Advanced Connectivity & the Leap to Intelligent Services
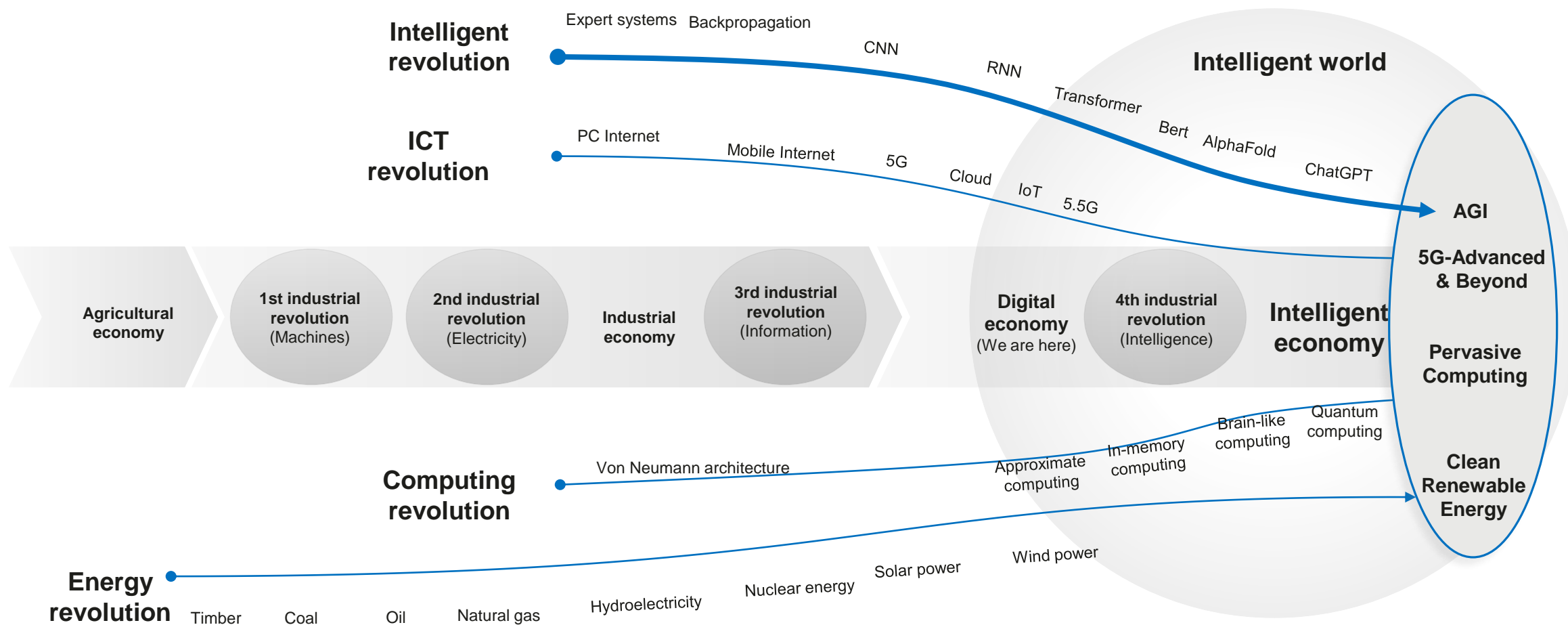
Keynote presentation for: InfoCom World 2024, Digital Greece: Time for a Leap!

Building a Fully Connected, Intelligent World

HUAWEI

We are Rapidly Entering an Age of "All Intelligence"
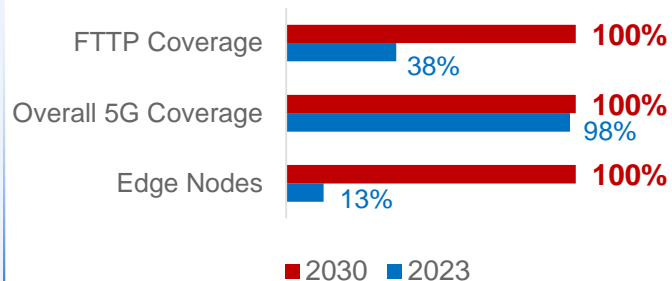## Connectivity + Computing + AI are the Pillars of Tomorrow

Intelligent revolution: Expert systems · Backpropagation · CNN · RNN · Transformer · Bert · AlphaFold · ChatGPT

