



NOKIA

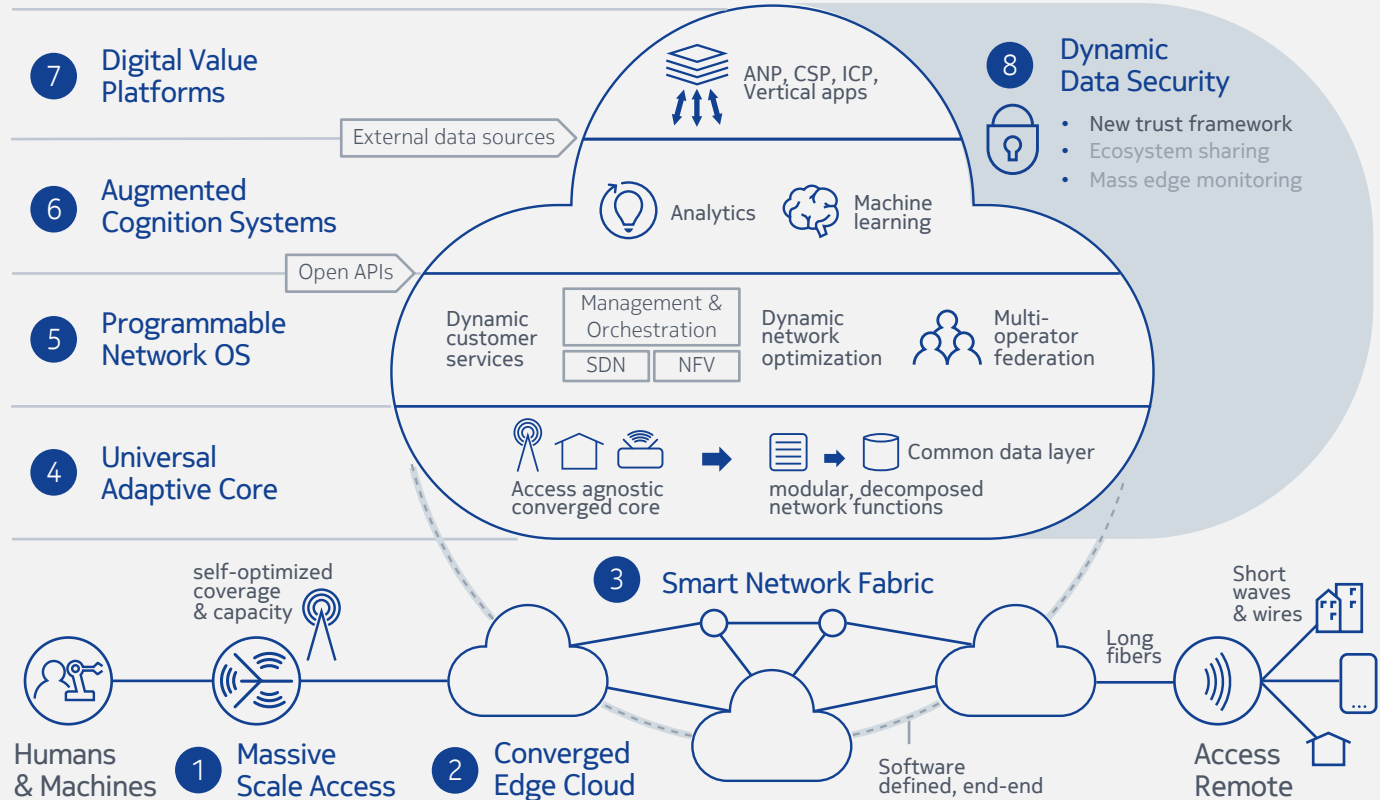
# Ultra Broadband Networks

Creating value through Fixed Networks

Federico Guillén  
President, Fixed Networks

# Nokia Bell Labs Future X

A clear vision  
of how  
networks  
need to  
evolve



# Fixed Networks



Primary investment domain



Secondary investment domain

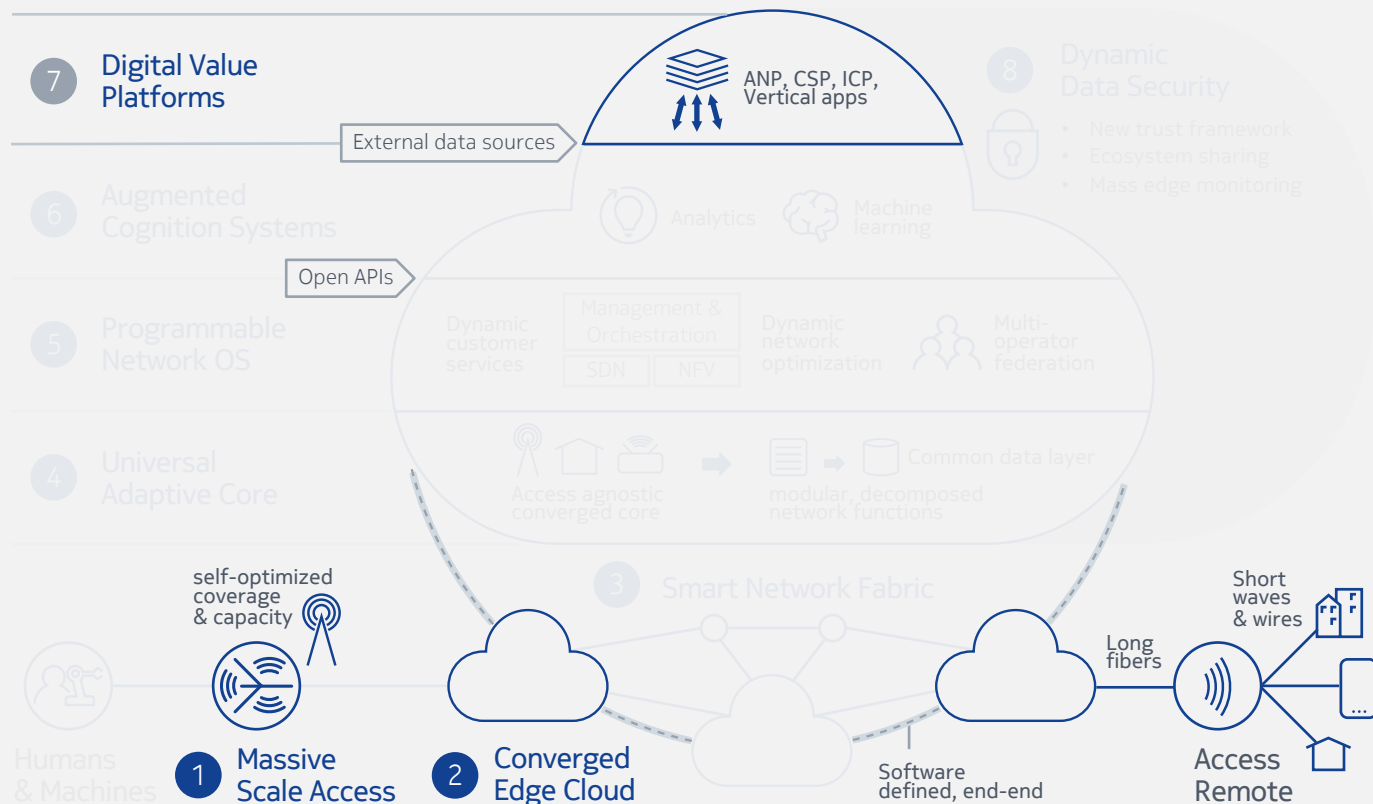
## Business Group vision

- Massive scale ubiquitous access
- Fiber-like speed over any media
- Flexible software-defined access
- Helping CSPs beyond pure connectivity

## Current Portfolio Focus

1 2 7

- Advanced Copper, Fiber and Coax access
- Virtualized access solutions
- Access network transformation services
- Smart Home
- Residential CPE



# Fixed Networks at a Glance

18

out of the largest 20  
communication service  
providers as customers

€8.7bn

2016 primary  
addressable market

*Source: Nokia estimate*

First

Vectoring  
Vplus  
G.fast  
XG-FAST  
XG-CABLE  
Universal NG-PON

#2

Fiber 34% share  
excluding China  
(#3 in China)

*Source: Dell'Oro*

#1

Copper  
46% share

*Source: Dell'Oro*

#2

Services  
20% share

*Source: Nokia estimate*

# Two market drivers: Ultra-Broadband for all and Gigabit

Penetration

30Mbps

Minimum for  
Universal e-health,  
E-learning, triple play

100Mbps

2020 target for  
universal e-health,  
e-learning, triple  
play

1 Gbps

Reality today  
Marketing,  
disruption  
Business services

10 Gbps

Residential  
marketing  
Business services  
Mobile transport

100 Gbps

The future?

