

Nokia Progress Update

December 2023

NOKIA

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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.

Nokia presents financial information on reported, comparable and constant currency basis. Comparable measures presented in this document exclude intangible asset amortization and other purchase price fair value adjustments, goodwill impairments, restructuring related charges and certain other items affecting comparability. In order to allow full visibility on determining comparable results, information on items affecting comparability is presented separately for each of the components of profit or loss. Constant currency reporting provides additional information on change in financial measures on a constant currency basis in order to better reflect the underlying business performance. Therefore, change in financial measures at constant currency excludes the impact of changes in exchange rates in comparison to euro, our reporting currency. As comparable or constant

currency financial measures are not defined in IFRS they may not be directly comparable with similarly titled 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 Nokia and believes that these measures provide meaningful supplemental information on the underlying business performance of Nokia. These financial measures should not be considered in isolation from, or as a substitute for, financial information presented in compliance with IFRS.

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Agenda

| | | |
|---------------|---|-----------------------------|
| 14:00 – 14:05 | Welcome | David Mulholland |
| 14:05 – 14:50 | Group Strategy, NI, Nokia Technologies Update | Pekka Lundmark |
| 14:50 – 15:05 | Financial Update | Marco Wirén |
| 15:05 – 15:20 | CEO/CFO Q&A session | Pekka Lundmark, Marco Wirén |
| 15:20 – 16:00 | Cloud and Network Services Update | Raghav Sahgal |
| 16:00 – 16:15 | CNS Q&A session | Raghav Sahgal |
| 16:15 – 16:30 | <i>Break</i> | ---- |
| 16:30 – 17:15 | Mobile Networks Update | Tommi Uitto |
| 17:15 – 17:30 | MN Q&A session | Tommi Uitto |

CEO presentation

1. Introduction

2. Solid execution against a backdrop of uncertainty

3. Mid to long-term opportunities remain attractive

4. Evolving business structure for long-term value creation

5. Network Infrastructure

6. Nokia Technologies

7. Financial targets

At Nokia, we create
technology that helps
the world act together



Four businesses, with clear differentiators



| Trailing twelve months (Q4-Q3) | Network Infrastructure | Mobile Networks | Cloud and Network Services | Nokia Technologies | Nokia Group |
|--------------------------------|------------------------|--------------------|----------------------------|--------------------|---------------------|
| Net sales | EUR 8.7 bn | EUR 10.3 bn | EUR 3.3bn | EUR 1.5bn | EUR 24 bn |
| <i>% of group net sales</i> | 36% | 43% | 14% | 6% | - |
| % gross margin | 38% | 34% | 39% | 100% | 40.1% |
| Operating profit | EUR 1.2 bn | EUR 0.6 bn | EUR 0.2 bn | EUR 1.1 bn | EUR 2.7 bn** |
| % operating margin | 13.8% | 6.2% | 5.4% | 74.6% | 11.2% |
| <i>% of group OP*</i> | 38% | 20% | 6% | 36% | - |

Business differentiators

Portfolio leverages in-house **silicon**
 #1 vendor in **fiber broadband** and **SP edge routing**

Highest capacity baseband
anyRAN software architecture

Leading telco move to **Cloud** and **SaaS**
 Organically developed **Network as Code** platform

20 000 patent families
6 000 5G patents
 Strong **multimedia** patents

*% calculated based on share of BG operating profit before the impact of Group Common and Other **Nokia Group Comparable Operating Profit

Solid execution against a backdrop of uncertainty

Executing on our corporate strategy in 2023

Our pillars

1

Grow CSP business faster than market

- Significant improvements in technology position
- Market share expansion in Mobile Networks and Optical Networks

2

Expand the share of enterprise

- Represents ~10% of Group net sales
- 28% constant currency growth year-to-date
- Strong pipeline of opportunities in 2024 and beyond

3

Actively manage our portfolio

- Disposal of VitalQIP, RFS
- Redhat partnership
- CNS prioritizing R&D towards growth areas
- Acquisition of Fenix Group
- Additional actions underway

4

Secure business longevity in Nokia Technologies

- Long-term agreements with Samsung and Apple
- Further growth in expansion areas

5

Build new business models

- Organically developed Network as Code platform
- CNS evolving to SaaS and ARR models

6

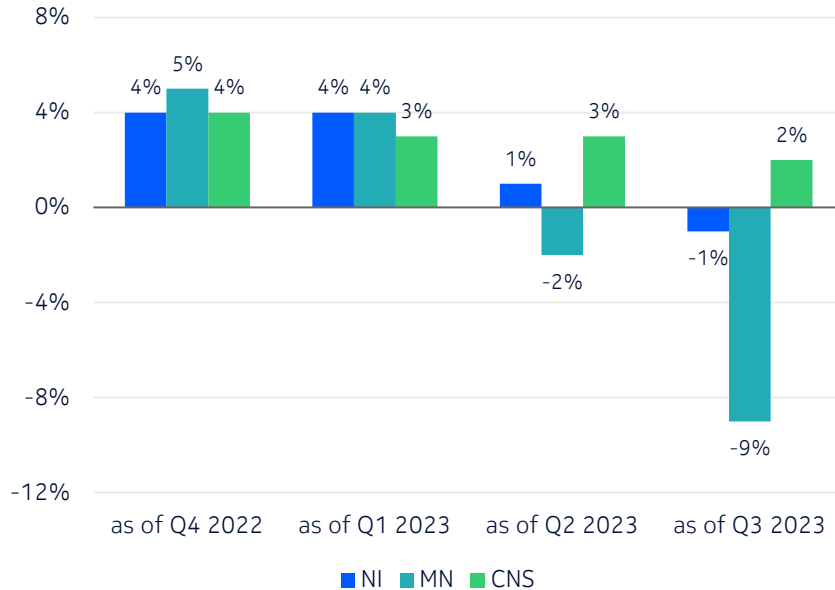
Develop ESG into a competitive advantage

- Improving product energy efficiency
- Help customers to enter circular economy
- CNS solutions that can transform physical and asset-intensive industries to decarbonize

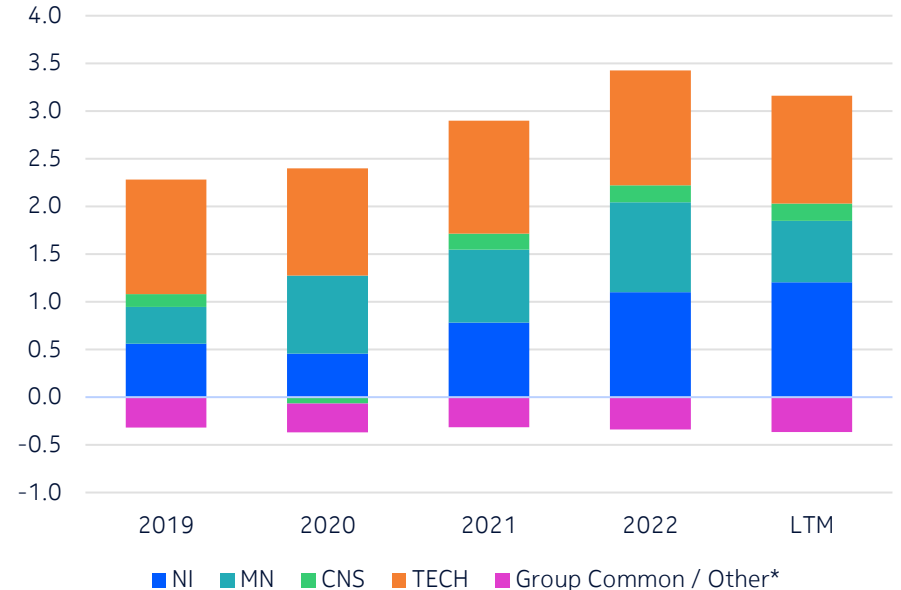
2023 has seen an industry-wide deterioration in demand

Resilient financial performance considering unprecedented market deterioration

2023 TAM expectations by BG



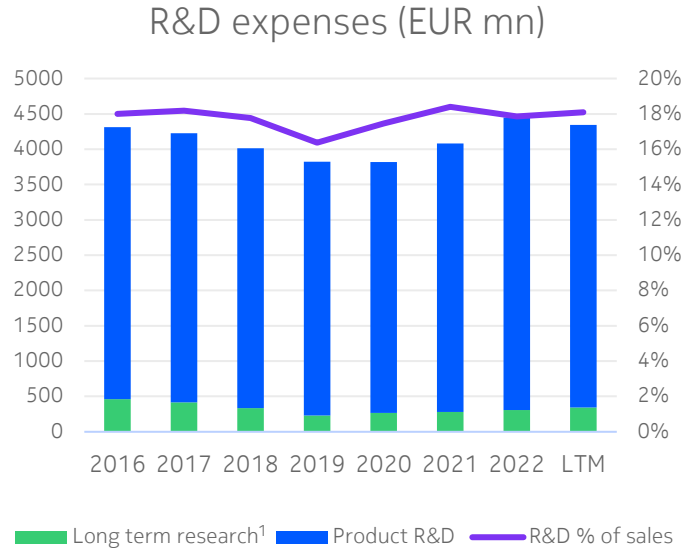
Operating profit by business group (EUR mn)



* Excluding the impact from venture fund investments

R&D and long-term research are key to success

Success in areas where we have increased investments



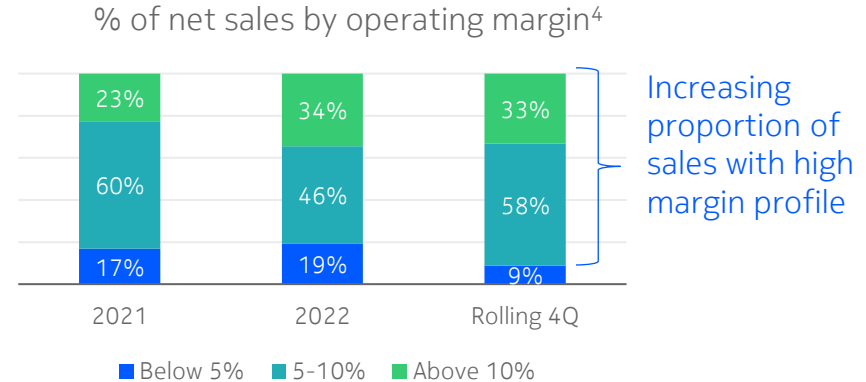
¹ Includes Bell Labs and Nokia Technologies R&D

² Dell'Oro rolling 4Q excluding China

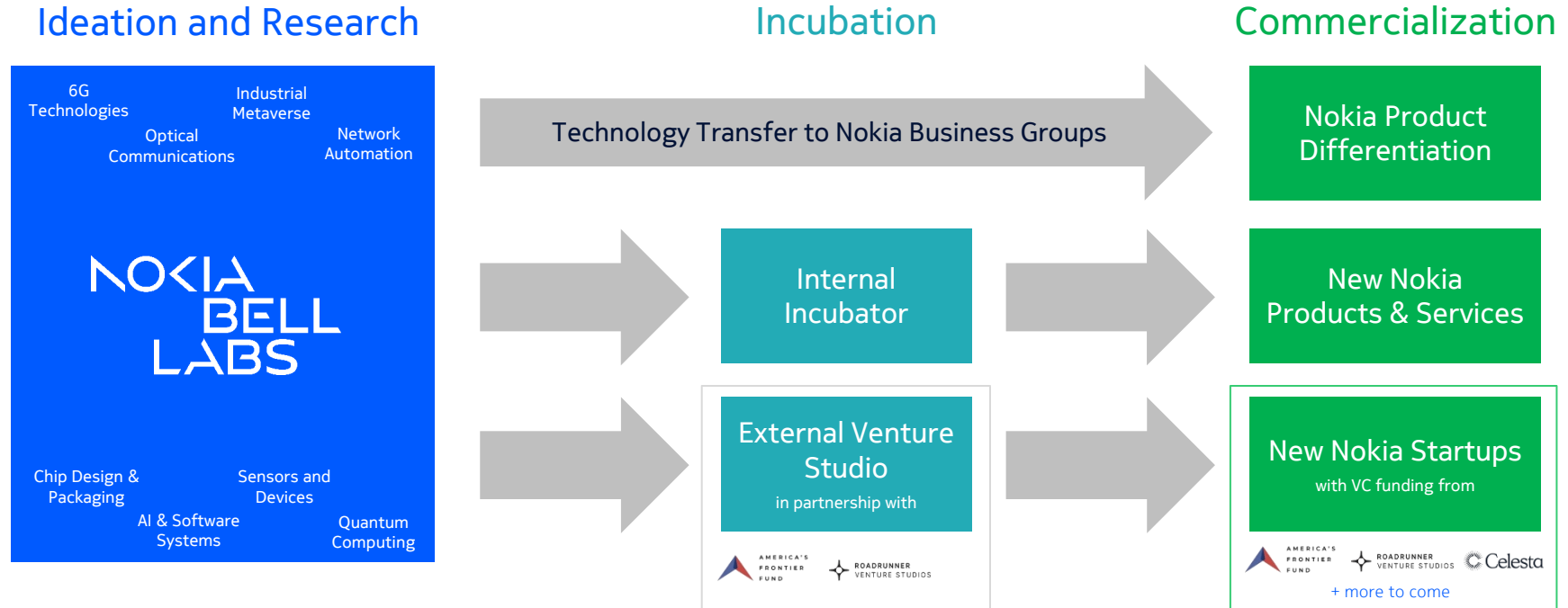
³ OMDIA rolling 4Q excluding China

⁴ Includes: total MN and NI and CNS broken into businesses; excludes Nokia Technologies and Group Common

| | Q1 2022 share (rolling 4Q) | Q3 2023 share (rolling 4Q) |
|---------------------------------|-------------------------------|-------------------------------|
| RAN ² | 23% | 27% |
| Optical Networking ³ | 15% | 18% |



External venture studio and VC partnerships create a new path for value creation of Nokia Bell Labs innovations



Research



- 6G Technologies
- Optical Communications
- Chip Design & Packaging
- AI & Software Systems
- Industrial Metaverse
- Network Automation
- Sensors and Devices
- Quantum Computing