ICT revolution: PC Internet · Mobile Internet · 5G · Cloud · IoT · 5.5G

Intelligent world · **Intelligent economy**

AGI · **5G-Advanced & Beyond** · **Pervasive Computing** · **Clean Renewable Energy**

Agricultural economy → 1st industrial revolution (Machines) → 2nd industrial revolution (Electricity) → Industrial economy → 3rd industrial revolution (Information) → Digital economy (We are here) → 4th industrial revolution (Intelligence)

Computing revolution: Von Neumann architecture · Approximate computing · In-memory computing · Brain-like computing · Quantum computing

Energy revolution: Timber · Coal · Oil · Natural gas · Hydroelectricity · Nuclear energy · Solar power · Wind power

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Working Towards a **Digital**, **Intelligent** & **Green** Greece

GREECE DIGITAL DECADE

Government Skills Infrastructures Business

Digital Infrastructure

FTTP Coverage	**100%** / 38%
Overall 5G Coverage	**100%** / 98%
Edge Nodes	**100%** / 13%

■ 2030 ■ 2023

Digital Enterprises

Digital Intensity	**88%** / 38.4%
Cloud adoption	**74%** / 24%
AI adoption	**43%** / 5%

■ 2030 ■ 2023
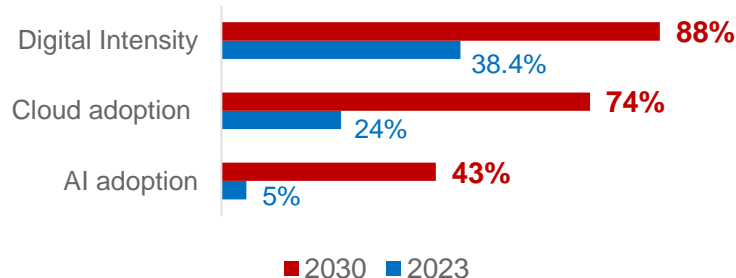
Climate and Energy Strategy
(National Climate Law - 2022)

GHG Emissions: **55%** (2030) / **80%** (2040) reduction.