Speed

“Fiber to the most  
economical point”:  
The key to the  
operator’s  
business case

FTTX

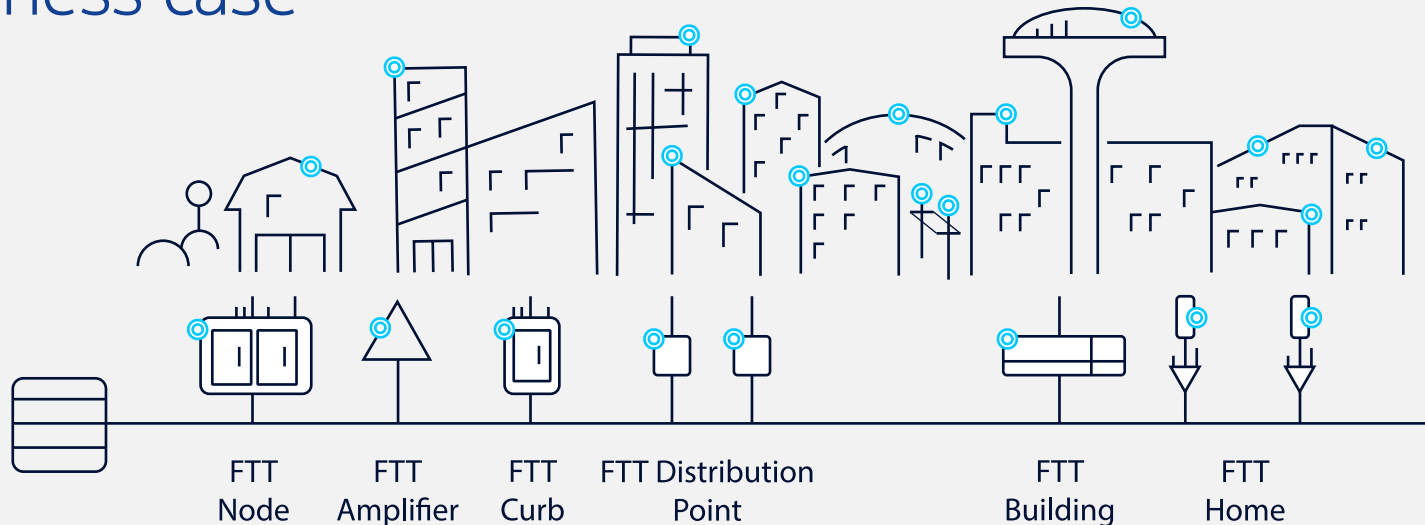
GPON/EPON, P2P  
Vectoring, G.fast, Vplus  
TWDM/XGS-PON, 10G  
EPON, DOCSIS 3.0, 3.1,  
Symmetrical



