPON (Gigabit Passive Optical Network): A fiber access technology that delivers 2.5Gbps over a single optical fiber to multiple end points including residential and enterprise sites.

GSM (Global System for Mobile Communications): A digital system for mobile communications that is based on a widely accepted standard and typically operates in the 900 MHz, 1800 MHz and 1900 MHz frequency bands. See also 2G.

GSM-R (GSM-Railway): An international wireless communications standard for railway communication and applications. A sub-system of European Rail Traffic Management System (ERTMS), it is used for communication between train and railway regulation control centers.

HERE: A former Nokia company focused on mapping and location intelligence services, which was divested to an automotive consortium in 2015.

Internet of Things (IoT): All things such as cars, the clothes we wear, household appliances and machines in factories connected to the internet and able to automatically learn and organize themselves.

IP (Internet Protocol): A network layer protocol that offers a connectionless internet work service and forms part of the (Transmission Control Protocol) TCP/IP protocol.

IP (Intellectual Property): Intellectual property results from original creative thought, covering items such as patents, copyright material and trademarks, as well as business models and plans.

IPR (Intellectual Property Rights): Legal rights protecting the economic exploitation of intellectual property, a generic term used to describe products of human intellect, for example patents, that have an economic value.

IP/MPLS (IP Multiprotocol Label Switching): IP/MPLS is a routing technique in telecommunications networks that directs data from one node to the next based on short path labels rather than long network addresses, thus avoiding complex lookups in a routing table and speeding traffic flows.

IPR licensing: Generally an agreement or an arrangement where a company allows another company to use its intellectual property (such as patents, trademarks or copyrights) under certain terms.

IP/Optical Networks: Our IP/Optical Networks business group provides the key IP routing and optical transport systems, software and services to build high capacity network infrastructure for the internet and global connectivity.

LTE (Long-Term Evolution): 3GPP radio technology evolution architecture and a standard for wireless communication of high-speed data. Also referred to as 4G.

Mission-critical networks/communications: One of the key elements of 5G. Mission-critical communications meets the needs of emergency responders such as emergency operations centers, fire departments, emergency vehicles, police, and search and rescue services, replacing traditional radio with new communications capabilities available to smartphone users.

Mobile broadband: Refers to high-speed wireless internet connections and services designed to be used from multiple locations.

Mobile Networks: Our Mobile Networks business group offers an industry-leading portfolio of radio access networks solutions, including 2G, 3G, 4G, 5G and Single-RAN, microwave radio links and cloud computing hardware platforms.

MPLS: Multiprotocol Label Switching, a routing technique for networks.

MSO: Multiple System Operators (MSO) are operators of multiple cable television systems. The majority of system operators run cable systems in more than one community and hence most of them are multiple system operators.

Networks segment: One of our three reportable segments until the end of 2020. As Nokia's new operating model became effective on January 1, 2021, the reportable segments changed accordingly.

NFV (Network Functions Virtualization): Principle of separating network functions from the hardware they run on by using virtual hardware abstraction.

Nokia Bell Labs: Our research arm engaged in discovering and developing the technological shifts needed for the next phase of human existence as well as exploring and solving complex problems to radically redefine networks.

Nokia Enterprise: Recognizing the growth potential of our business within the enterprise customer segment, we created Nokia Enterprise business group, effective 1 January, 2019. It addresses the mission- and business-critical networking requirements of asset-intensive industries such as transportation, energy, manufacturing and logistics – as well as governments and cities.

Nokia Networks: Our former business focused on mobile network infrastructure software, hardware and services.

Nokia Software: Our business group and a reportable segment offering carrier-grade software applications and platforms to provide operations and business support systems, build, deliver, and optimize services, enable their monetization, and to improve customer experience.

Nokia Technologies: Our business group and a reportable segment focused on advanced technology development and licensing.

Non-Standalone (NSA): Network architecture that is built over an existing 4G network.

Nuage Networks: A Nokia brand, focused on creating Software Defined Networking (SDN) solutions that simplify and automate communication service providers' cloud networks and enterprise Wide Area Networks (SD-WAN).