Incubation

External Venture Studio
In partnership with



Commercialization

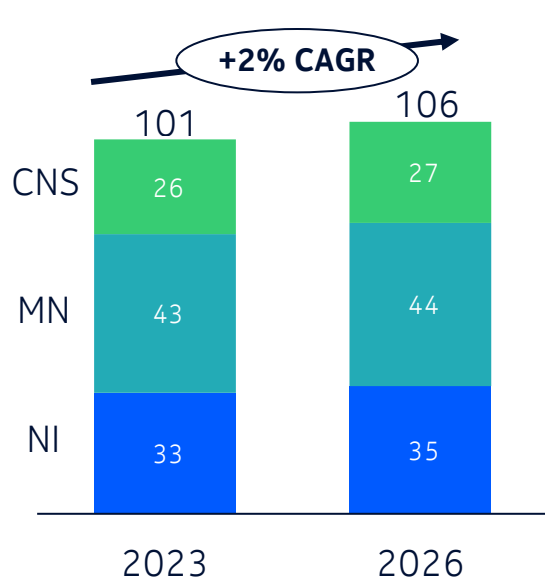
Startup Creation
With VC partnership



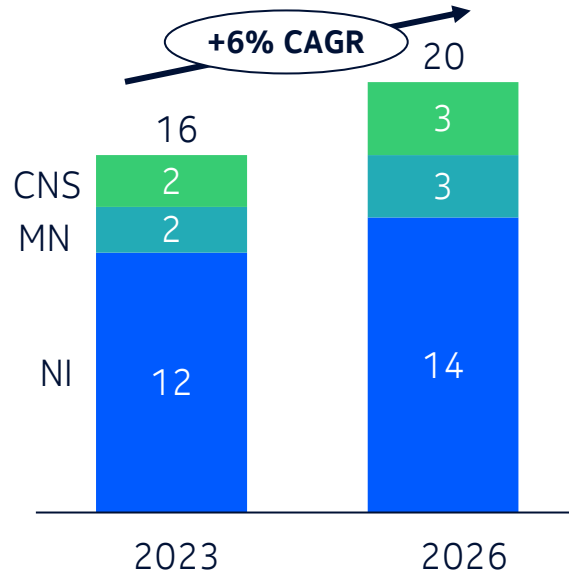
Mid to long-term opportunities
remain attractive

CSP spending constrained but growth in Enterprise and Webscale

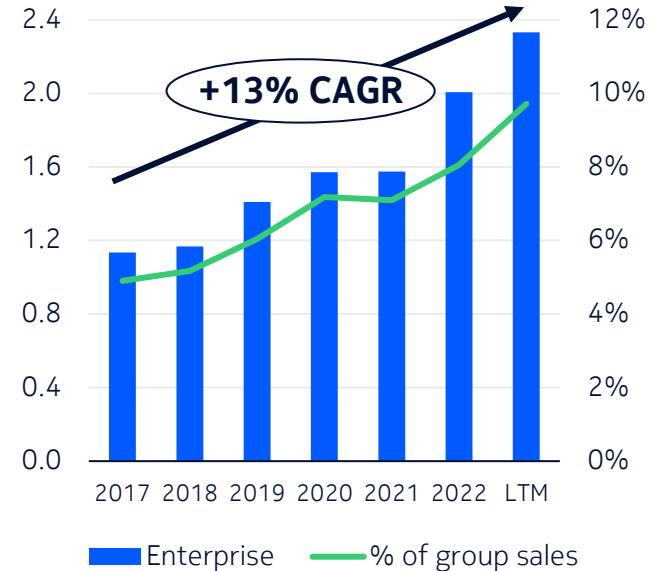
Nokia CSP TAM (EUR bn)



Nokia Enterprise + Webscale TAM (EUR bn)



Net sales to Enterprise customers (EUR bn)



Digitalization of industry and society is reshaping the world

With key ingredients: AI, cloud, and network connectivity



Cloud – Fusing digital & physical worlds

Enables scalability and reliability for, e.g.:

- Computing and data resources
- Real-time services
- IoT (ubiquitous sensing and actuation)
- Digital Twinning

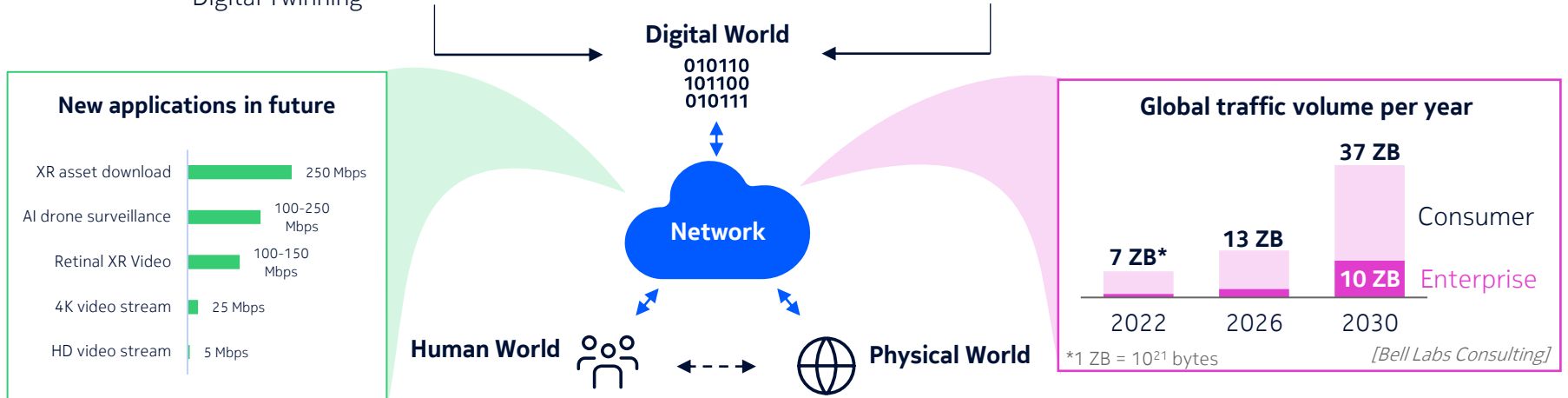


AI – Generating business growth

Enables automation, large-scale data analysis and enhanced experiences. Potential to:

- Increase annual productivity growth by 1.5%pt
- Increase global GDP by 7% (over 10 years)

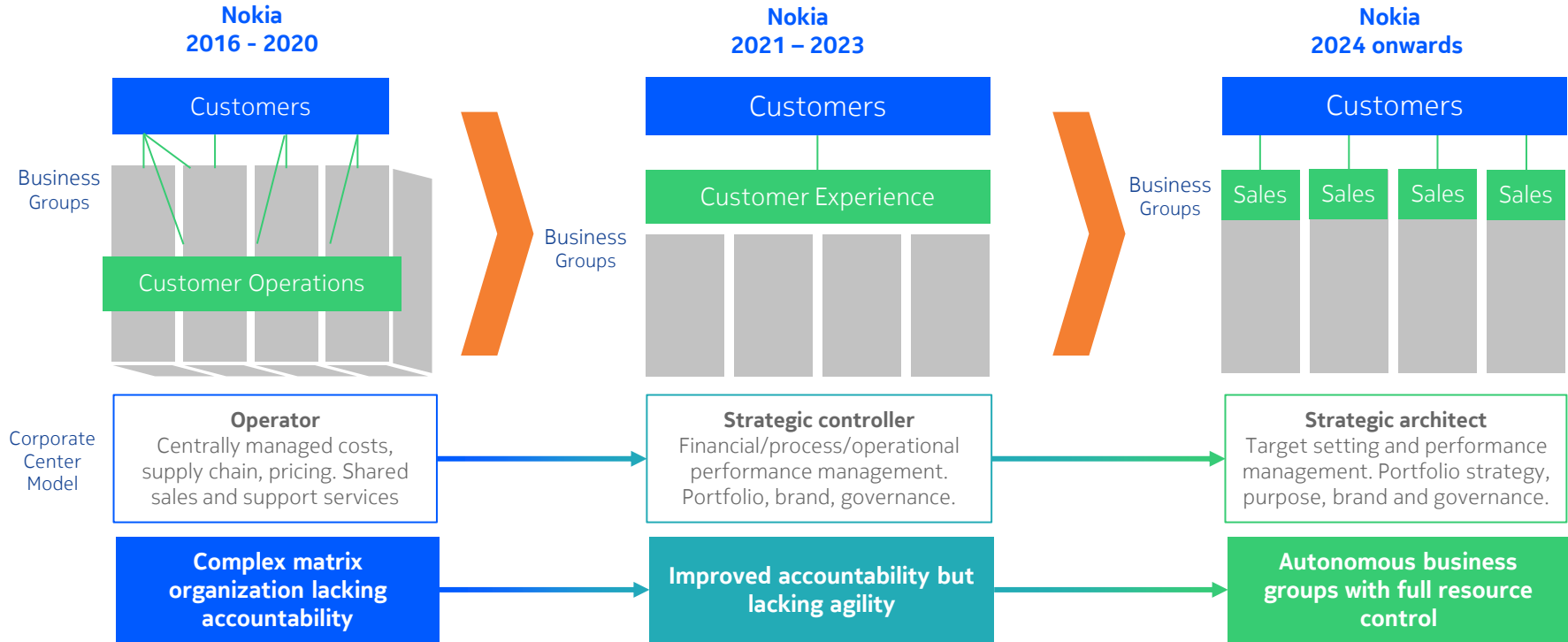
[Goldman Sachs Research]



Evolving business structure for long-term value creation

Evolving Nokia's operating model to empower business groups

Moving greater decision making and resources into our business groups



Actions will increase our agility and responsiveness



Responsiveness to customers

- Increased sales empowerment
- Agility to address opportunities in distinctive markets
- Faster diversification beyond CSPs
- Shorter distance between customers and R&D



Strategic flexibility

- Greater independence for BG specific strategies
- Greater optionality for business groups
- Enables preparing for potential partnerships

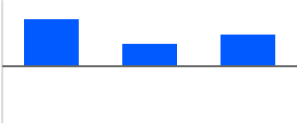


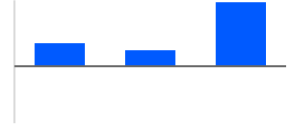


Financial accountability

- Better resource allocation
- Faster decision making
- Full accountability and visibility to each business group
- Lower corporate center costs

Increasing the speed of our strategy execution to accelerate shareholder value creation

Autonomy is important because our BGs are all different ...

| | Network Infrastructure | Mobile Networks | Cloud and Network Services | Nokia Technologies |
|-------------------------------------|---|--|---|---|
| Type of sale | Largely product sale with some projects | Large project sale with software upgrades | Software increasingly cloud-centric | Patent licensing |
| % sales to non-CSP | 20% | <5% | 5-10% | 100% |
| Margin potential | Mid-teens | Double-digit | Mid-teens | N/A |
| Cash conversion | Predictable | High volatility | Predictable | Predictable |
| Operative cash flow profile '21-'23 |  |  |  |  |

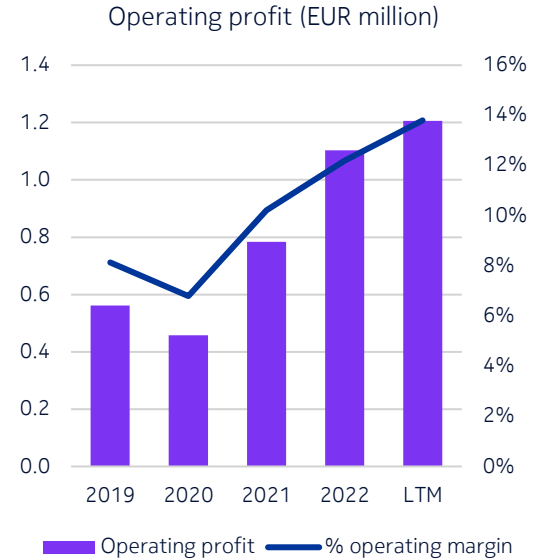
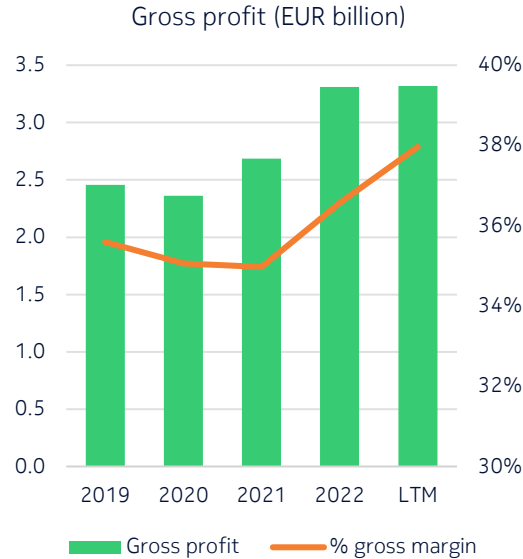
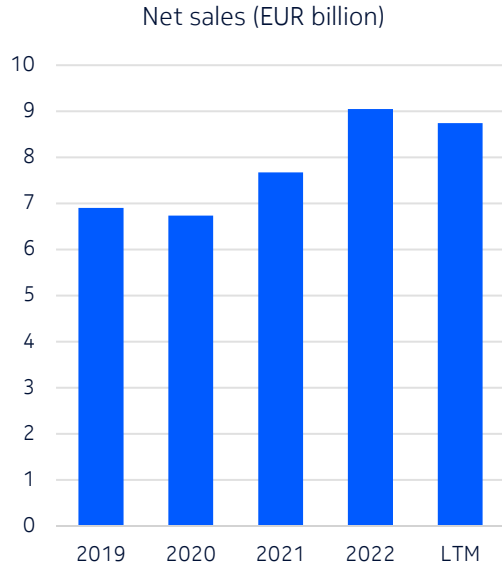
... and this will help them execute faster

Enabling business groups to execute on individual strategies



Network Infrastructure

Significant improvement in operating performance since 2020



Aspiration

Net sales: Grow faster than the market; **Operating margin:** Mid-teens operating margin

Demand drivers support return to growth in 2024

All units in NI have drivers that suggest a return to growth in 2024

Fixed Networks

- **Demand/appetite for fiber build** remains strong – less than 40% of homes connected with fiber*
- Many **government funding programs** (EU & US) will support build rates
- **\$42bn BEAD program** to start benefiting in H2'24

IP Networks

- **Strong product cycle** with both FP5 and FPcx products ramping
- **Momentum in Enterprise/WebScale**; orders signed supporting further growth in 2024
- Seeing a supportive **improvement in order intake in Q4**

Optical Networks

- **PSE-V and PSE-6** getting strong recognition for technology competitiveness
- **Strong opportunity to grow market share** supported by technology competitiveness and geo-politics
- **Scale key to improving margins** over time

Submarine Networks

- Demand outlook supported by **order backlog that covers demand for 2024**
- **Appetite for subsea cables is not slowing down**
- Winning our fair share of **EUR 7 billion pipeline** supports net sales until 2027/2028

* % of homes not connected with fiber to the home globally outside China; Source: IDATE World FTTX market, Dec 2022