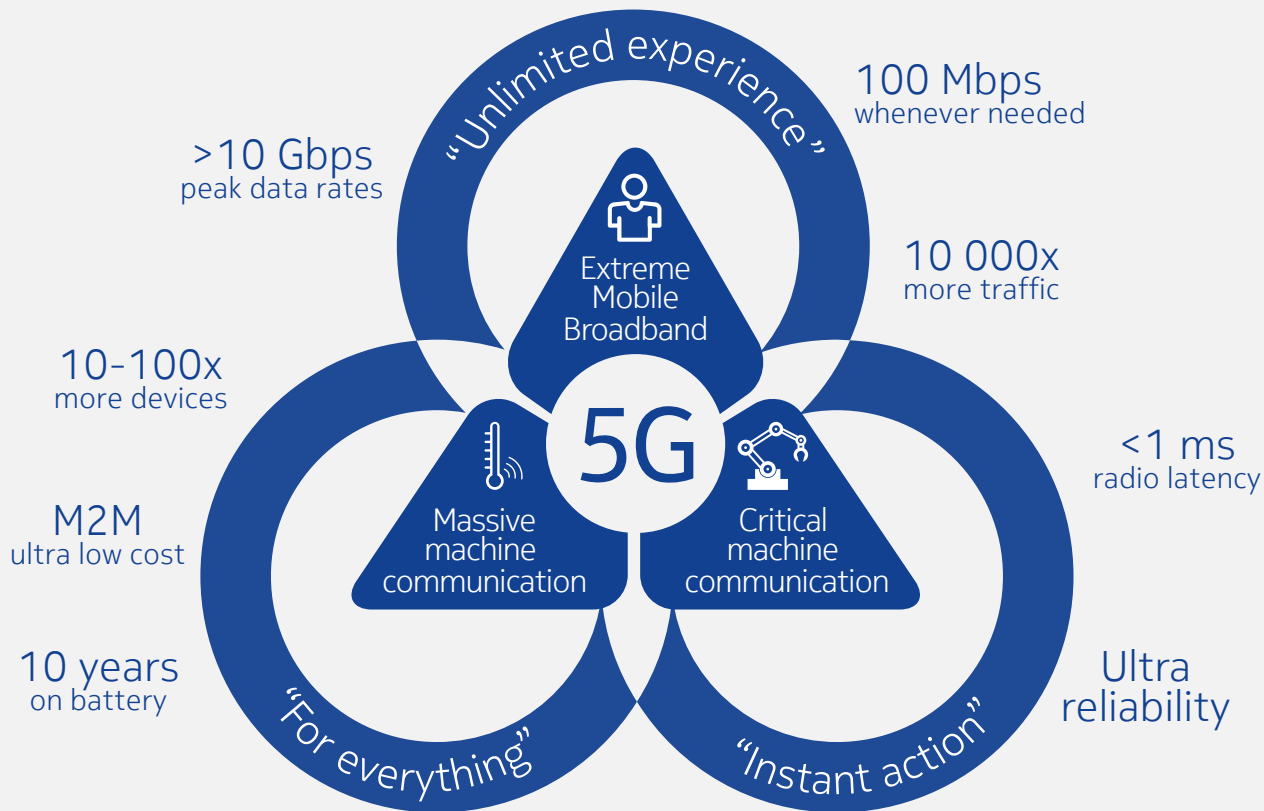
XG-FAST

XG-CABLE

XLG-PON



# 5G will change everything

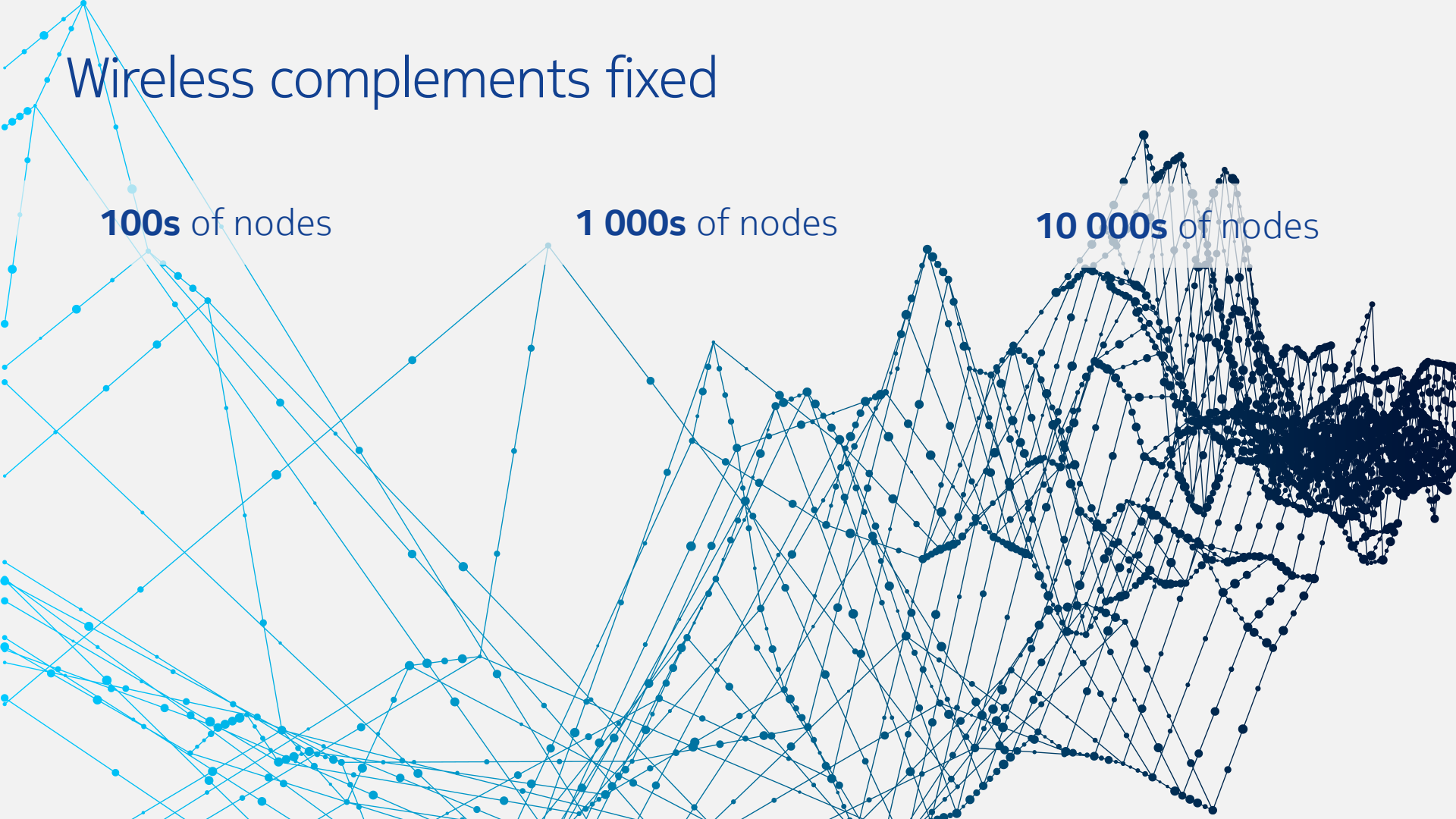


# Wireless complements fixed

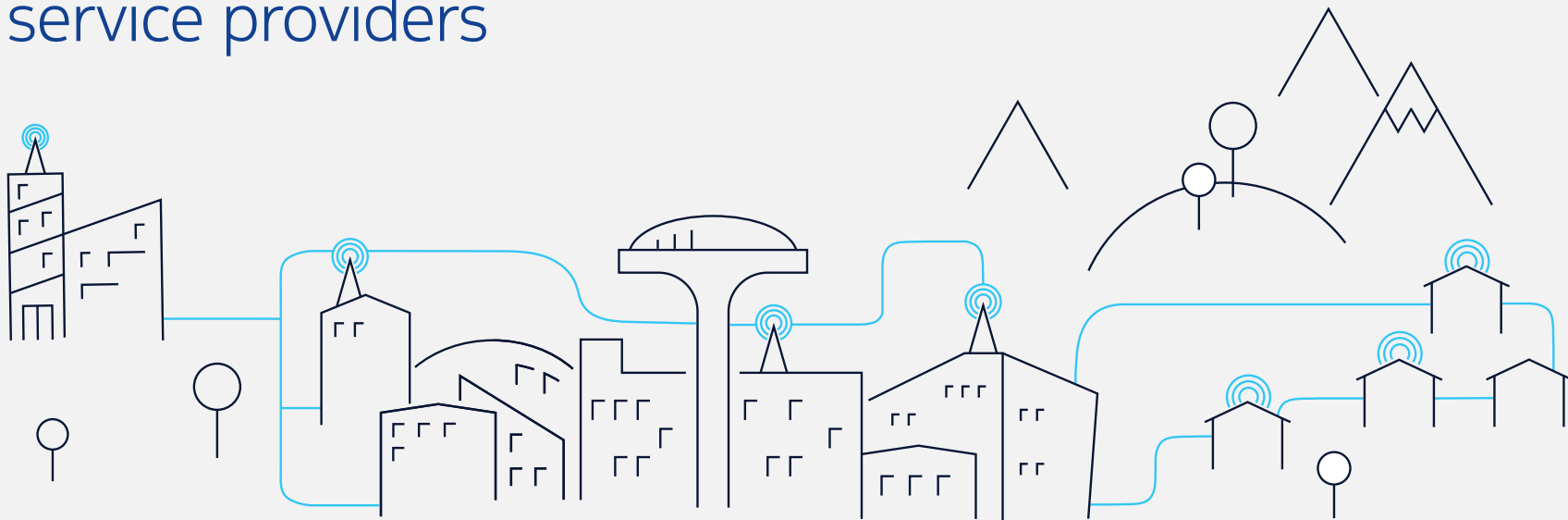
**100s** of nodes

**1 000s** of nodes

**10 000s** of nodes



# Addressing the needs of converged communication service providers



## Mobile Transport

Fixed networks for backhaul/midhaul, especially for smart cells