Operating System (OS): Software that controls the basic operation of a computer or a mobile device, such as managing the processor and memory. The term is also often used to refer more generally to the software within a device e.g. the user interface.

Packet: Part of a message transmitted over a packet-switched network.

Platform: Software platform is a term used to refer to an operating system or programming environment, or a combination of the two.

PON (Passive Optical Network): A fiber access architecture in which unpowered fiber optic splitters are used to enable a single optical fiber to serve multiple end-points without having to provide individual fibers between the hub and customer.

Programmable world: A world where connectivity will expand massively, linking people as well as billions of physical objects - from cars, home appliances and smartphones, to wearables, industrial equipment and health monitors. What distinguishes the Programmable World from the Internet of Things (IoT) is the intelligence that is added to data to allow people to interpret and use it, rather than just capture it.

PSE-3: The PSE-3 chipset is the first coherent digital signal processor to implement Probabilistic Constellation Shaping (PCS), a modulation technique pioneered by Nokia Bell Labs.

RAN (Radio Access Network): A mobile telecommunications system consisting of radio base stations and transmission equipment.

SDAN: Software Defined Access Network.

SDN (Software-Defined Network): Decoupling of network control and data forwarding to simplify and automate connections in data centers, clouds and across the wide area.

SD-WAN: Software-Defined Networking in a Wide Area Network (WAN) that simplifies and automates enterprise networks, seamlessly connecting users and applications, from branch office to cloud.

SEP (Standard-Essential Patent): Generally, patents needed to produce products which work on a standard, which companies declare as essential and agree to license on Fair, Reasonable and Non-Discriminatory (FRAND) terms. Can be referred to as essential patent also.

Single RAN: Single RAN (S-RAN) allows different radio technologies to be provided at the same time from a single base station, using a multi-purpose platform.

Small cells: Low-powered radio access nodes (micro cells or picocells) that are a vital element in handling very dense data traffic demands. 3G and LTE small cells use spectrum licensed by the operator; Wi-Fi uses unlicensed spectrum which is therefore not under the operator's exclusive control.

Standalone (SA): Network architecture that allows independent operation of a 5G service without interaction with an existing 4G core and 4G radio network.

Technology licensing: Generally refers an agreement or arrangement where under certain terms a company provides another company with its technology and possibly know-how, whether protected by intellectual property or not, for use in products or services offered by the other company.

Telco cloud: Applying cloud computing, SDN and NFV principles in telecommunications environment, e.g. separating application software from underlying hardware with automated, programmable interfaces while still retaining telecommunications requirements such as high availability and low latency.

Transmission: The action of conveying signals from one point to one or more other points.

TXLE (Technical Extra-Large Enterprise): Technically sophisticated companies, such as banks, that invest heavily in their own network infrastructures to gain a key competitive advantage.

VDSL2 (Very High Bit Rate Digital Subscriber Line 2): A fixed broadband technology, the successor of ADSL. Launched in 2007, it typically delivers a 30Mbps broadband service from a street cabinet (also called a "Fiber-to-the-Node" deployment) over existing telephone lines.

VDSL2 vectoring: A fixed broadband technology launched in 2011, able to deliver up to 100Mbps over a VDSL2 line by applying noise cancellation techniques to remove cross-talk between neighboring VDSL2 lines.

Virtual Reality (VR): The simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors.

VoLTE (Voice over LTE): Required to offer voice services on an all-IP LTE network and generally provided using IP Multimedia Subsystem, which is an architectural framework designed to deliver IP-based multimedia services on telecommunications networks; standardized by 3GPP.

WAN (Wide Area Network): A geographically distributed private telecommunications network that interconnects multiple local area networks.

WCDMA (Wideband Code Division Multiple Access): A third-generation mobile wireless technology that offers high data speeds to mobile and portable wireless devices. Also referred to as 3G.

Webscale companies: Companies - such as Google, Microsoft, and Alibaba - which are investing in cloud technology and network infrastructure on an increasing scale to fulfill their needs for massive, mission-critical networks.

WING: Worldwide IoT Network Grid is a managed service that offers CSPs the ability to support their enterprise customers with global IoT connectivity across borders and technologies.