Network Infrastructure has a strong future ahead of it

Supportive drivers across the portfolio mid-term

| | Fixed Networks | IP Networks | Optical Networks | Submarine Networks |
|-------------------------------------|---|--|--|---|
| Addressable Market growth ('23-'26) | 4% CAGR | 3% CAGR | 1% CAGR | Single-digit CAGR |
| Growth opportunity | Grow faster than the market from technology leadership position | Grow faster than the market gaining share in enterprise/webscale | Gain share based on now technology leadership position | Continue executing on backlog to grow with market |
| Operating margin (2022) | Mid-teens | High-teens | Low-single digit | Low-single digit |
| Operating margin aspiration | Mid-teens | High-teens | Double-digit | High-single digit |
| Key competitors | Adtran, Calix, Ciena, Fiberhome, Huawei, ZTE | Arista, Ciena, Cisco, Juniper, Huawei | Ciena, Fujitsu, Huawei, Infinera, Ribbon, ZTE | Subcom, NEC, Huawei |

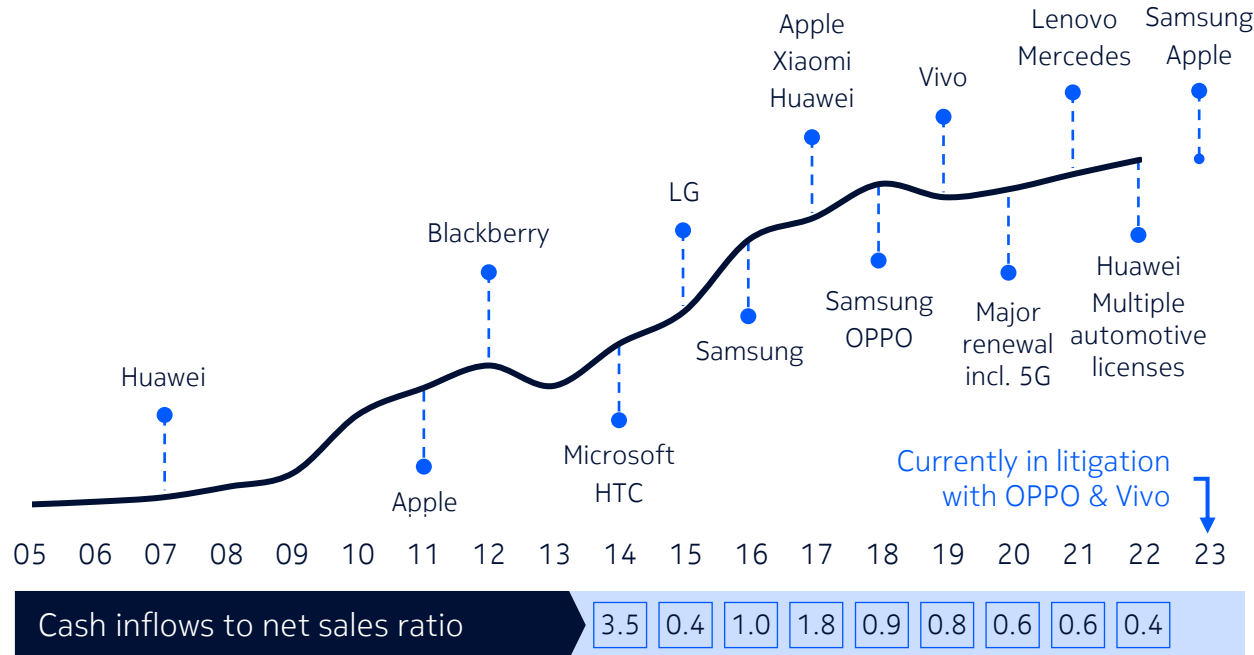
NI Aspiration

Net sales: Grow faster than the market; **Operating margin:** Mid-teens operating margin

Nokia Technologies

A proven track record

Patent business net sales and key deals



Proven assets

Strong IP assets with their value proven through the legal system

Expert team


Strong patent creation, licensing, and litigation teams

Licensee-friendly

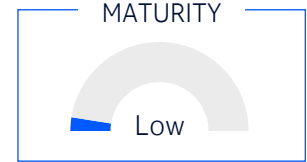
Compelling licensing offering incl. patents and technology


NOTE: A limited subset of example deals is presented here for illustration purposes only and may include past and/or current licensees and do not imply future license renewals. Patent business net sales are illustrated using a 3-year moving average (centered). Cash inflows to net sales ratio shown is for Nokia Technologies.

Continued progress in growth areas

 **Multimedia services**
Entry with ongoing negotiations

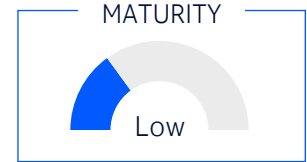
NEW SEGMENT
Active negotiations and enforcement



 **IoT devices**
12 new licensing deals in 2022-2023

RECENT DEAL EXAMPLES

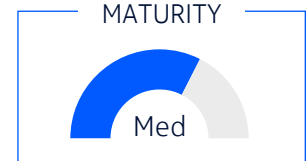
Block Landis+Gyr A leading POS company



 **Connected vehicles**
35 new licensing deals in 2022-2023

RECENT DEAL EXAMPLES

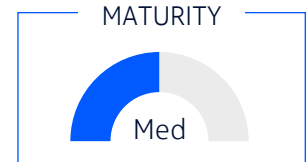
BMW Mercedes Hyundai



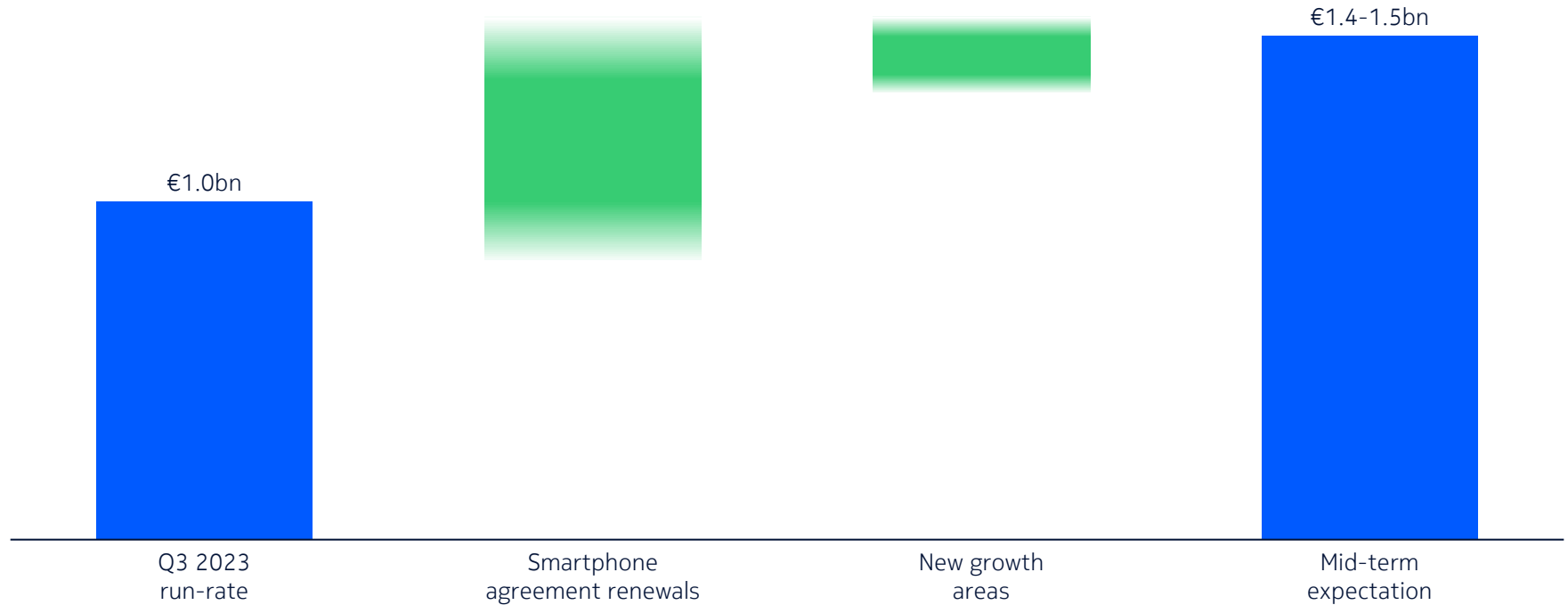
 **Consumer electronics**
18 new licensing deals in 2022-2023

RECENT DEAL EXAMPLES

Roku A leading fitness company Vivotek
Sagemcom TechniSat



Nokia Technologies' path to returning to EUR 1.4 – 1.5bn run rate



Financial targets

Financial targets to be achieved by 2026

Comparable operating margin assumptions by Business Group

| | |
|----------------------------|--------------------------------------|
| Network Infrastructure | 12 to 15% |
| Mobile Networks | 6 to 9% |
| Cloud and Network Services | 7 to 10% |
| Nokia Technologies | Operating profit more than EUR 1.1bn |
| Group Common and Other | Negative EUR 300 – 350 million |

Revenue growth

Grow faster than market

Comparable Operating Margin

≥13%

Free cash flow

55 to 85% conversion from comparable operating profit

Financial Update

Marco Wirén, Chief Financial Officer

NOKIA

CFO areas of progress and priorities going forward

Areas of progress

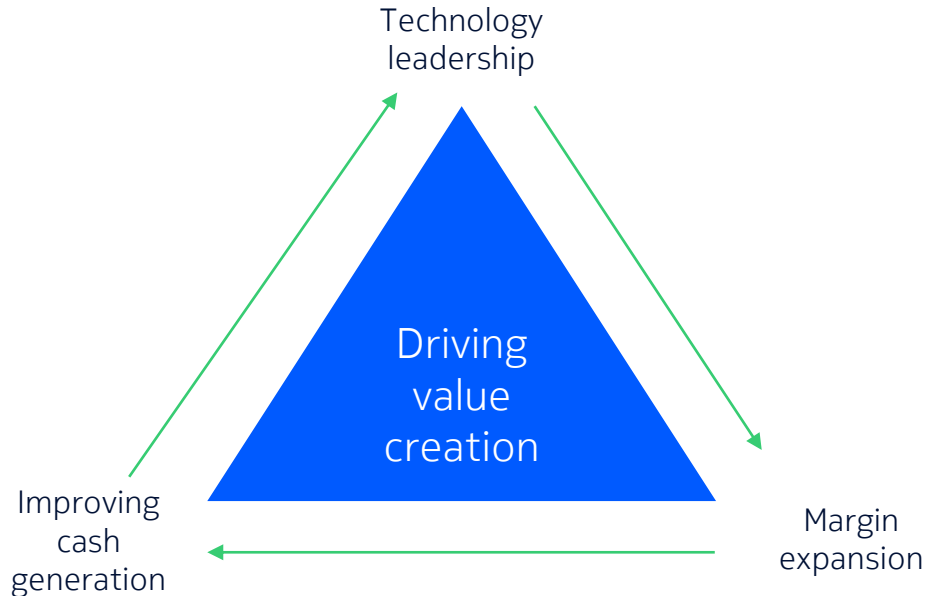
- ✓ Re-established and progressing technology leadership through prioritized R&D
- ✓ Operating model evolving
- ✓ Strengthened balance sheet
- ✓ Resumed and increased dividend / completed EUR 600mn share buyback program
- ✓ Increased transparency and simplified reporting



Priorities going forward

- 1 Shareholder value creation
- 2 Securing profitability
- 3 Generating sustainable cash flow

Cornerstones of value creation



- 1 Capital allocation with priority on organic R&D investments and shareholder distributions
- 2 Swift actions to remove costs and secure profitability
- 3 Strong focus on improving cash generation after working capital investment to support growth
- 4 New operating model drives further transparency in addition to leaner corporate center

Action to secure profitability in an uncertain environment

EUR 800-
1,200m

gross cost savings by 2026

Approx. 70% in
Operating Expenses

EUR 400m

In-year savings in 2024

Executing quickly on the cost
reduction program

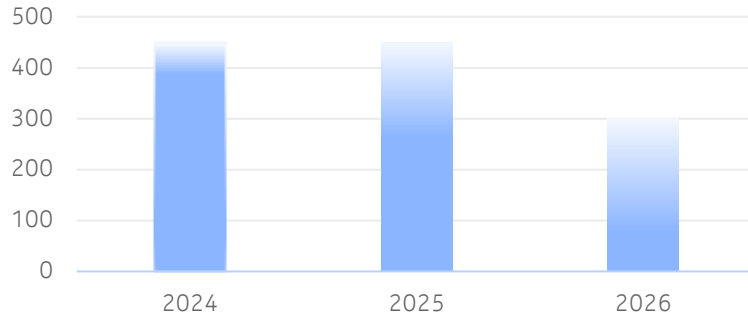
72-77k

headcount by end of 2026

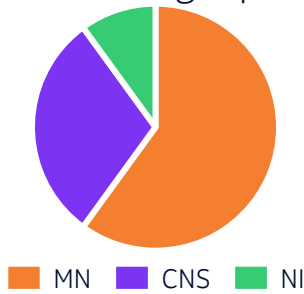
Compared to current
workforce of ~86k

Taking fast action through cost savings plan

Expected savings by year (EUR mn)



Expected savings split by BG

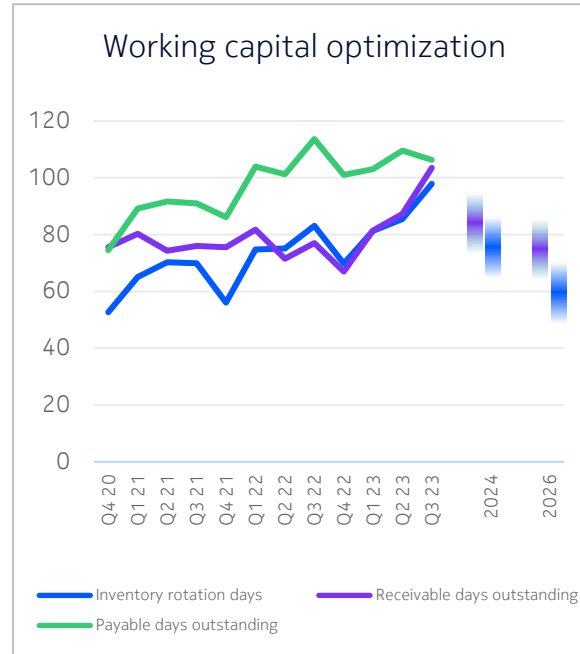
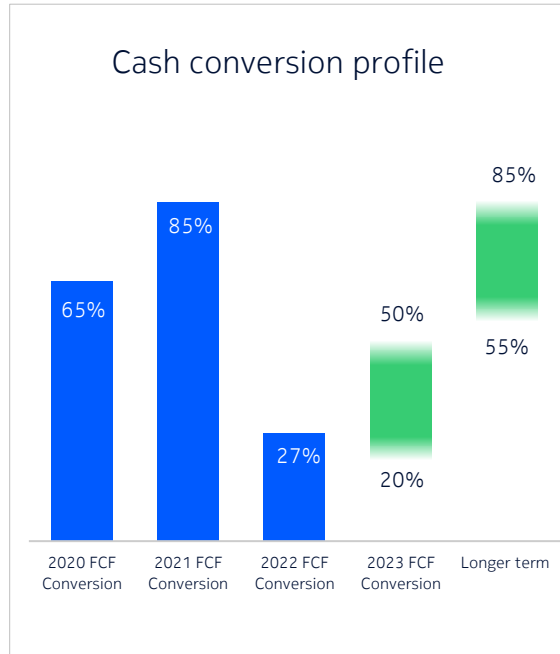