## Hybrid access

Boost peak speeds with hybrid fixed/LTE CPE; instant activation; resilience & troubleshooting

## Fixed Wireless

Fixed wireless LTE as primary broadband connectivity in hard to serve areas; 5GTTTH in ultra-dense urban areas, and for fast initial coverage

# Wireless completes the ultra-broadband access portfolio

FTTX

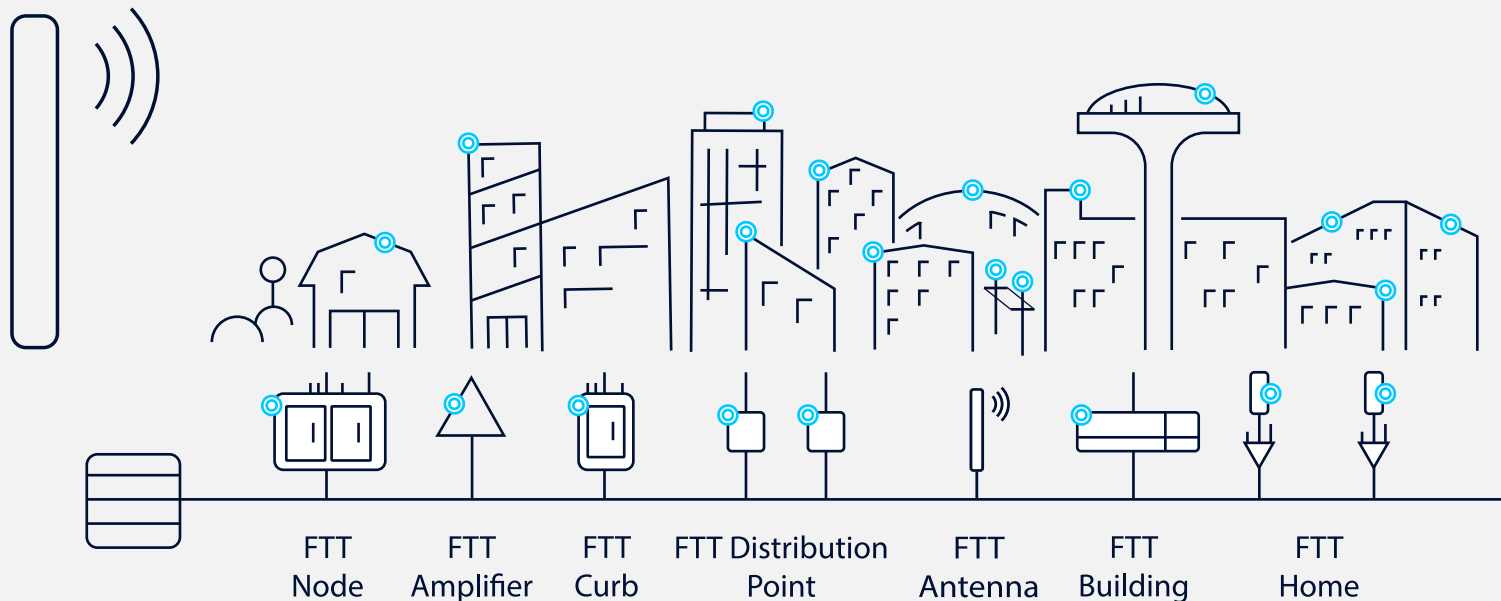
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Symmetrical



XG-FAST

XG-CABLE

XLG-PON



# Foundation: Technology Depth & Innovation

## Solutions

- G.fast and Vectoring ASIC and technology
- PON platform and evolution path
- Unified Cable Access Solution (fiber and Virtual Converged Cable Access Platform)