Power Generation: Boosting use of **renewable energy.**

Transport: Subsidies/Policies to increase **EVs adoption.**

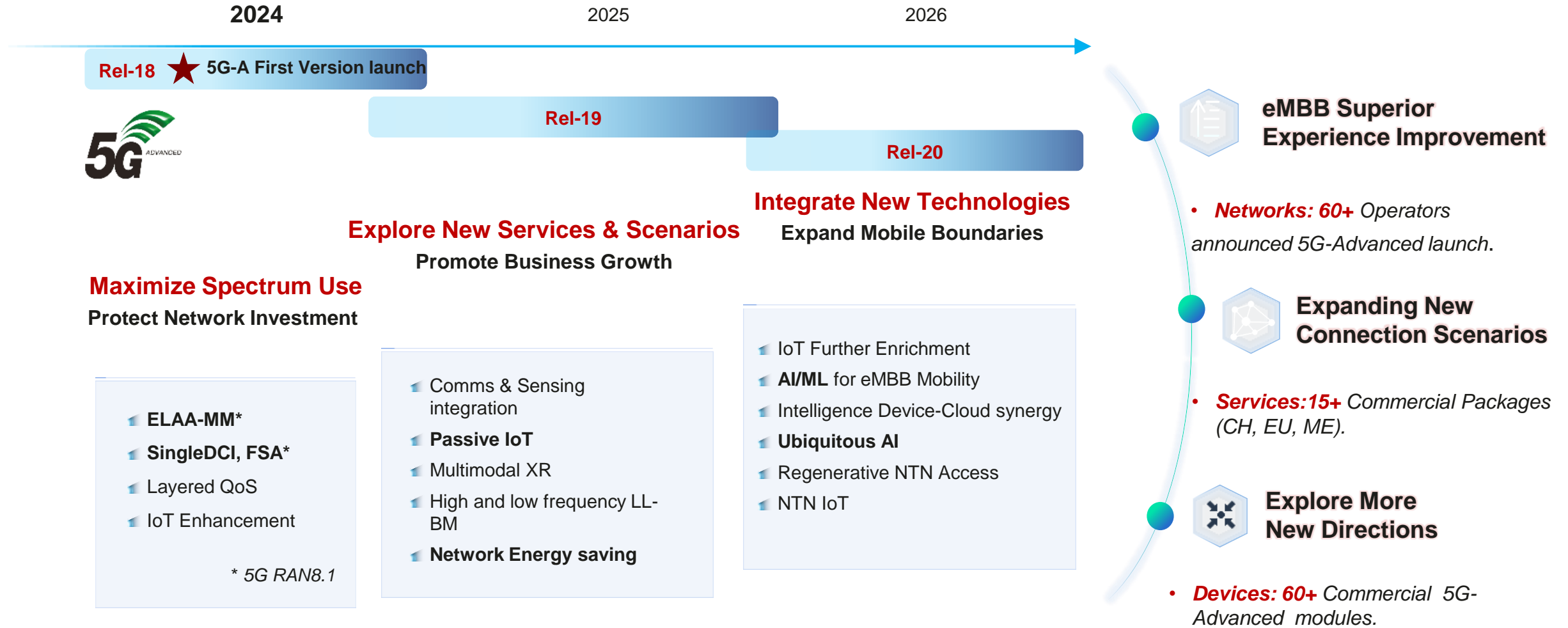## Advanced Connectivity

5G-Advanced   50G PON   10Gbps Campus

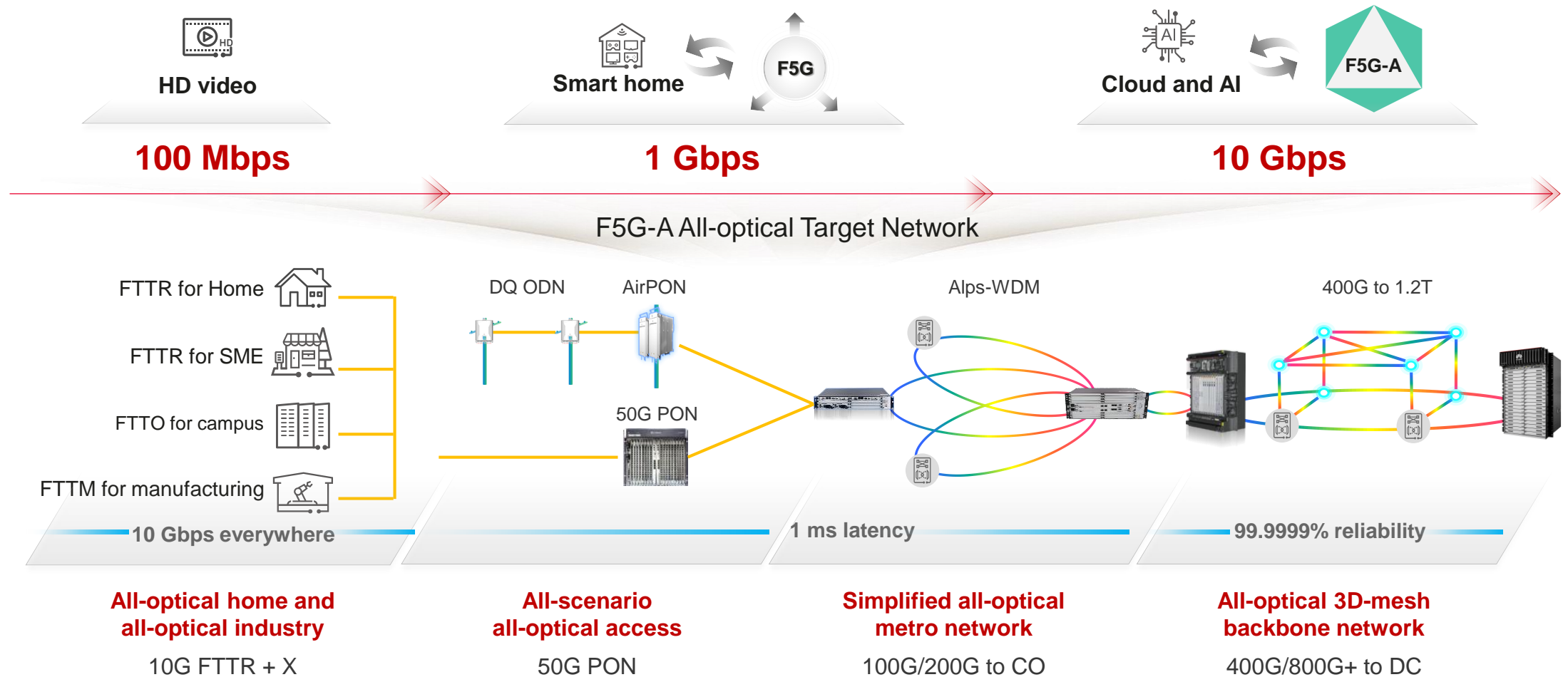## Boosting Cloud & AI

Hybrid/Edge Cloud   AI Storage

Green Transformation

Green Energy & EV Charging

Source: Greece DESI Report 2023

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Advanced Connectivity: The 5G-Advanced Journey Has Begun