Corporate Center savings below 5% of total

- Taking fast action to deliver EUR 800 – 1 200m
- ~70% of savings in operating expenses with prioritization on protecting R&D capacity
- Savings by BG:
 - Mobile Networks ~60%
 - Cloud and Networks Services ~30%
 - Network Infrastructure ~10%
- Cash and charges amounts to align with savings
- Net savings expected in 2024, and sustained through 2026
- Small amount of savings/charges still expected from prior plans to impact 2024

Cash flow improvements through working capital optimization

NWC capital volatility caused by India, deployment to normalize



NWC drivers

- Elevated **inventory** levels following period of challenging supply constraints
- **Receivables** to normalize following strong India growth
- Strong focus on **overdue** collections
- **Target neutral net working capital impact to cash flow**

Capital allocation / management policy

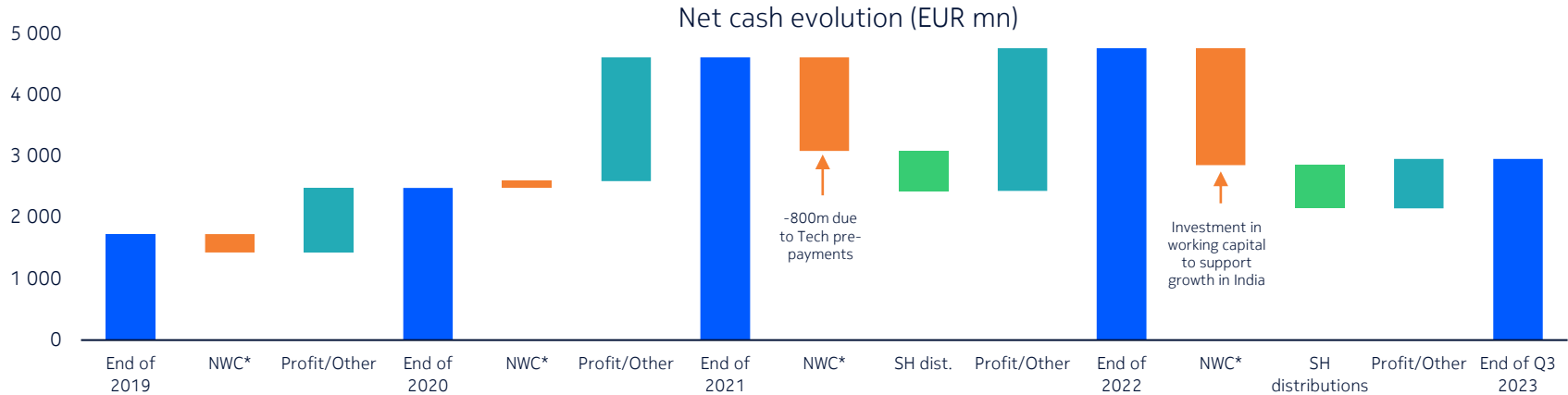
Targeting

10-15%

Net cash as % of net sales

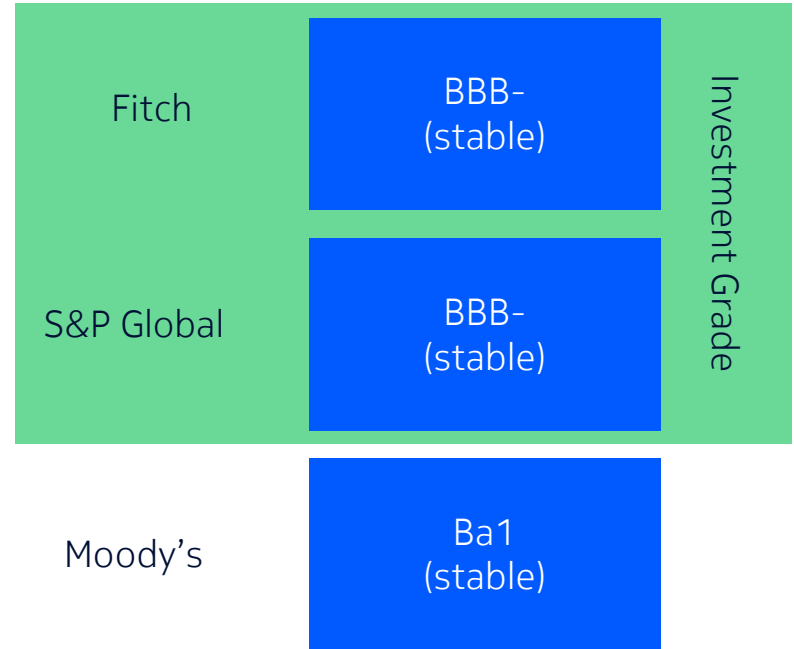
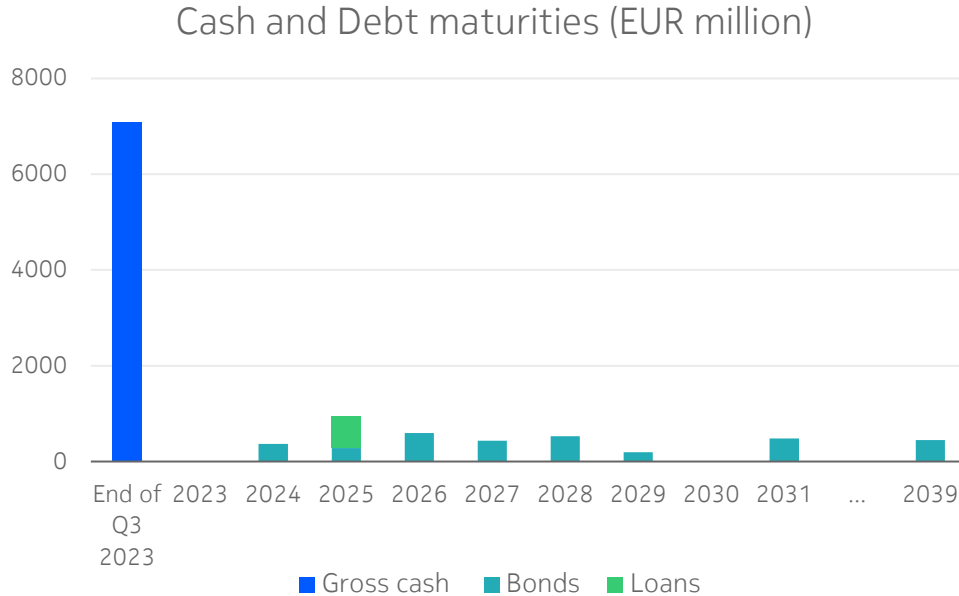
Dividend policy:

target recurring, stable and over time growing ordinary dividend payments, taking into account the previous year's earnings as well as the company's financial position and business outlook

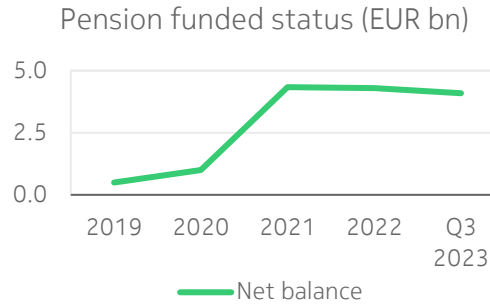
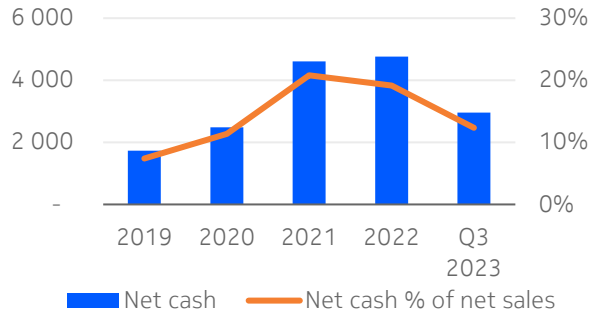


* Excluding restructuring and associated cash flows

Well structured debt profile with investment grade credit rating



A resilient balance sheet with opportunities to create value



Preliminary assumptions for business groups in 2024

Formal guidance to follow in January with Q4 results

| Business Group | Net sales | Operating margin |
|-----------------------------------|--|--------------------------------------|
| Network Infrastructure | Return to mid-single digit growth (all units to contribute) | Largely stable |
| Mobile Networks | Expected to decline (India normalization) | Low single digit |
| Cloud and Network Services | Modest growth | Stable to slightly increasing |
| Nokia Technologies* | | Operating profit more than EUR 1.0bn |

*Assuming conclusion of outstanding litigation/renewal discussions by the end of 2023. If renewal discussions are resolved in 2024, Nokia would expect to benefit from catch-up payments.

Positioning Nokia to create value for shareholders

Steps we have taken to reposition Nokia for a stronger future

1

Transitioned from end-to-end to a Technology Leader

- Spending >EUR 4 bn on R&D a year... significantly improved product competitiveness since 2020
- Bell Labs... benefit from a world leading research organization bringing true innovation
- Investments paying off ... significant market gains across business, especially Optical and Mobile Networks

2

Evolving operating model to maximize value creation

- Operational autonomy... agile business groups that can adapt to fast moving markets
- Strategic flexibility.... Each BG able to make decisions that best fits their markets
- Financial accountability... full control over resources and full visibility to performance of each business

3

Market leading business in Network Infrastructure

- Well placed to return to growth in 2024 ... all units have solid demand drivers
- Silicon investment drives differentiation ... our network processors are industry leading
- Balancing investment with margin progress ... further scale will drive margin expansion

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The background is a solid blue color. On the right side, there is a large white circle containing a 3D abstract graphic of intertwined, flowing lines in shades of red, orange, and blue. A similar but smaller version of this graphic is positioned at the top left, extending from the top edge of the slide.

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Cloud and Network Services Business Update