## Technology innovation

- XG FAST
- XG CABLE
- XLG PON
- Virtualization & Software Defined Networks

## Services

- World class PSTN and Broadband transformation processes and tools

# Our Strategy rests on three pillars

**Maintain  
leadership**  
in primary market

**Grow**  
in adjacent markets  
Cable, Enterprise  
verticals, Digital Home

**Best-in-class**  
operational efficiency

# Fixed Networks: Primary market

#2 Excluding China

#1

#2

## Fiber

**Goal:** Become #2 world-wide

Lead the transition to 10Gbps through innovation (universal next gen PON solution)

Grow market share in China, Japan and Korea

## Copper

Maintain leadership through technology innovation (Vectoring, Vplus, G.fast)

Grow in tier 2/3 operators in the US

Gain market share in North America, Europe, Asia-Pacific and Latin America

## Services

Lead PSTN transformation wave, speed up fiber rollout initiatives, and grow maintenance

Become reference in Professional Services for SDN and Virtualization

# Fixed Networks: Attractive adjacencies

## Cable

**Goal:** Become #3 by 2021 and #2 by 2025 in Cable Access leveraging Virtualization and distributed Access Architecture path (Gainspeed)

Gain market share in North America, Europe, Asia-Pacific and Latin America

## Enterprise

**Goal:** Reach #1 or #2 position in Passive Optical LAN market

## Digital home

Includes the whole home: WiFi, Video and IoT and smart home

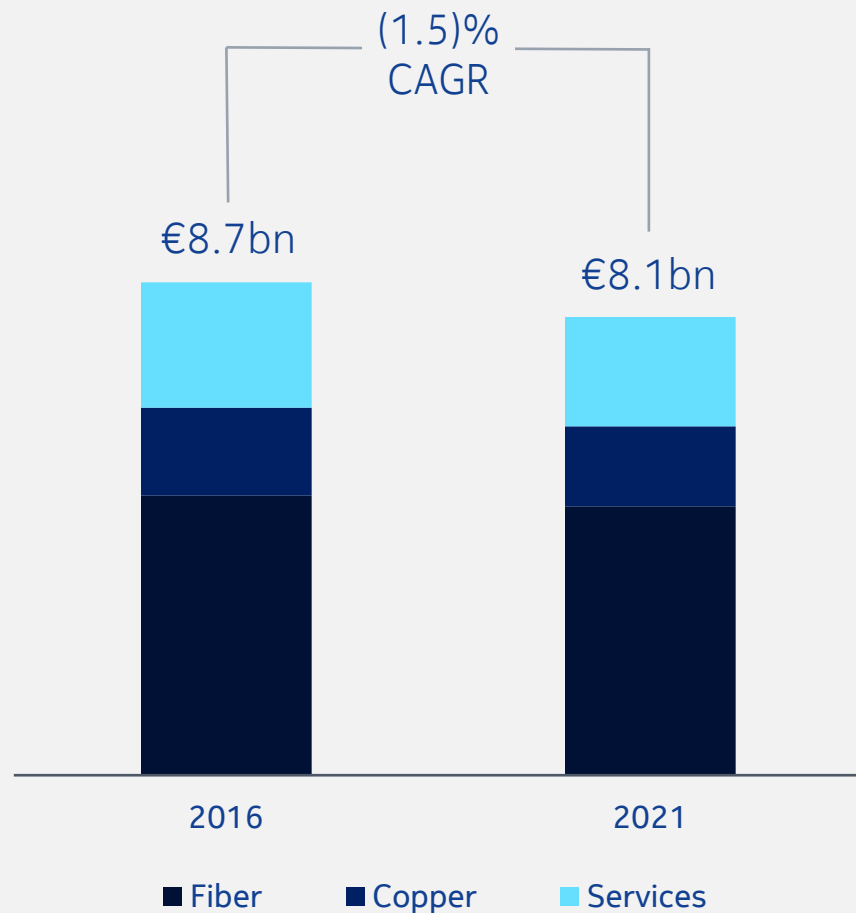
# Fixed Networks

## Primary market outlook

### Primary market:

- Fiber Access Solutions (Infra and CPEs)
- Copper Access Solutions (Infra)
- Product attached Services