WLAN (Wireless Local Area Network): A local area network using wireless connections, such as radio, microwave or infrared links, in place of physical cables.

Investor information

Information on the internet

www.nokia.com

Available on the internet: financial reports, members of the Group Leadership Team, other investor-related materials and events, and press releases as well as environmental and social information, including our Sustainability Report, Code of Conduct, Corporate Governance Statement and Remuneration Statement.

SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC (<http://www.sec.gov>).

Investor Relations contacts

investor.relations@nokia.com

Annual General Meeting

Date: April 8, 2021

Place: Espoo, Finland

Dividend

The Board proposes to the Annual General Meeting that no dividend be paid for the financial year 2020.

Financial reporting

Our interim reports in 2021 are planned to be published on April 29, 2021, July 29, 2021 and October 28, 2021. The full-year 2021 results are planned to be published in February 2022.

Information published in 2020

All our global press releases and statements published in 2020 are available on the internet at www.nokia.com/en_int/news/releases.

Stock exchanges

The Nokia Corporation share is quoted on the following stock exchanges:

	Symbol	Trading currency
Nasdaq Helsinki (since 1915)	NOKIA	EUR
New York Stock Exchange (since 1994)	NOK	USD
Euronext Paris (since 2015)	NOKIA	EUR

Documents on display

The documents referred to in this annual report on Form 20-F can be read at the Securities and Exchange Commission's internet site at <http://www.sec.gov>.

Contact information

Nokia Head Office

Karakaari 7

FI-02610 Espoo, Finland
FINLAND

Tel. +358 (0) 10 44 88 000
Fax +358 (0) 10 44 81 002

Signatures

The registrant hereby certifies that it meets all of the requirements for filing on Form 20-F and that it has duly caused and authorized the undersigned to sign this annual report on Form 20-F on its behalf.

Nokia Corporation

By: **/S/ STEPHAN PROSI**
Name: Stephan Prosi
Title: Vice President, Corporate Controlling and Accounting

By: **/S/ ESA NIINIMÄKI**
Name: Esa Niinimäki
Title: Deputy Chief Legal Officer, Corporate

March 4, 2021



CODE OF ETHICS

FOR THE PRINCIPAL EXECUTIVE OFFICERS AND THE SENIOR FINANCIAL OFFICERS

1 Purpose

The purpose of this Code of Ethics (the “Code”) is to reinforce ethical behavior and promote high standards of corporate governance. This Code complements Nokia’s Code of Conduct, Nokia Insider Policy and other guidelines and policies applicable at Nokia.

2 Applicability

The Code applies to Nokia’s President and Chief Executive Officer, Chief Financial Officer, Deputy Chief Financial Officer and Corporate Controller (the “Officers”).

3 Good corporate practices

3.1 Honest and ethical conduct

The Officers shall act honestly and ethically in all their business activities in their respective roles. They shall comply with and promote compliance with the highest standards of ethical conduct, including the principles set out in Nokia’s Code of Conduct, in all their business activities at Nokia.

3.2 Conflicts of interest

Situations involving an actual or apparent conflict of interest between personal and professional relationships of the Officers with Nokia, or any doubt thereof, shall be handled in an ethical way. An Officer shall not participate in consideration of a matter in which he/she has a conflict of interest or even a perceived conflict of interest between his/her personal and professional relationships with respect to Nokia.

For the avoidance of doubt, the Officers shall comply with the provisions on conflicts of interest included in various Nokia guidelines and policies (e.g., Nokia Insider Policy, Conflict of Interest Policy and external board membership related standard operating procedures).

3.3 Fair and timely disclosure

The Officers shall take all measures generally required from a prudent principal executive officer or senior financial officer, including measures in accordance with Nokia's disclosure controls and procedures, to promote full, fair, accurate, timely and understandable disclosure in reports and documents filed with or submitted to financial and regulatory authorities or stock exchanges by Nokia.

3.4 Compliance with laws and regulations

The Officers shall comply in all their business activities in their respective roles with all applicable governmental laws, rules and regulations of Finland and other applicable jurisdictions, as well as the rules of stock exchanges on which Nokia shares are listed, including the New York Stock Exchange. These obligations include cooperating, appropriately, with governmental investigations of Nokia's business and operations.