Raghav Sahgal

December 12, 2023

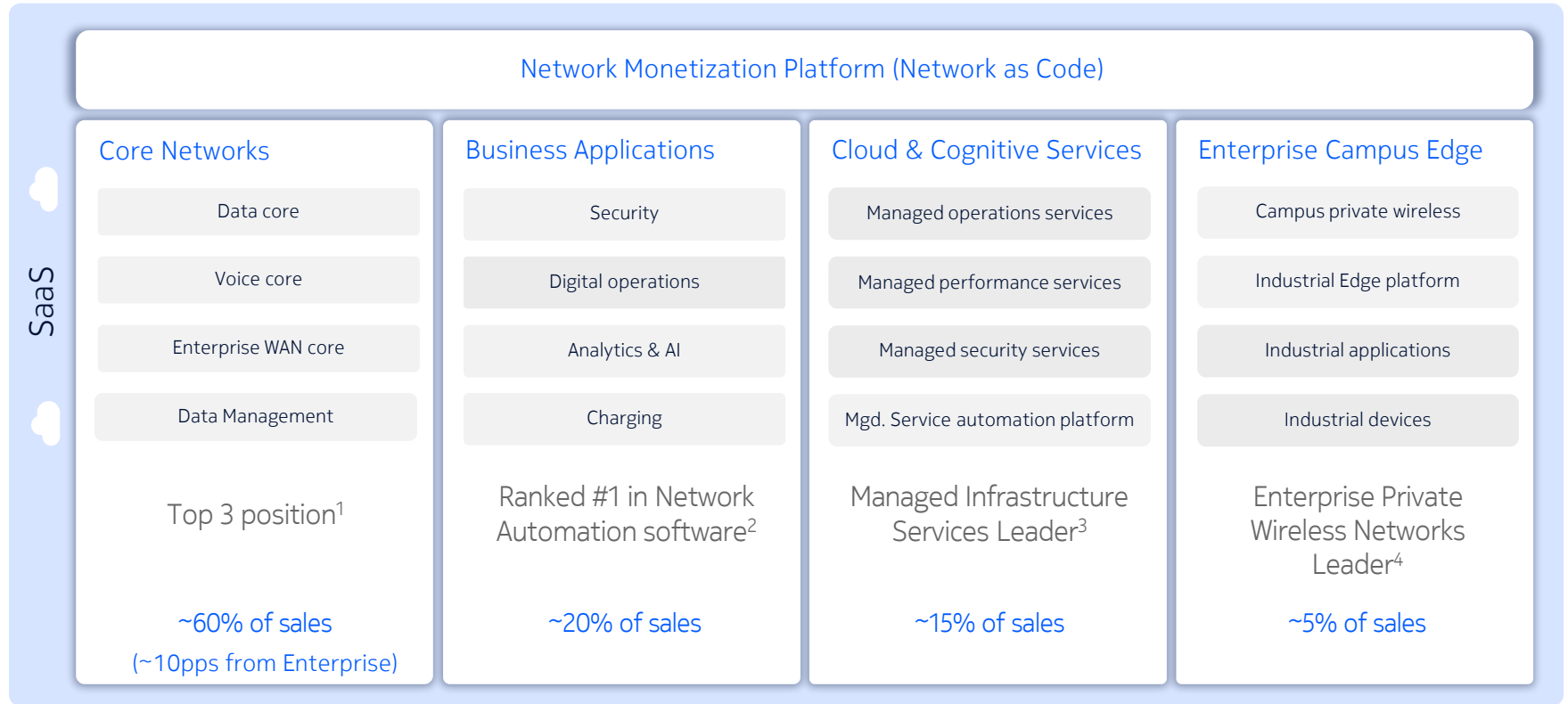
Agenda

1. CNS explained
2. Strategy and investment focus
3. Long term expectations

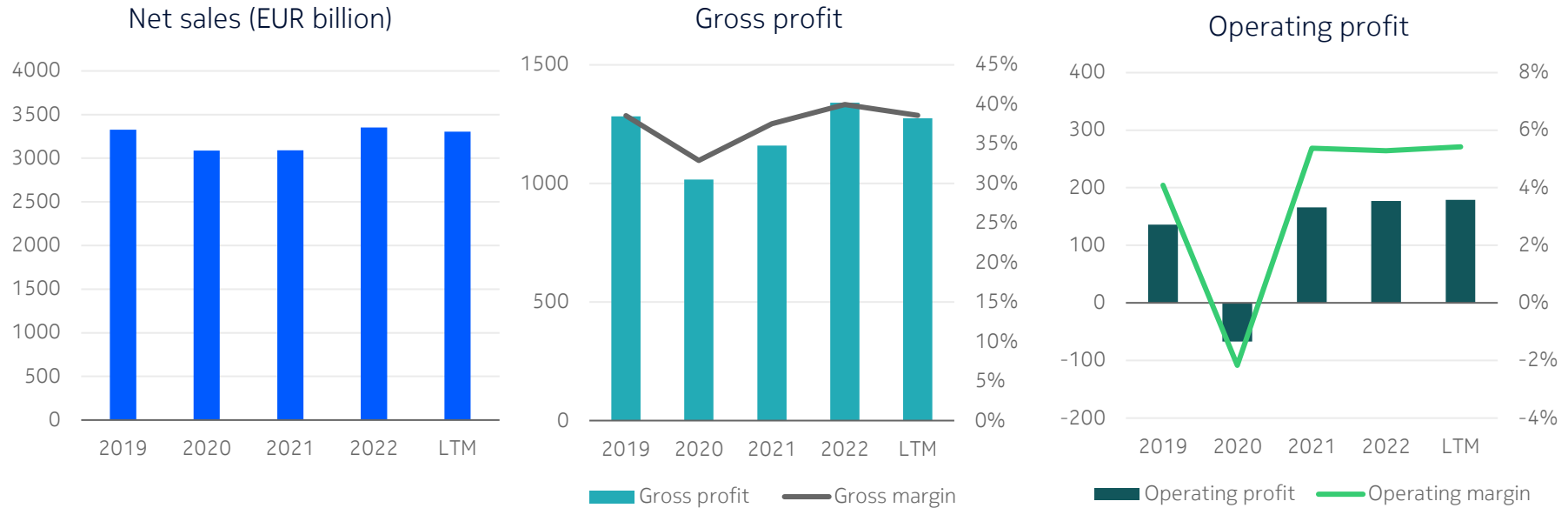
Cloud and Network Services

Software and solutions where networks meet cloud

Cloud and Network Services – organized for growth



Shift to new business models drives growth and margin expansion



Aspiration

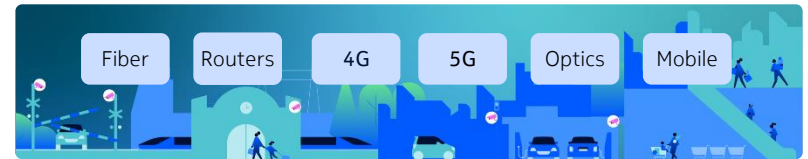
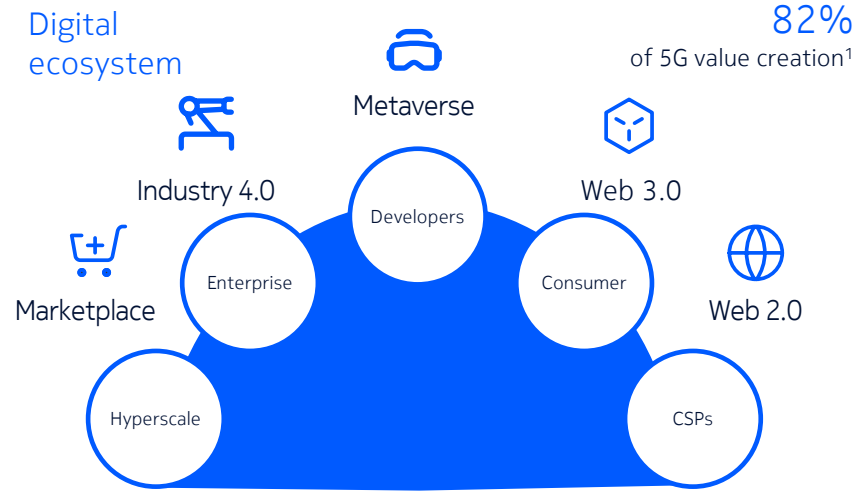
Net sales: Grow faster than market; **Operating margin:** Expand to double-digit operating margin

An analogy to explain Cloud and Network Services

Mobile and Fixed Networks create a road for traffic to use



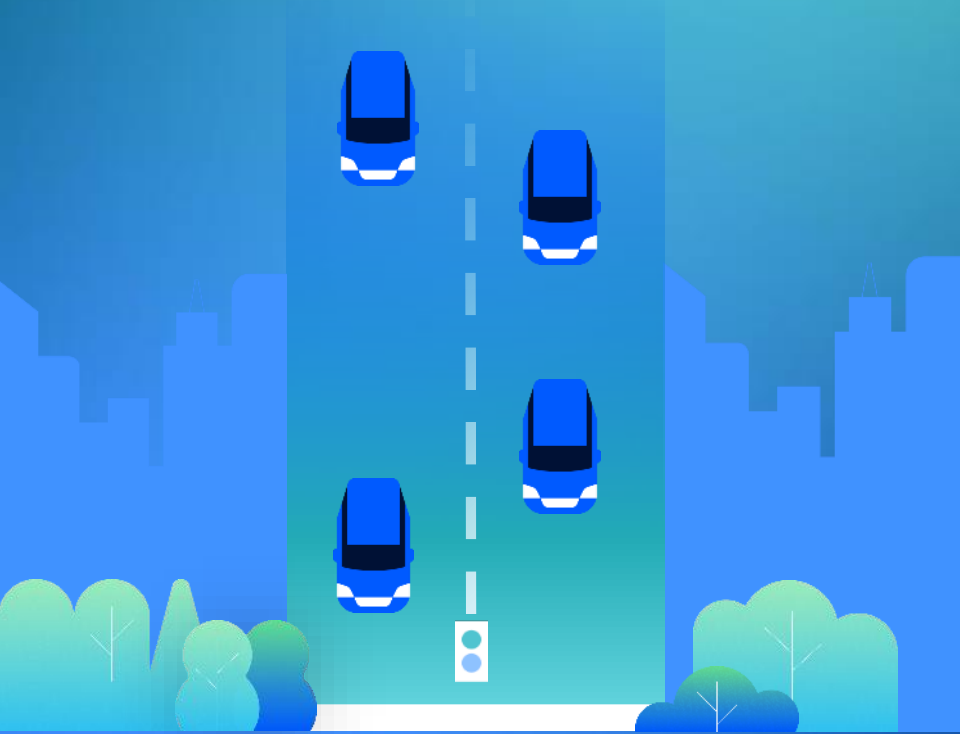
Digital ecosystem



Note 1: Nokia analysis, Gartner 5G value data.

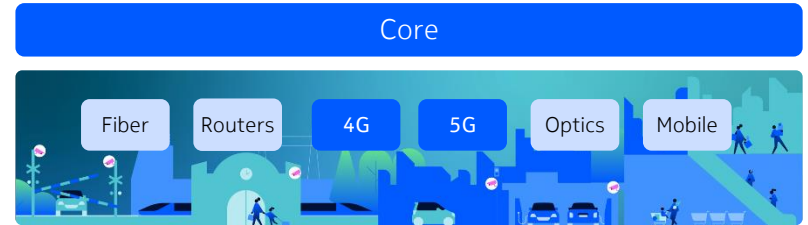
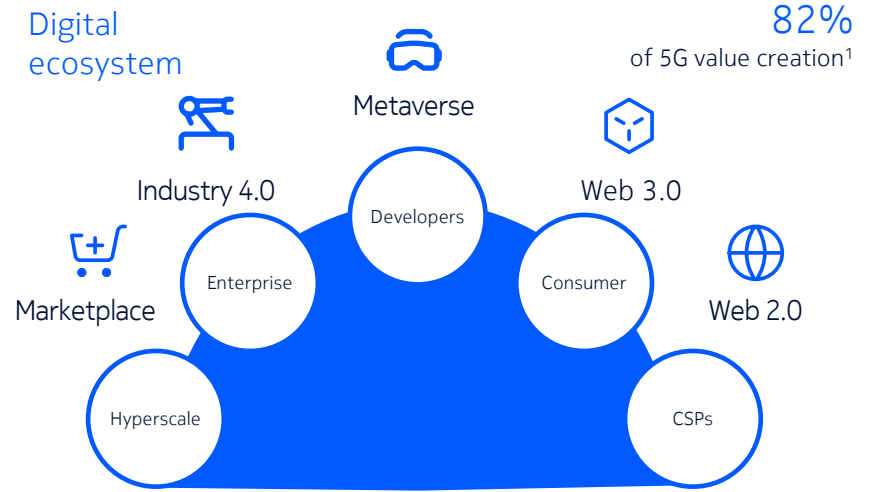
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Core networks add lane markers and traffic lights to prioritize, route and optimize information flow



Core Networks develops cloud-native core 5G software for private, hybrid, or public clouds; available as SaaS

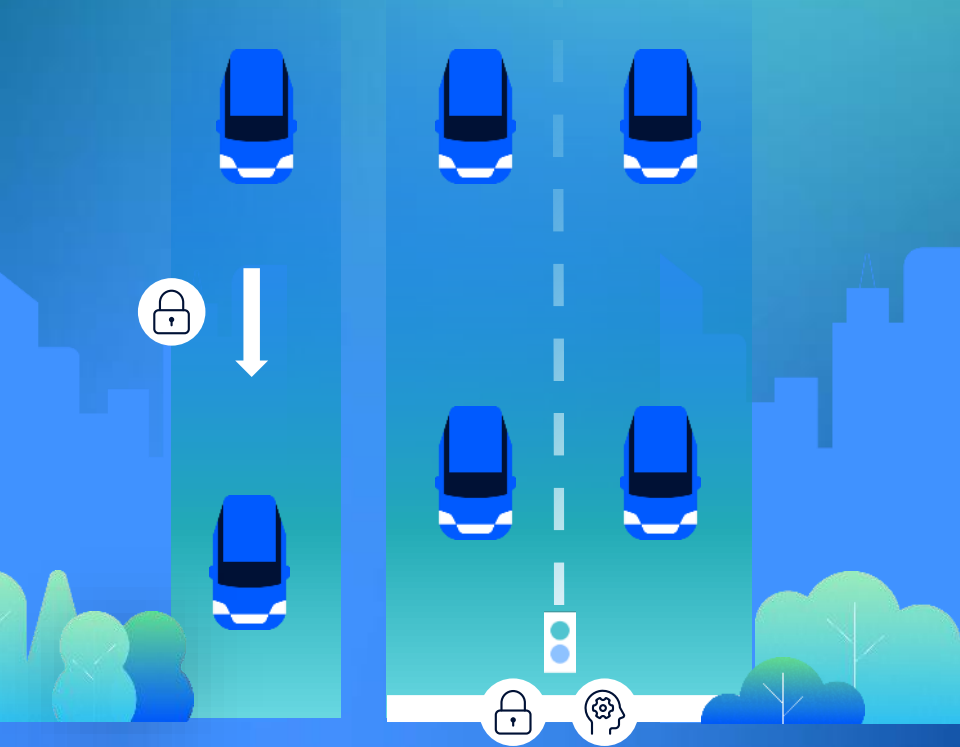
Digital ecosystem



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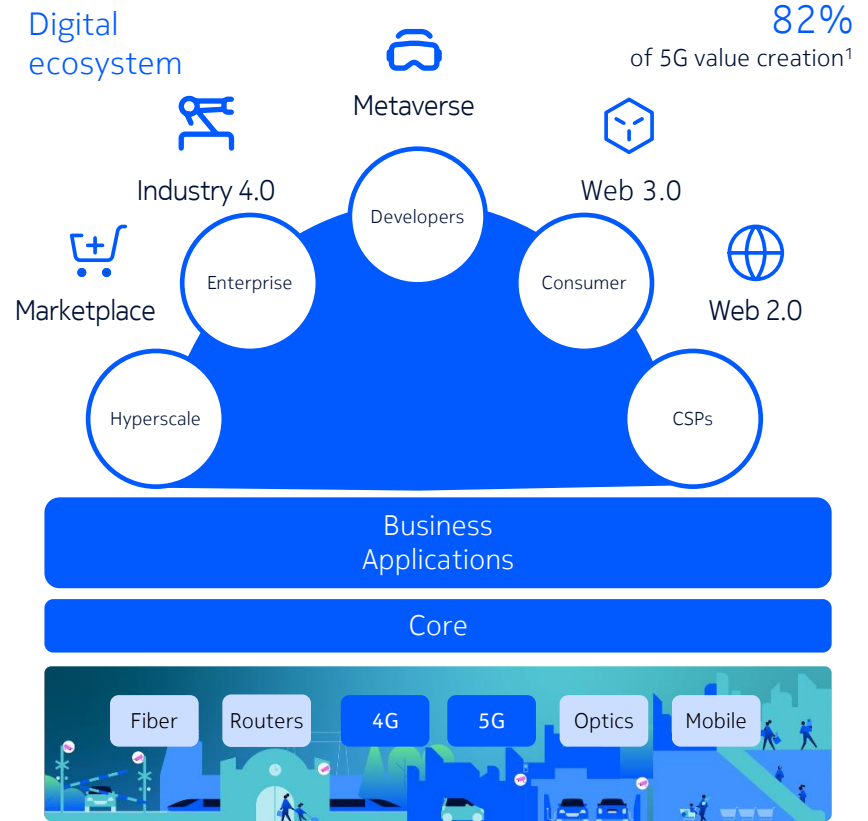
NOKIA

Business Applications improve traffic light timing, coordinate automated HOV/fast lane functions and keep hackers from disrupting traffic



Business Applications uses AI/ML to automate network operations and security; available as SaaS

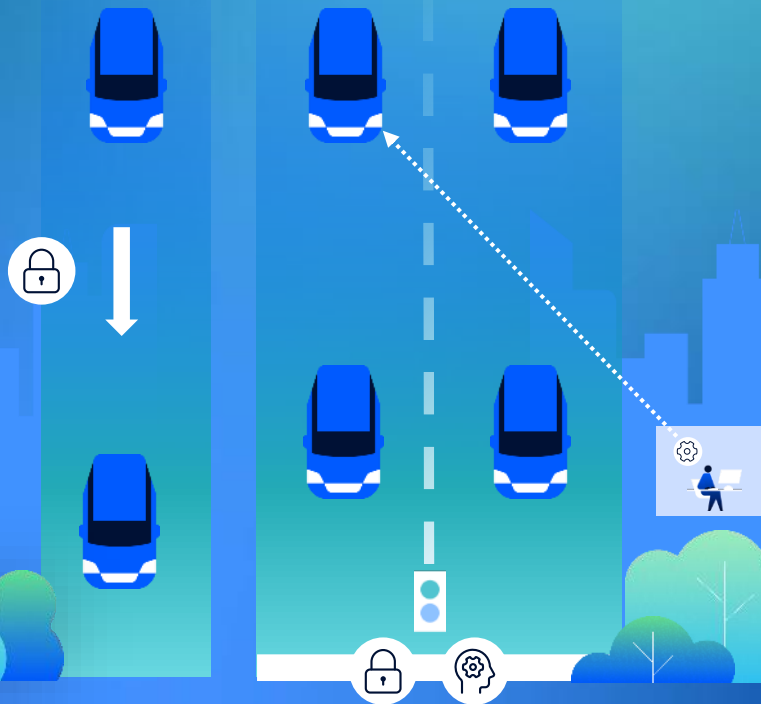
Digital ecosystem



Note 1: Nokia analysis, Gartner 5G value data.