2024   2025   2026

Rel-18 ★ **5G-A First Version launch**

Rel-19

Rel-20

Integrate New Technologies
Expand Mobile Boundaries

Explore New Services & Scenarios
Promote Business Growth

Maximize Spectrum Use
Protect Network Investment

- **ELAA-MM***
- **SingleDCI, FSA***
- Layered QoS
- IoT Enhancement

* 5G RAN8.1

- Comms & Sensing integration
- **Passive IoT**
- Multimodal XR
- High and low frequency LL-BM
- **Network Energy saving**

- IoT Further Enrichment
- **AI/ML** for eMBB Mobility
- Intelligence Device-Cloud synergy
- **Ubiquitous AI**
- Regenerative NTN Access
- NTN IoT

eMBB Superior Experience Improvement

- *Networks: 60+* Operators announced 5G-Advanced launch.

Expanding New Connection Scenarios

- *Services:15+* Commercial Packages (CH, EU, ME).

Explore More New Directions

- *Devices: 60+* Commercial 5G-Advanced modules.

Advanced Connectivity: 50GPON & All-optical Ultra-broadband Network

HD video

100 Mbps

Smart home

F5G

1 Gbps

Cloud and AI

F5G-A

10 Gbps

F5G-A All-optical Target Network

FTTR for Home

FTTR for SME

FTTO for campus

FTTM for manufacturing

DQ ODN   AirPON

50G PON

Alps-WDM

400G to 1.2T

10 Gbps everywhere

1 ms latency

99.9999% reliability

All-optical home and all-optical industry

10G FTTR + X

All-scenario all-optical access

50G PON

Simplified all-optical metro network

100G/200G to CO

All-optical 3D-mesh backbone network

400G/800G+ to DC

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Advanced Connectivity: Ultra-broadband Platform Smooth Evolution

Upgrade Existing Platforms

50GPON Board Supported to Fast Develop Users

50GPON Board

Existing Infra

10GPON   **50GPON**

50GPON board supported

in existing platform

NCE-FAN by **software upgrading**

support 50GPON management
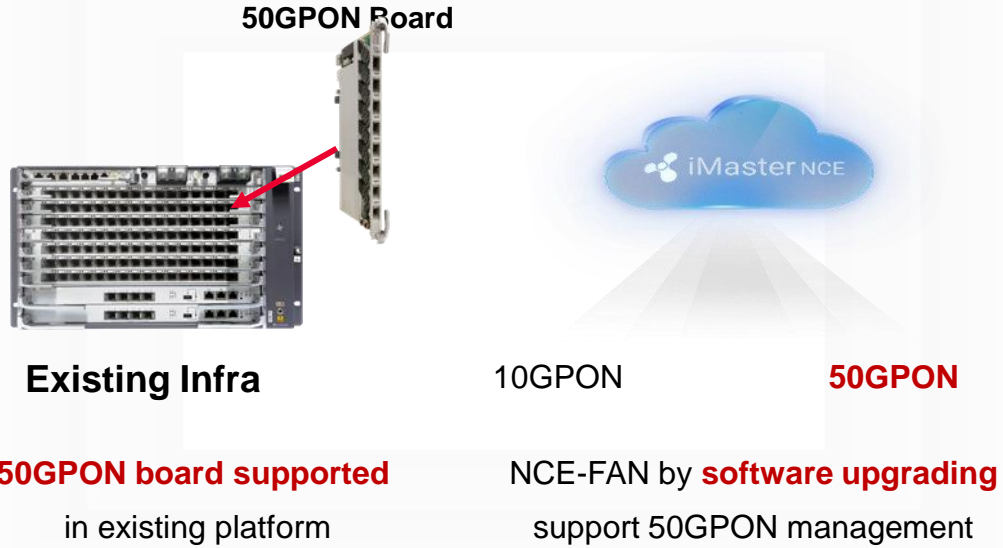
Future-proof OLT Platform

10GPON/50GPON boards Supported for Cost Saving

Future-proof OLT

Key Infrastructure Requirements:

- Smooth evolution : 10GPON→50GPON

- G/10G/50G PON boards reuse supported

30+ Operators Testing & Verifying 50G PON

B2B   **B2H**
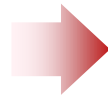
50GPON

Large Enterprise   Wi-Fi 7 Campus Backhaul

Support higher FTTH Tariff and higher ARPU

Advanced Connectivity: Monetization Evolution Towards Smart Homes

One Smart Home

One Home Network

One Fiber

Digital Home → **Smart Home**

FTTH → **FTTR**

1Gbps → 10Gbps

Connected & Visible

AI sensing with privacy, detectable, manageable

Broadband

- 10Gbps to all rooms

Voice + SIM

- 10ms latency

- 8TB home storage

HD TV

- 0 PLR roaming

4K ULTRA HD → 8K ULTRA HD

Online   Online

FTTR

Slave 1

MESH

Master   Slave 2

Slave 3

FTTR   Home AI Hub

10GPON → **50GPON**

Wi-Fi 6 → **Wi-Fi 7**

Service Monetization
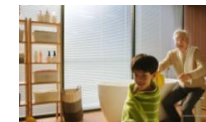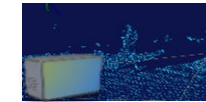
Experience Monetization

Bandwidth Monetization

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Cloud & AI: Telecom Foundation Models to Enable Intelligent O&M Operations

Telecom Foundation Model

Network maintenance

Intelligent inference, efficient resolution

Experience assurance

Integrated sensing, multi-objective optimization
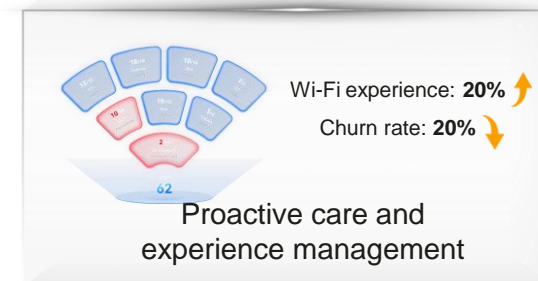
Telecom Foundation Model for AN L4

Service enablement

Intent-driven provisioning, agile go-to-market
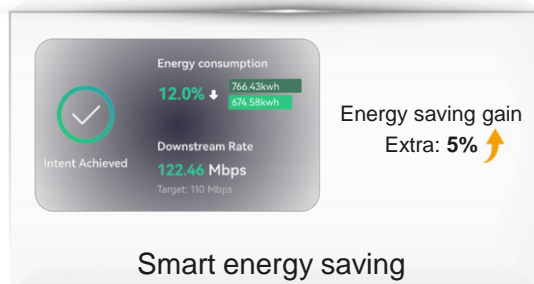
Value Creation

+ Monetization capability

Work order
SMF
MAE-CN
UPF

Premium: **30%**
TTM: **90%**

Instant service delivery

+ Customer experience

Wi-Fi experience: **20%**
Churn rate: **20%**

Proactive care and experience management
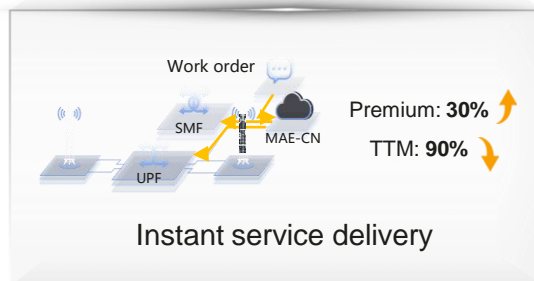
Agents

Scenario-based machine-machine collaboration
Policy-driven, automated closure

Copilots

Role-based human-machine collaboration
Intelligent Q&A, assisting O&M

+ Resource efficiency

Energy consumption
12.0% ↓ 766.43kwh
674.58kwh
Intent Achieved
Downstream Rate
122.46 Mbps
Target: 110 Mbps

Energy saving gain
Extra: **5%**

Smart energy saving

+ O&M efficiency

Intent understanding
Fault identification
Root Cause Analysis
Rectification suggestion
Chain of Thought

Ticket automation rate: **80%**
MTTR: **20%**
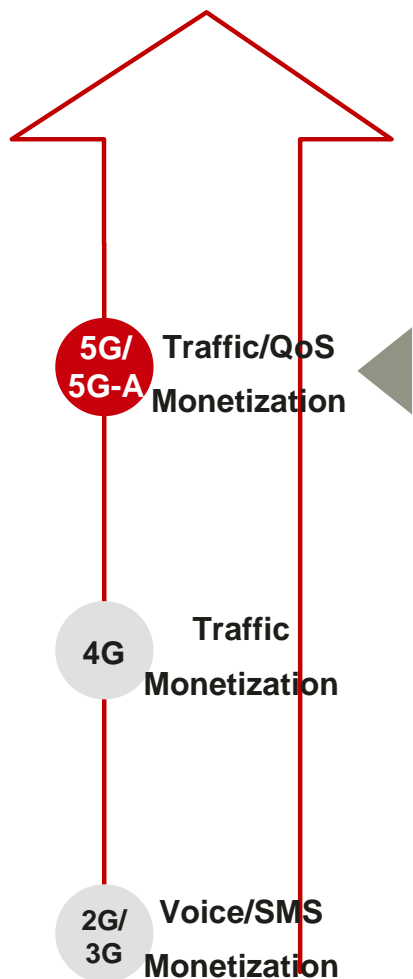
Intelligent incident O&M