4 Accountability

4.1 Clearances

Nokia regards adherence to this Code as well as accountability for such adherence as important.

The Chief Compliance Officer may, upon request, advise the Officers whether a particular situation or behavior is in compliance with this Code or not, and give a clearance for a situation or behavior that is obviously and evidently compliant. The determination whether a conflict of interest exists or not, shall be made by the Chief Compliance Officer or, upon the request of the Officer or the Chief Compliance Officer, by the Chair of the Audit Committee.

4.2 Reporting of illegal or unethical behavior

Any suspected failures to adhere to, and suspected violations of this Code by any of the Officers, shall be reported to the Chief Compliance Officer or to the Chair of the Audit Committee. Except for such matters that are beyond question frivolous, each such matter shall be reviewed and considered by the Audit Committee. The matter shall be prepared for such consideration by the Chief Compliance Officer or another officer as instructed by the Audit Committee.

4.3 Violations

The Audit Committee shall consider and determine if a violation of this Code has occurred, and possible consequences, if any, for such violation. The consequences may vary from a

written reprimand to a recommendation to the corporate body entitled to discharge the Officer in question to discharge him/her from his/her duties, and may include other measures that the Audit Committee deems appropriate, depending on the circumstances of the case.

4.4 Recording

The Chief Compliance Officer shall keep records of all clearances given by him/her or the Vice Chair of the Board, as well as of all reports made under this Code on suspected failures by the Officers to adhere to the Code or suspected violations thereof. In addition, records shall be kept on all decisions taken by the Audit Committee in respect of matters considered under this Code.

5 Assignments

The Audit Committee may authorize its Chair to resolve a specific matter, or a specific category of matters, under this Code.

Any reference to the Chief Compliance Officer in this Code is equally applicable to his/her deputy.

6 Waivers

Any waiver of this Code may be made only by the Audit Committee and must be disclosed as set forth below.

7 Disclosure

This Code will be published on the Nokia's website. Amendments to, and waivers of, this Code will be disclosed in a similar way.

8 Approval and amendments

This Code is approved, and may be amended, by the Board of Directors of Nokia.

CERTIFICATION

I, PEKKA LUNDMARK, certify that:

1. I have reviewed this annual report on Form 20-F of Nokia Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: March 4, 2021

/s/ PEKKA LUNDMARK

PEKKA LUNDMARK

President and Chief Executive Officer

CERTIFICATION

I, MARCO WIRÉN, certify that:

1. I have reviewed this annual report on Form 20-F of Nokia Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: March 4, 2021

/s/ MARCO WIRÉN

MARCO WIRÉN

Chief Financial Officer

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the annual report on Form 20-F of Nokia Corporation (the “Company”) for the period ending December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the “Report”), the undersigned hereby certify that to the best of our knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ PEKKA LUNDMARK

Name: PEKKA LUNDMARK

Title: President and Chief Executive Officer

Date: March 4, 2021

/s/ MARCO WIRÉN

Name: MARCO WIRÉN

Title: Chief Financial Officer

CONSENT OF DELOITTE OY

We consent to the incorporation by reference in Registration Statement Nos. 333-253253, 333-236903, 333-230467, 333-223848 and 333-187096 on Form S-8 of our reports dated 4 March 2021, relating to the financial statements of Nokia Corporation and the effectiveness of Nokia Corporation's internal control over financial reporting appearing in this Annual Report on Form 20-F for the year ended 31 December 2020.

/s/ Deloitte Oy

Deloitte Oy
Helsinki, Finland
March 4, 2021

CONSENT OF PRICEWATERHOUSECOOPERS OY

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-253253, 333-236903, 333-230467, 333-223848, and 333-187096) of Nokia Corporation of our report dated March 5, 2020, except for the change in the manner in which the Company accounts for other operating income and expenses discussed in Note 2 to the consolidated financial statements, as to which the date is March 4, 2021, relating to the consolidated financial statements, which appears in this Form 20-F.

/s/ PricewaterhouseCoopers Oy

PricewaterhouseCoopers Oy
Helsinki, Finland
March 4, 2021