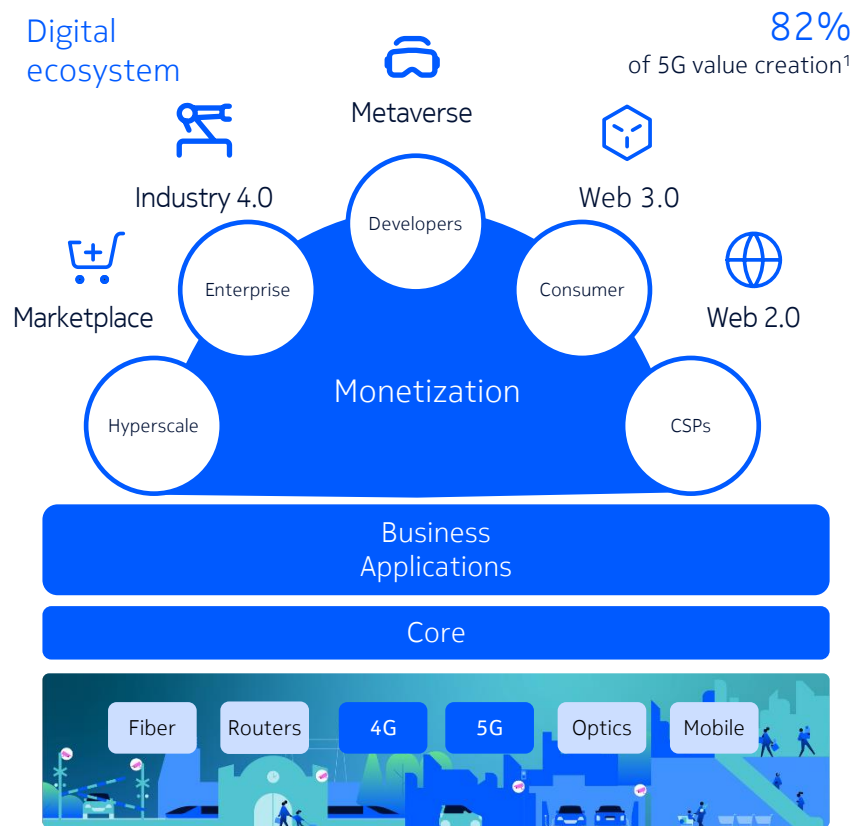
NOKIA

Monetization occurs via application subscription for remote-control of vehicles



Monetization exposes functionality from the network to developers for specialized applications; available as SaaS

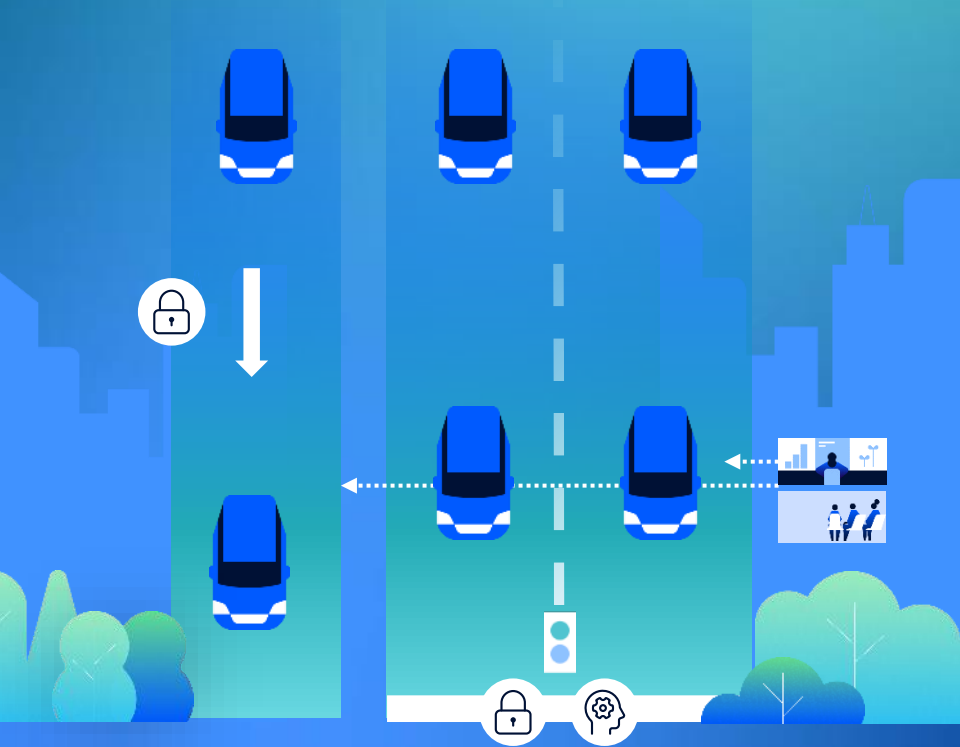
Digital ecosystem



Note 1: Nokia analysis, Gartner 5G value data.

NOKIA

Cloud and Cognitive Services manages infrastructure like contract companies that manage roadways and consult on design

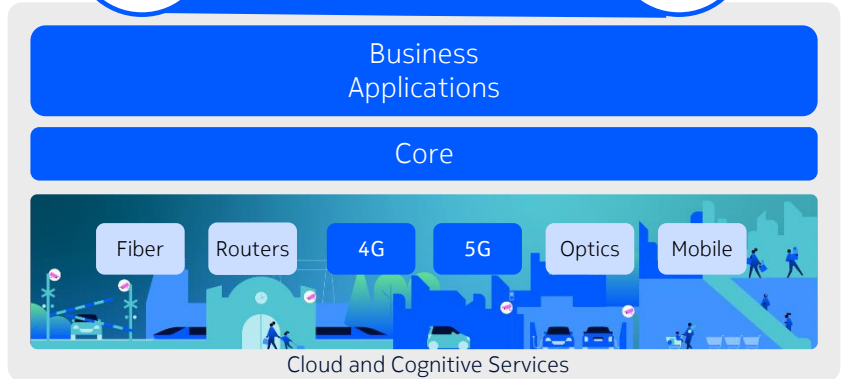
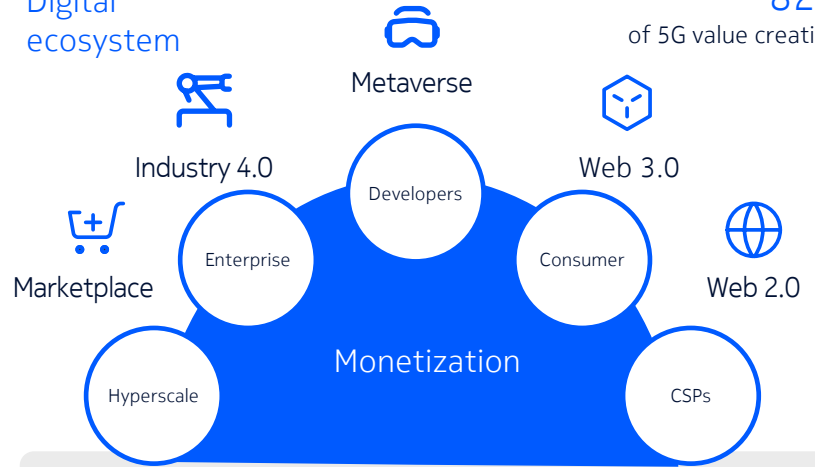


Cloud and Cognitive Services operates and optimizes networks (managed services) including network infrastructure

Digital ecosystem

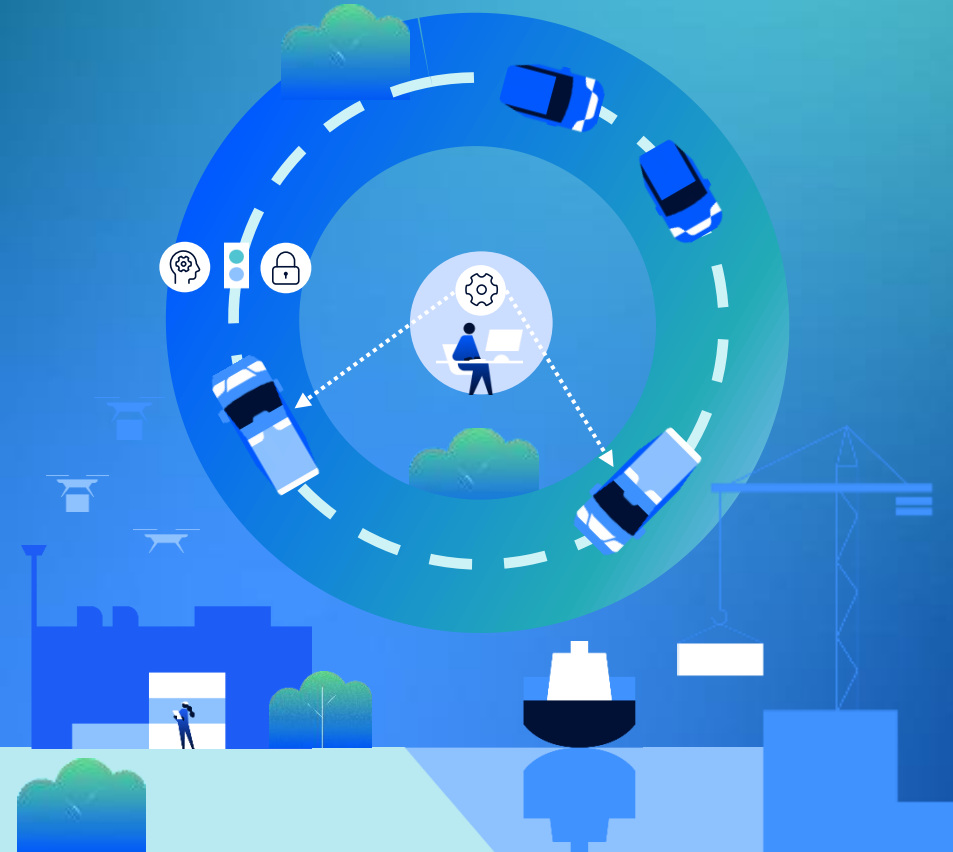
82%

of 5G value creation¹



Note 1: Nokia analysis, Gartner 5G value data.

Enterprise provides safe, efficient private roads for businesses with applications for remote control of vehicles onsite



Enterprise Solutions delivers full edge cloud platform (I/P/SaaS) for private wireless and industrial automation

Industrial digital ecosystem



Note 1: Nokia analysis, Gartner 5G value data.

NOKIA

Investing for growth where networks meet cloud

Capitalizing on the changing landscape

2022 and prior



Connectivity and consumers

- Focus on growth segments
- Rebalance, focus investments
- Digitization and simplification

2023



Capabilities, cloud, and SaaS

- 5G SA and Autonomous Ops
- Enterprise leadership
- SaaS uptake and progress

2024+

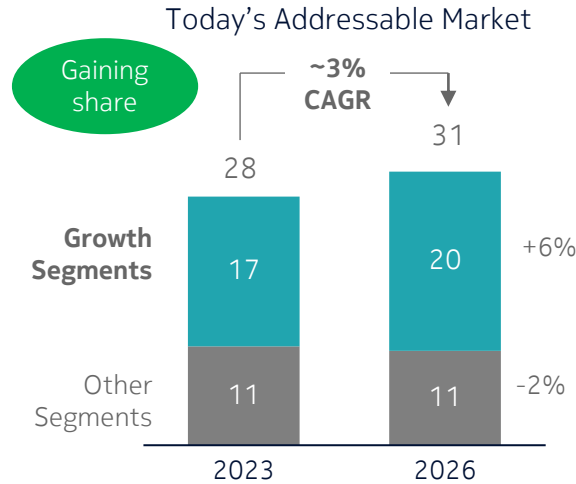


Artificial Intelligence, automation, and APIs

- Beyond connectivity
- Network as Code
- Observability and AI

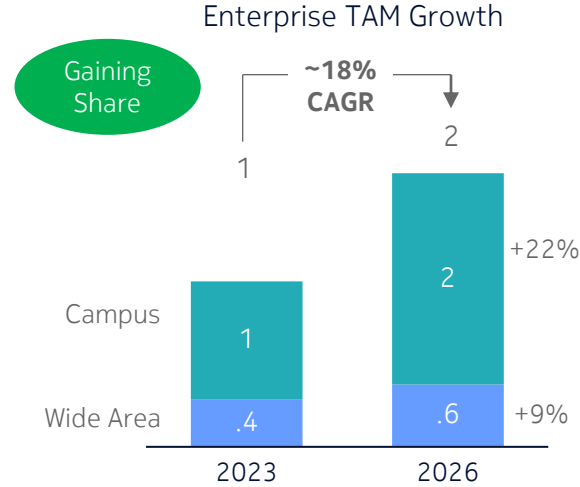
Investing for growth: the CNS opportunity

*Figures in Bn EUR in constant currency

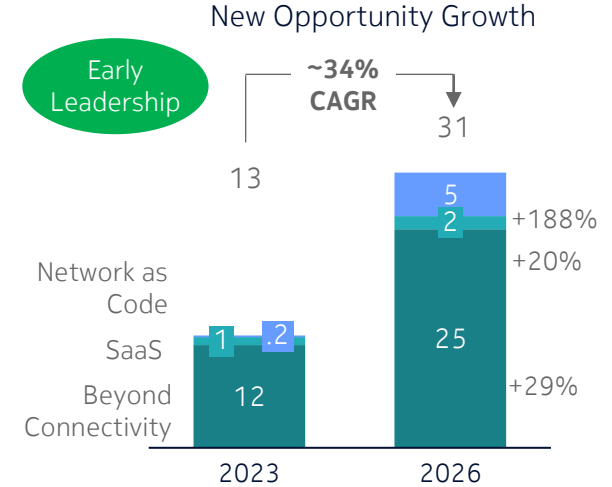


Growth segments: Core, Digital Operations, AI and Analytics, Security, and Private Wireless