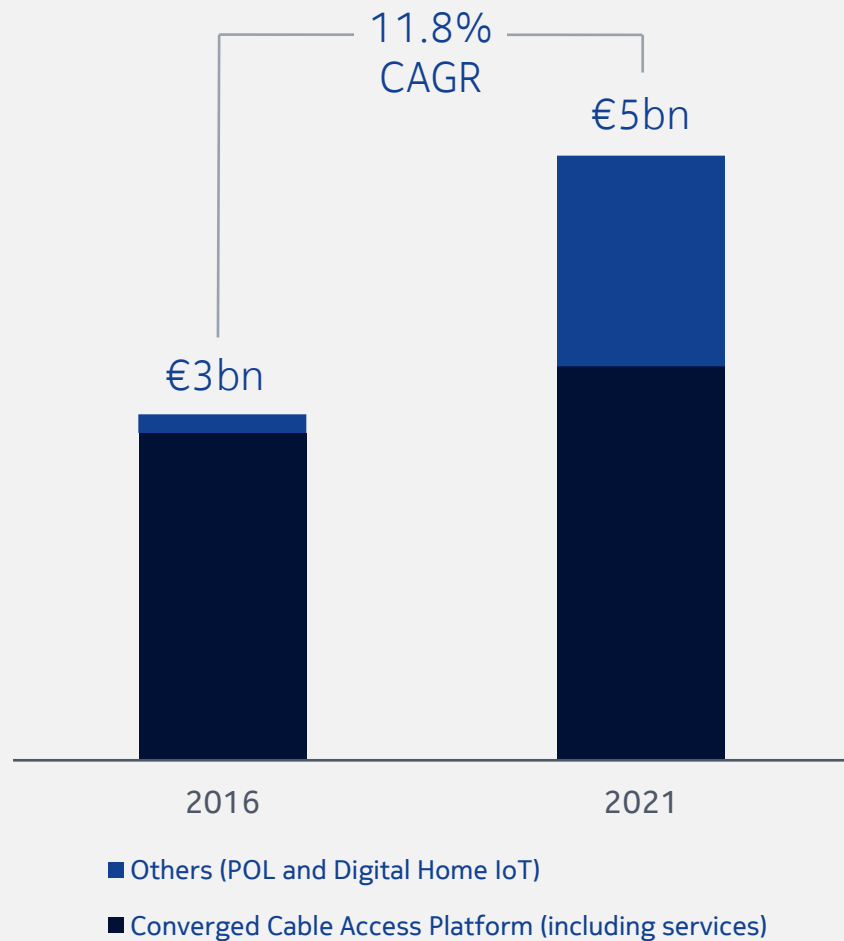
Source: Nokia estimate



# Fixed Networks

Market outlook for  
Attractive adjacencies

Source: Nokia estimate



# Fixed Networks: Higher returns through focused growth

Required investments already factored into long-term guidance

## Disciplined expansion and diversification

Primary  
market

Attractive  
adjacencies



€8.7bn in 2016

5-year CAGR (1.5)%

€3bn in 2016

5-year CAGR 11.8%



## Strong long-term business model

Net sales:

Grow faster than the primary market

Long-term  
operating margin:

Maintain double digits

Fixed Networks

Nokia will achieve the EUR 1.2 billion cost savings target

Adopt Nokia  
Business  
System

Best in class  
cost

Industry-  
leading  
efficiency  
ratios

# Fixed Networks

## Looking forward

# 2016



- Growth, driven by increased spend by key customers
- First next generation copper and fiber deployments
- First Passive Optical LAN wins, first Virtual CCAP trials

# 2017



- Strong 2016 makes year-on-year growth challenging
- First cable customers with Gainspeed product family

# 2018



- Growth resulting from focused investments in Cable, Enterprise and Digital Home.
- Growth in primary market supported by universal ultra-broadband and countries and cities moving to gigabit services.

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The image shows a perspective view down a modern, curved subway tunnel. The walls are made of bright orange, curved panels, and the floor is composed of light-colored square tiles. Several people are walking through the tunnel, their figures blurred to suggest movement. A large, semi-transparent 'NOI' logo is centered over the image. The tunnel appears to be part of a larger transit system, with a glass-enclosed area visible at the far end.