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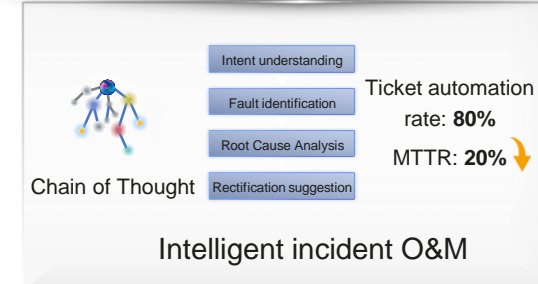
Network – Cloud – Intelligence Synergy to Open Up New Opportunities

Synergy for : User Experience / Business model / Network Architecture Re-construction

Network + Cloud + Intelligence

Network + Cloud

Network

Experience Monetization: DL/UL

Speed, Latency, Priority, Logo

Cloud Desk   Cloud Camera   Cloud Drive

AI Enabled
new experience

AI Home
Gateway

AI Applications
in popular industries

AI Quality Check

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Network: Experience Monetization is the New Trend
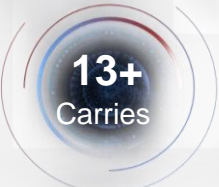
① DL Speed-based Monetization

- **Speed Priority for High End** O₂ 🇩🇪

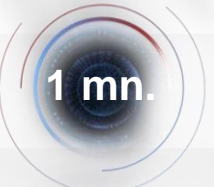| Data Volume	Unlimited Basic	Unlimited Smart	Unlimited Max
25 GB 50 GB 140 GB…	3 Mbps **29.99 €**	15 Mbps **39.99 €**	**500** Mbps **99.99 €**

② Uplink Monetization Thrives

- **Live Streaming Tariff**

13+ Carries · with Uplink Live Streaming Plans · **1 mn.** · Livestream Subs in China

③ VIP Users with High Network Priority & Customized Logo

SUPREME Unparalleled Experience					Ordinary
51 $	64 $	81 $	102 $	**vs**	16~29 $
150 GB	200 GB	250 GB	350 GB		30~100 GB
Thereafter Data < 1Mbps		Thereafter Data < 5Mbps			-
Network Priority: **QCI = 6**					QCI=9
Customized Logo: **SUPREME**					-

60+ 5G Operators Monetizing 5G Network QoS

- **AIS** — Hotspot Booster Add-on
- **3** — QoS Privilege for VIP Users
- **du** — Speed-Tiers in 5G era
- **中国移动 China Mobile** — Uplink-based Live Streaming
- **ooredoo** — 5G Gaming Accelerator

5G/5G-A — Traffic/QoS Monetization

4G — Traffic Monetization

2G/3G — Voice/SMS Monetization

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+ Cloud: FMC3.0 Extends Connections, Explores New Growth Spaces

+Cloud FMC3.0

+Content FMC2.0

Bundling FMC1.0
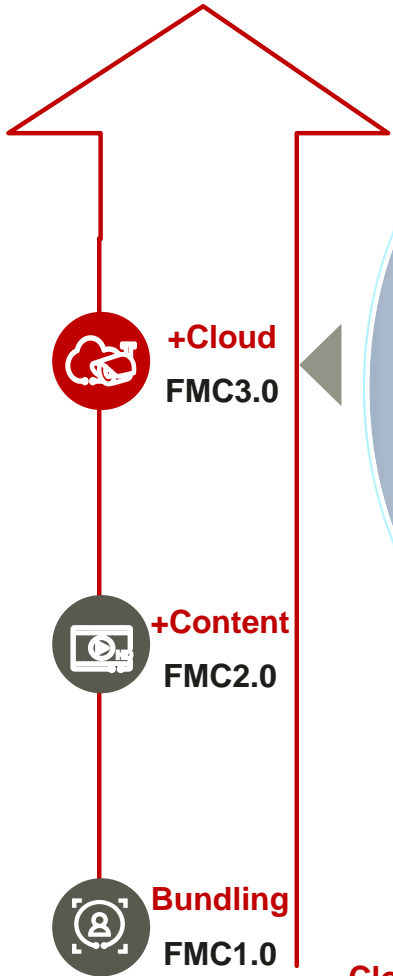
ToB

Smart Education — ethio telecom

Full Stack Solution (Cloud IaaS/SaaS, Network & Terminal)