CSP headwinds but focused on growth



Unique and recognized leadership



Foundation in place, good customer and analyst feedback

Creating value in Growth Segments

Customer Benefits

New services

through 5G SA and network slicing
(5G core)

30%

energy savings with no performance impact
(AI and analytics)

40%

issues resolved with no human intervention
(digital operations)

35%

efficiency gain through automated security
(security)

Nokia Benefits

1.5x-2.0x

sales growth vs. market
(2023)

Cost

reduction with modernized portfolio

50+

5G SA Core customer project backlog

55%

increase in “strategic” relationships

CNS Solution and Position

- ✓ Top 3 in most growth segments
- ✓ Award-winning applications
- ✓ 500+ security engagements
- ✓ 5G SA leadership / experience
- ✓ AI-based energy efficiency
- ✓ 675+ private wireless clients

Creating value in Enterprise Private Wireless (PW)

Customer Benefits

Productivity

improvement with asset tracking / status

10x

fewer access points vs. Wi-Fi
(mining)

Safety

improved for workers and end users

25%

decrease in cycle time for AGVs
(manufacturing)

Nokia Benefits

>1.6x

book to bill with strong pipeline coverage
(campus)

25%+

sales growth expect in the coming years
(campus)

Larger

long-term deals with generational shifts
(wide area)

60%+

of sales transacting with indirect channel
(campus)

CNS Solution and Position

- ✓ #1 position; 30% share (est.)
- ✓ 675+ enterprise clients
- ✓ 100s of 5G SA clients
- ✓ Network as a Service (campus)
- ✓ Digital Automation Cloud
- ✓ NEW: Core Enterprise Solution

Creating value Beyond Connectivity

Customer Benefits

Compatibility

between OT protocols and public cloud

GenAI

first OT compliant solution on the market

20+

3rd party industrial apps on edge platform

OT-Grade

Wi-Fi at the edge with competitive price point

Nokia Benefits

Platform

based economics and revenue share (15%)

High margin

applications with connectivity

Broader

sales coverage with platform partners

Stickiness

as customers acquire additional services

CNS Solution and Position

- ✓ First, unique in market
- ✓ Mission critical edge / μ edge
- ✓ NEW: Integrated 4G/5G/Wi-Fi
- ✓ NEW: MX-Boost – Bell Labs
- ✓ NEW: Nokia Digital Twins
- ✓ Nokia Drone Networks

Creating value in Software as a Service

Customer Benefits

3 hours

to instantiated core network vs. 3 months

60%

reduction in first-year costs
(AVA EE)

Risk

reduction if uptake of new services is light

70%

faster interoperability testing
(iSIM)

Nokia Benefits

3X, 3X, 2X

target for ARR growth in coming years

25+%

target operating margin at scale

30-50%

increase in speed from order-to-fulfillment

Credibility

as technology and business model leader

CNS Solution and Position

- ✓ 8 SaaS services
- ✓ 30+ SaaS clients
- ✓ FIRST – Core as a Service win
- ✓ Strong security certifications
- ✓ Engaged with main webscalers
- ✓ Platform for Network as Code

Creating value in Network as Code (NaC)

CSP Benefits

Monetization

of advanced 4G and 5G capabilities

Simple

solution attracts enterprise developers

Participation

in the digital ecosystem

Improved

margins from next gen CPaaS services

Nokia Benefits

Increases 5G

revenue with monetization solved

Capital

friendly, measured investment approach

Developer

access and engagement

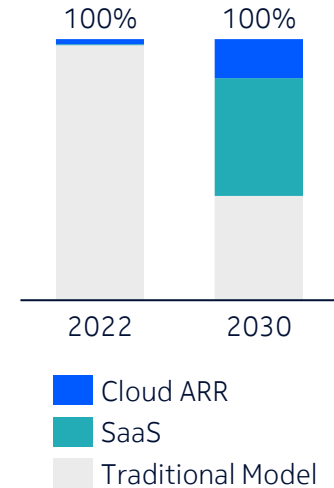
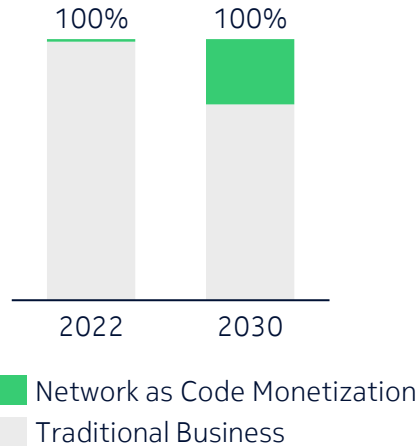
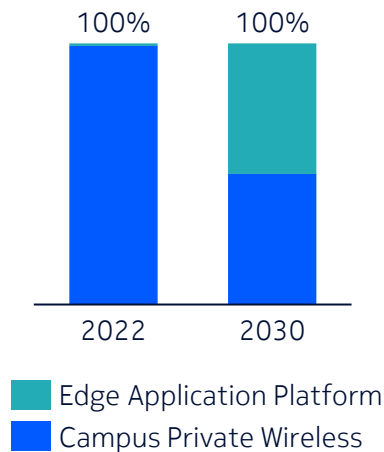
Platform

economics as aggregator

CNS Solution and Position

- ✓ NEW: NaC Platform launched
- ✓ 10+ CSP client engagements
- ✓ Acknowledged leadership
- ✓ Advanced 4G/5G only, no legacy
- ✓ Drone demo – Enterprise + NaC
- ✓ Enterprise client access

Holding our longer-term value creation aspirations



By 2030 about half of campus revenue will come from our edge platform (Mission Critical Industrial Edge)

By 2030 about a quarter of CNS revenue will be generated through new monetization of the digital ecosystem

By 2030 more than half of CNS revenue will be generated through as-a-service models

Note: Categories not fully mutually exclusive

Critical technology investment areas that drive our business

Observability



Edge and
Micro-Edge



Artificial
Intelligence



Continued growth focus where networks meet cloud

1

Growing faster than fastest growing segments of the market

2

Rapidly expanding our position in enterprise connectivity and beyond

3

Building new business models with SaaS and Network as Code

4

Developing ESG into a competitive advantage for Nokia and for the industry

5

Actively managing our portfolio

NOKIA

Update on Mobile Networks

Tommi Uitto

President of Nokia Mobile Networks

The Nokia logo is positioned on the right side of the slide, centered vertically. It is enclosed within a large, white, stylized arrow shape that points to the left. The background of the slide is a gradient of blue, transitioning from a darker shade at the top to a lighter shade at the bottom.

NOKIA

AT&T confirms Nokia's strong RAN technology and engagement

“Nokia has highly competitive products and services in Radio Access Networks (RAN) and an accomplished R&D shop. I’ve always valued our close engagement.”

Chris Sambar, EVP Networks, AT&T



Agenda

1. Market dynamics

2. Mobile Networks progress and positioning

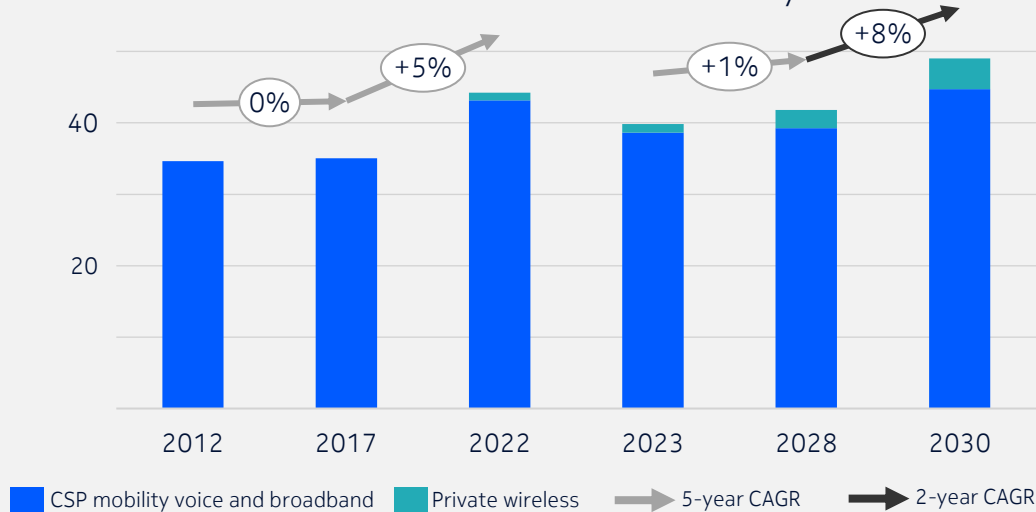
3. Revamped strategy to capture long-term opportunities

4. Key take-aways

Market dynamics

Despite short-term market challenges, long-term demand for high-performance radio technology remains

Radio technology product and services market in 2022 €bn constant currency*



Overall Mobile Networks market growth 2023-2026

1% CAGR

(2023: €44bn** 2026: €46bn**)

Private Wireless Networks market growth 2023-2028

~21% CAGR

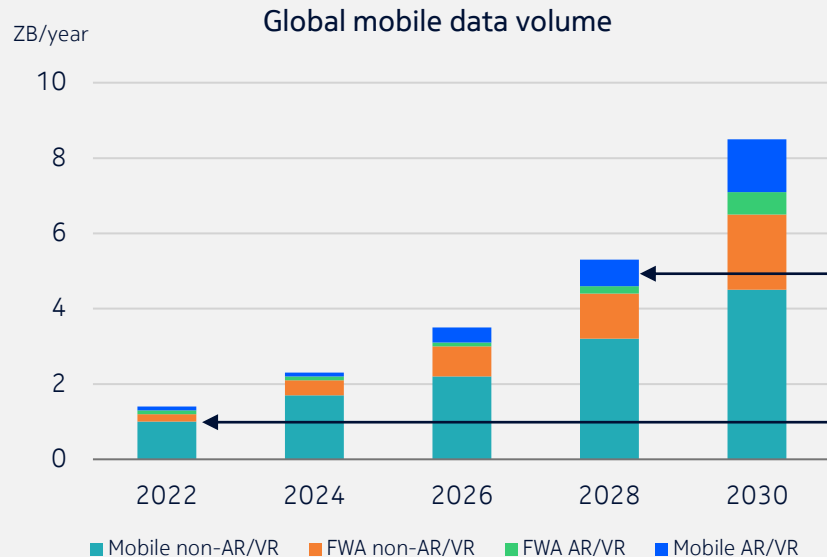
* Market excluding China and Russia. Actual currency EUR values for market figures before 2022.

** Assuming end of October FX rates persist for future years

Traffic growth requires new spectrum and 6G technology by 2030

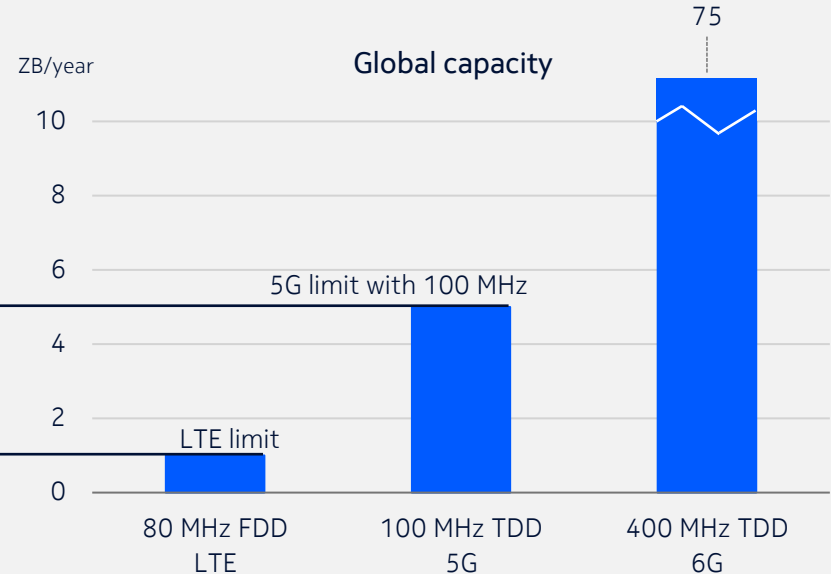
Organic mobility traffic growth + Fixed Wireless Access (FWA) + AR/VR in CSP networks

5x Global mobile network traffic by 2030



*Enterprise traffic not included

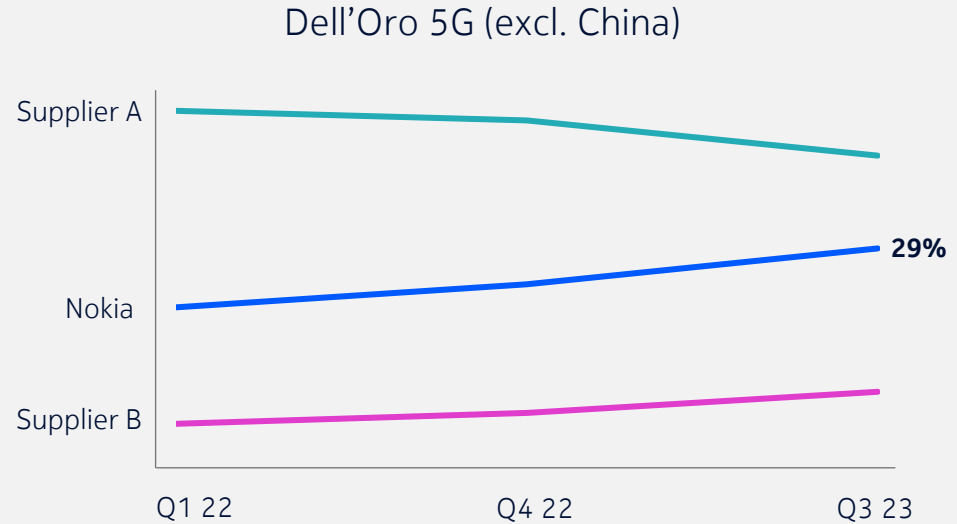
Estimated global radio capacity



Mobile Networks progress and positioning

Nokia has continued to gain 5G RAN market share

Since Q1 2022 Nokia has increased its 5G RAN market share (excluding China) faster than any competitor



Source: Dell'Oro group inc., Mobile RAN quarterly report 3Q23 (rolling 4Q)

We have won 47 new CSP customers since early 2019

47 new RAN customers



+21 non-public



Increased RAN share with 31 customers



+13 non-public



Enterprise customers worldwide trust our innovation and performance for their mission-critical networks

675+

Private wireless
customers
in total

112

Transport



159

Energy



142

Manufacturing
& supply chain



176

Government & cities



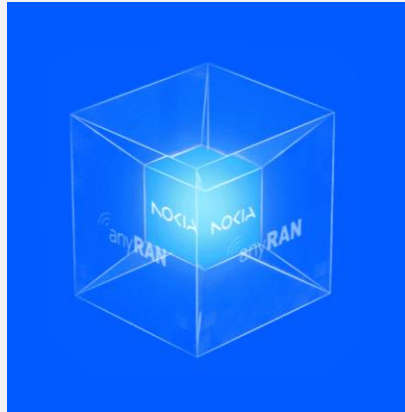
87

Other industries



145+ out of these
with 5G

We continue to invest in R&D and develop market-leading products for our customers



Collaborative advantage
with leading cloud infrastructure
and computing hardware
suppliers

High-capacity
AirScale Massive
MIMO radios powered
by ReefShark SoC



Ultra-performance
AirScale Baseband
powered by
ReefShark SoC



Wavence microwave
transport for
cost-effective
critical networks



AI/ML-powered
MantaRay portfolio
for network
management and
optimization



AI/ML-powered
services with digital
twins and analytics
tools



Energy efficiency built
into the entire
portfolio incl. site
solutions



Mobile Networks continues to demonstrate technology leadership

Selected highlights from 2023

Capacity



Industry first **5G carrier aggregation** combining 5 TDD and FDD carriers in sub-6 GHz (5CC CA) network

Range



Nokia hits extended range **mmWave 5G speed record** in Finland of more than 2 Gbps over a distance of almost 11 km

Distance



Nokia Wavence microwave products can increase typical E-band (80 GHz) link distances by up 50%

Nokia's holistic approach to ESG enables a more sustainable, safe and productive world



Repeatedly recognized as one of the **World's Most Ethical Companies** by Ethisphere



Boosting **circularity** in Egypt and Africa with UNIDO and Orange



Nokia Oulu factory: **250% increase in output**, with the same resources and energy consumption



Nokia's AirScale 5G BTS **power consumption has been reduced by up to 50 percent***



~120 **Senior Leader Safety tours**, tripling our target for the year

Leading industry analyst firms recognize our leadership

Selected quotes from 2023



“We rank Nokia as one of the top innovation and implementation leaders in our **ORAN** Competitive Assessment. It is actively engaging with key mobile operators and research groups with PoCs, testing, and deployments of ORAN.”

Open RAN vendor assessment, Competitive Ranking 11/2023



“Nokia’s portfolio of RAN solutions has no weaknesses, but it is less extensive than the portfolios of the other two leaders. **Baseband** is one of the vendor’s key strengths.”

Market Landscape, RAN Vendors 05/2023



“Nokia’s broad product refresh heading into 2H23 indicates the company is full speed ahead on capturing new market share and driven to reassert itself in the 5G landscape as both an **innovator and market leader.**”

Nokia launches ultra-performance AirScale baseband¹.06/2023



“Nokia was on the offensive in 2023, putting its earlier woes behind it and pointing to new products as illustrative that its current **chipsets** represent an area of strength for the vendor.”

5G RAN Competitive Landscape 08/2023

Sources: ¹IDC Link: Nokia Seeks to Ride Momentum Into 5G Advanced Era Through A Comprehensive AirScale Refresh. Doc No. #ICUS50998323 (June 28, 2023)

Revamped strategy to capture long-term opportunities

Mobile Networks revamps strategy, streamlines operational model and takes action to protect profitability and R&D output

Re-baselining operations for resiliency and profitability

- Sustainable cost structures to meet new market reality
- Focus on back-office processes and functions
- ~80% of the cost run rate improvements by end of 2025
- Protected R&D output and commitment to technology leadership

Driving productivity and efficiency via new ways of working

- Further adopt AI, automation, and remotization in service delivery
- Increased R&D productivity through Generative AI
- Optimized supply chain cost efficiency

Renewing go-to-market model to accelerate strategy execution

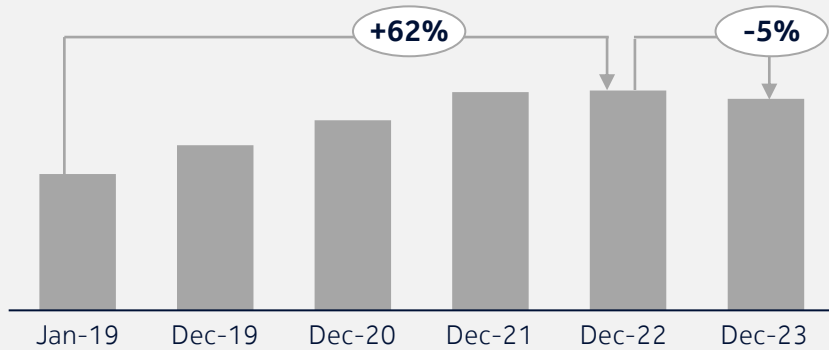
- Integrated decision-making and cross-functional collaboration from R&D to Sales bringing us closer to our customers to meet their needs
- Faster strategy execution to diversify to non-CSP segments
- Higher Sales & Marketing efficiency

Optimizing commercial performance and capabilities

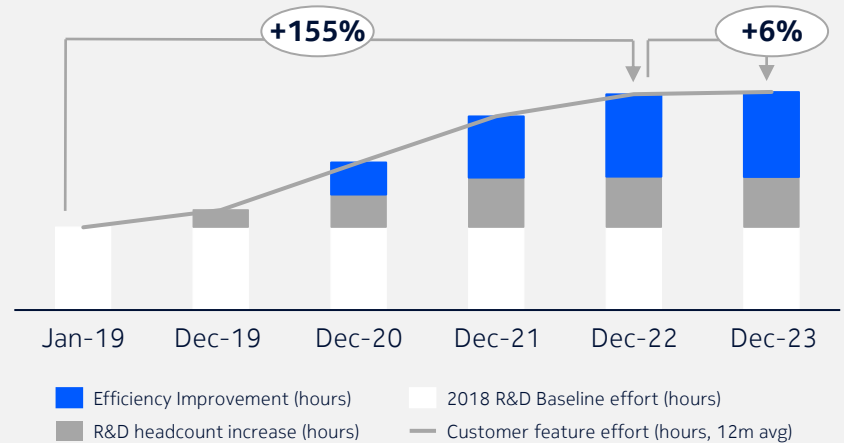
- Increased focus on profitability, building on market share growth
- Pricing based on portfolio value
- Improved commercial performance and contract structures
- Best-in-class internal commercial capabilities

We made significant progress throughout 2019 – 2023 increasing R&D output and productivity, while managing costs

RAN 5G R&D headcount

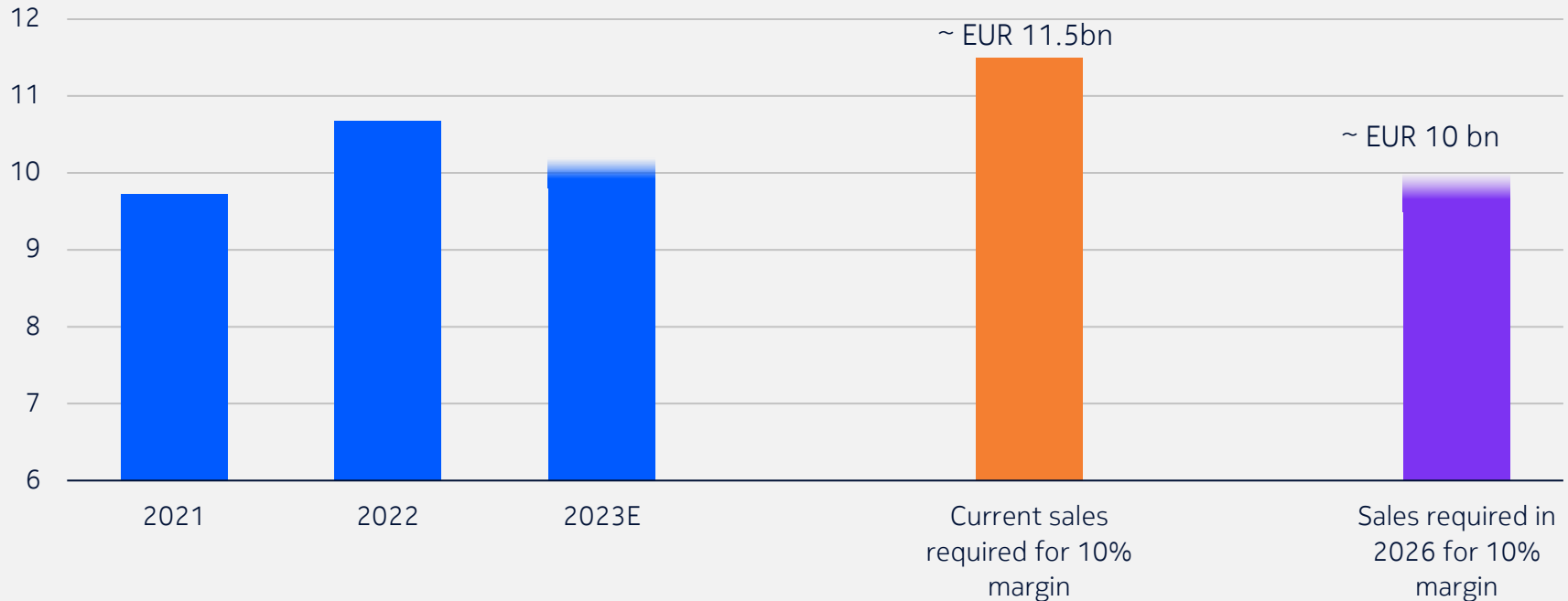


Increase in 5G R&D output

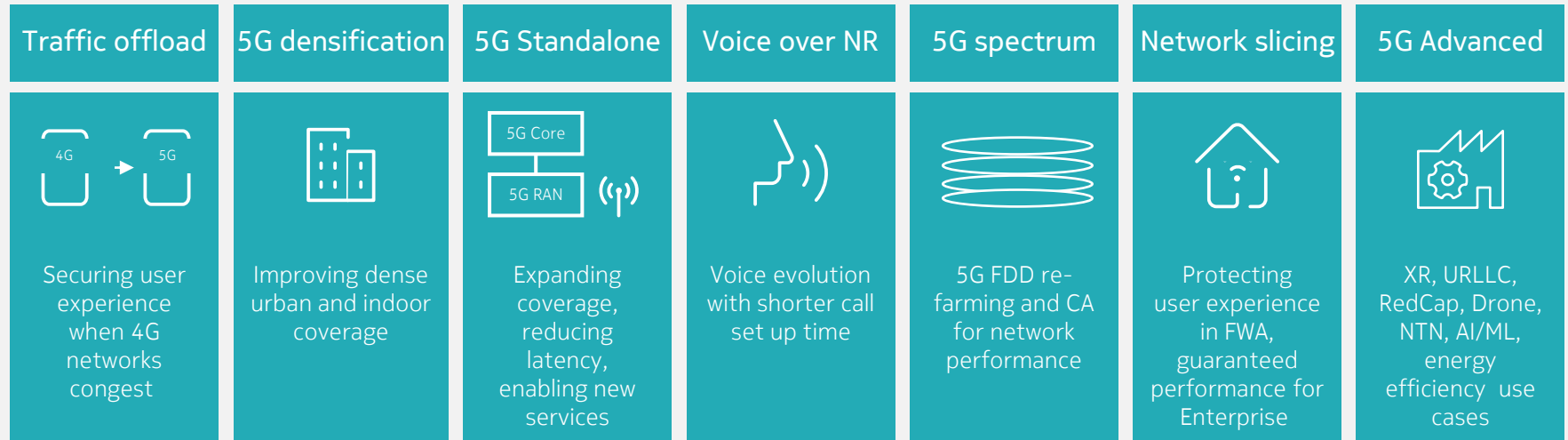


Cost reduction and profitability improvement program reduces sales volume required for 10% margin by ~€1.5 bn to ~€10 bn

Program started, ~80% run rate improvements targeted to be delivered by end of 2025



We invest in key technology capabilities to help our CSP customers monetize their mobile network investments



Developing new sales channel for Private Wireless via partnerships with Cisco, HPE/Athonet and Microsoft Azure

Expand Private Wireless customer reach with new partnerships



Mobile Networks will increase Private Wireless sales by providing Enterprise customers more flexibility and choice through:

- Strategic partnerships with leading vendors to Enterprise.
- Go-to-market with them and their MSP, VAR and SI partners.
- Nokia Mobile Networks brings RAN expertise and technology leadership
- Agile organization, fast time-to-market and turn-around
- Enterprise focused interoperability testing and joint solutioning

Accelerate Cloud RAN adoption by collaborating with hyperscalers and server makers



Lead Private Wireless in Campus Wireless and WAN with end-to-end solution



Leveraging 3GPP leadership to become an established radio technology provider in the defense communications market

Nokia will address three defense domains

Strategic

Permanent defense infrastructure



Wide Area and Data Center Networking

- Routing and data centers
- Optical and Microwave transmission

Operative

Deployed forward base operations



Private wireless for home and operational bases

- 5G smart bases and wide area coverage
- Private wireless

Tactical

Connected operations



Tactical 4G/5G communications

- New segment
- Deployable private wireless
- Operations communications
- Tactical multi-platform and satellite

MN is well positioned to grow

- Market leader in 3GPP private wireless.
- Mission critical RAN in commercial use today.
- Optimized offering for defense communications.
- Pursuing 3GPP adoption with international and national defense organizations.

Nokia to acquire Fenix Group, strengthening our offering to defense segment



Nokia proudly returns as Deutsche Telekom's supplier in Germany with proven Cloud RAN and O-RAN capabilities

“Open RAN is crucial to Deutsche Telekom’s strategy to promote greater supplier diversity and accelerate customer-oriented innovation in the radio access network. Our commercial deployment with Nokia and Fujitsu is an important step to prepare multi-vendor Open RAN as the technology of choice for future networks.”

Claudia Nemat

Board member for Technology and Innovation,
Deutsche Telekom AG



Nokia leads commercialization of high-performance Open RAN and Cloud RAN



Nokia deploys energy-efficient multi-vendor Open RAN 5G network with NTT Docomo of Japan



Making strides in collaboration with other top operators and ecosystem partners



Nokia completed inter-operability with radios from five different suppliers using the O-RAN 7-2x compliant interface

Key take-aways

Despite short-term market challenges, long-term demand for high-performance radio access technology remains

We are investing in new growth in Private Wireless for enterprise and defense, Cloud RAN and Open RAN

Cost reduction and profitability improvement program reduces sales volume required for 10% margin by €1.5 bn to €10 bn

As the #2 wireless supplier globally*, Nokia is strongly positioned to capture market opportunities in CSP, Enterprise and Defense segments

*excl. China

NOKIA