ToH

Video Monitoring — 中国电信 CHINA TELECOM

Users YoY 100%

20 million (2021) → 60 million (2023)

- Bandwidth **ARPU ↑ 13%**

eCloud Camera

ToC

Cloud Phone — 中国移动 China Mobile

Cloud Phone

Carrier Benefits
- 18M users by 1 year
- DOU: ↑ **23%**

Cloud Service Revenue (China CSPs)

- 68.4 ($9.7) — 2021
- **110%**
- 144.3 **($20.6)** — 2022
- **60%**
- 231.5 **($32.9)** — 2023

(Bn CNY)

- CT
- CM
- CU

AIS: Cloud IP Camera

Your personal security guard for 24 hour protection with 7-day playbacks available

Cloud IP Camera On-top service from 99 /month

Get FREE FULL HD
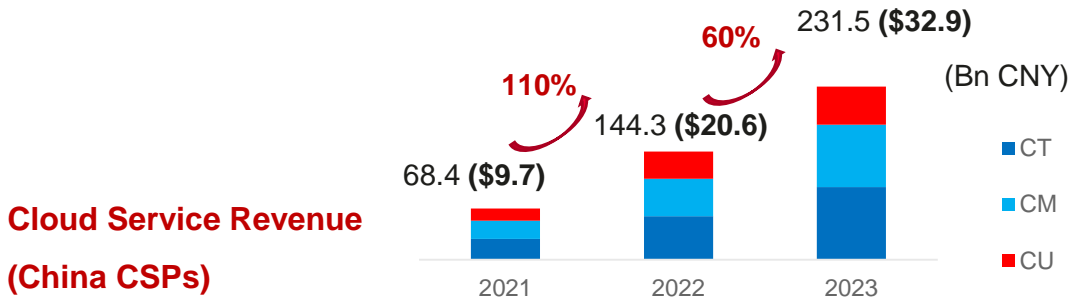
Smart IP Camera

STC: Cloud Storage

stc Cloud Storage Services

Disaster Recovery as a Service (DraaS)

Backup as a Service (BaaS)

Correspondence management systems (SaaS)

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+Intelligence: Innovating Customers Relations Through AI Services

Fine-tuning
Gen AI

Buy & Use
Traditional AI

China Mobile
中国移动
China Mobile
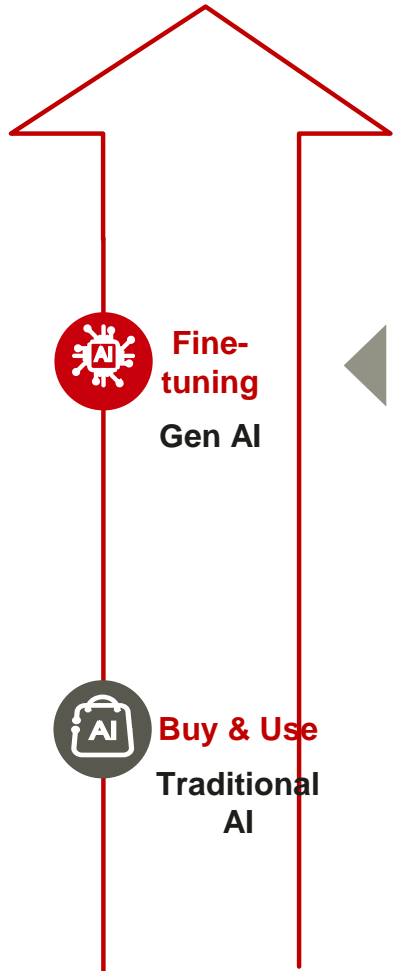
China Mobile AI+ Initiatives for 2024

Create "Model as a Service"

AICC, Government Services, …

CMCC **Jiutian** AI platform

Build AI Product Families

New Calling, Cloud Drive, AI Camera…

Real-time Translation

Visualized voice calling

Barrier-free Calling

Develop AI Industry Applications

Smart Steel, Smart Healthcare, …

65%
DICT services

35%
Basic services

| AI applications |
| Industry Cloud |
| IDC |
| … |

IoT
5G Private Network
Fiber Private Line

+

SK telecom

AI Corp
Transformation

Telefónica

Kernel 2.0
Apply Gen AI for key workflow

orange

300+ live AI initiatives
2200+ AI and Data experts
500+ patents in AI and Big Data

A.
AIX
AI Infra

A.: Personal AI assistant

AIX: AI for core business

AI Infra: DC, AI chips, LLM

1. Improve communication efficiency.
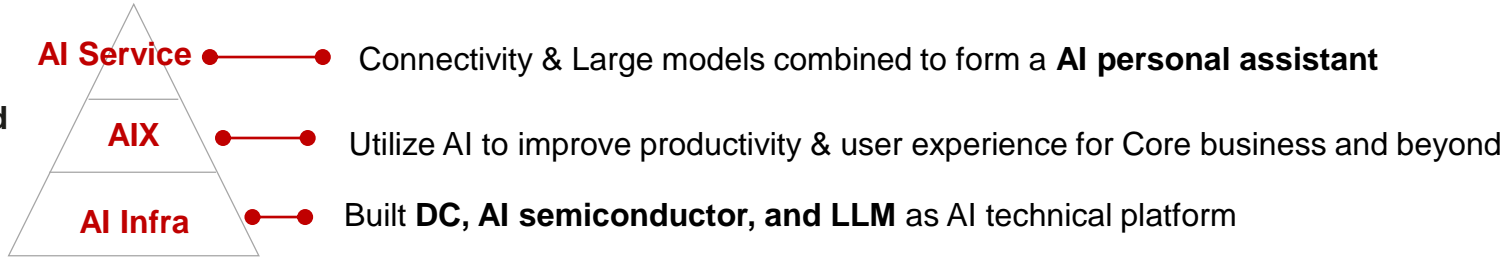
2. Network and IT automation;

3. AI service monetization

Top 3
AI priorities

1. Make networks smarter

2. Improve operating efficiency

3. Reinvent customer experience

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SK Telecom AI Pyramid Strategy: A Leading example of NW + Cloud + AI Synergy

AI Pyramid Strategy

AI Pyramid Strategy: AI Infrastructure, AI Transformation (AIX) and AI Service

AI Service — Connectivity & Large models combined to form a **AI personal assistant**

AIX — Utilize AI to improve productivity & user experience for Core business and beyond

AI Infra — Built **DC, AI semiconductor, and LLM** as AI technical platform

Planned heavy investment in AI

	2023	2028
AI Capex proportion	12%	33%
Revenue Trillion won	17.6	25

Strategy Execution

AI Infra: Self-developed + cooperation

- **Datacenter**
- **Chip / AI Computing**
- **Model**

AIX: Internal efficiency + Industry enablement

- **Network**
- **Telecom service:** AI TV and AI Home;AICC
- **ToB:** AI-assisted diagnosis; AI financial security

AI Service: Serving the world

- AI call assistant
- AI life assistant
- Terminal innovation, introduce of AI Pin services

Service Design

① A. Personal Assistant

Call Assistant   Life Assistant

② NUGU AI Service

AI + Speaker + Light (NUGU candle)

AI + Speaker + Night Light (NUGU mini)

AI + Speaker + Camera + Screen (NUGU nemo)

AI + Headset (NUGU buds)

NUGU

AI+ STB (Btv (A12))
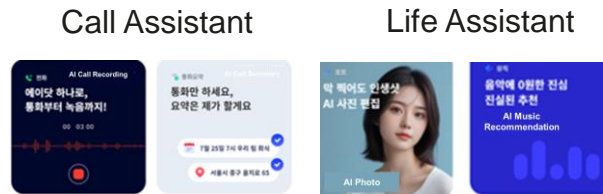
③ X Caliber Pet X-ray Image AI Diagnostic Service

Complete the analysis within **30s**

~8 USD /time or   ~225 USD/month

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As a Summary: Digital & Intelligent ICT Infra Will Enable the Intelligent World

Intelligent World 2030

Problems
Experimentation
Standards

Customer

Technology

Industry vision
Tech challenges
Academic workshops

5G/5G-A Era
10GPON/50GPON

New
Services

Connectivity

10x Better

Network Capabilities

Computing
power

+ Intelligence

Data

Intelligent
computing

Computing

A Robust Computing

Backbone for all Scenarios

Foundation
models

Green

ADN

Data
storage

*ADN: Autonomous driving network

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