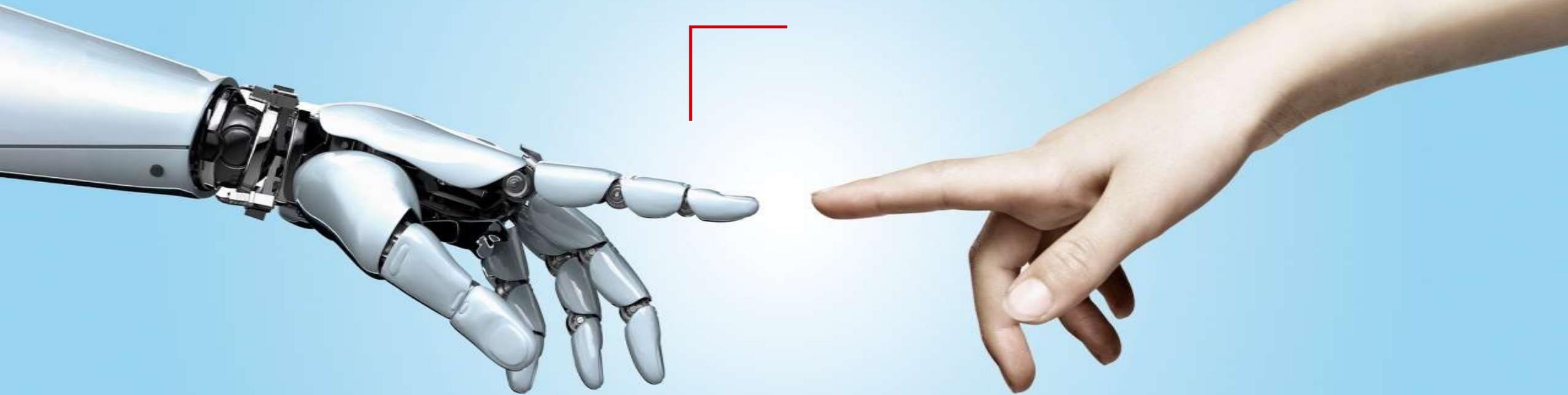


5G, Bring New Value

Oulu University 6G Summit Webinar, March 2020



Security Level:



Contents

1

Industry Insight

2

Huawei Briefing

Trends for 2025: Moving Towards an Intelligent World



All Things Sensing



All Things Connected



All Things Intelligent

Living with Bots



1

Adoption of intelligent domestic robots: 14%

Super Sight



2

Companies using AR/VR: 10%

Zero Search



3

Using of Intelligent personal digital assistants: 90%

Tailored Street



4

C-V2X penetration: 15%

Working with Bots



5

Ration of robots/humans in manufacturing: 103/10,000

Augmented Creativity



6

Proportion of large companies using AI: 97%

Frictionless Communication



7

Amount of enterprise data used efficiency: 86%

Symbiotic Economy



8

85% business application in cloud

5G's Rapid Rollout



9

Population covered by 5G: 85%

Global Digital Governance



10

Amount of data produced globally per year: 180ZB

Source from Huawei Global Industry vision 2025



More Countries Take 5G & AI as Core of National Digital Strategy

170+ Countries Release National Digital Strategy

ICT **20%** ↑ GDP **1%** ↑

5G Plays a Key Role in National Digital Strategies

5G Spectrum Auctioned Countries : **30+** @2019, to be **60+** @2020



5G+ Strategy: based on 5G to develop world top strategic products till 2026



High-performance 5G network by 2025, 5G as the foundation for digital value creation



National Security Strategy: 5G creating a new **USD \$250 billion** market



Be Leader of 5G to create a world-leading digital economy



IMT-2020 (5G) Promotion Group established in Feb 2013 by 3 ministries



5G forms the foundation of economic society and national life

20+ Countries Release National AI Strategy



American AI Initiative



Industrial Strategy: Artificial Intelligence Sector Deal



Development Plan on the New Generation of Artificial Intelligence



National Strategy for AI until 2030



Pan-Canadian Artificial Intelligence Strategy



Artificial Intelligence 2031



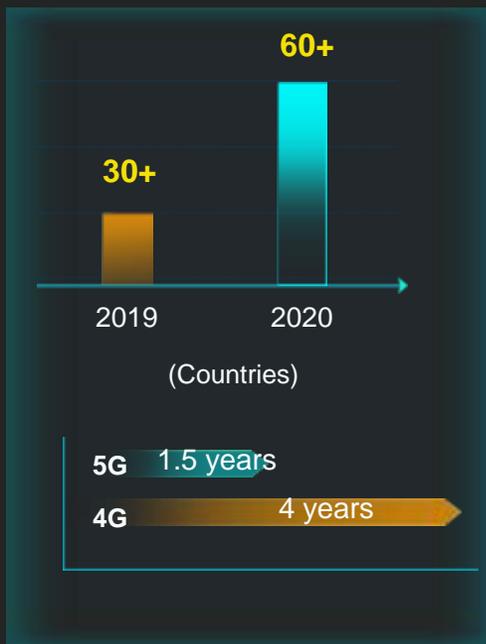
Smart Nation 2025



National Strategy for Artificial Intelligence

Developed Ecosystem Accelerates 5G Growth

Spectrum Auctions



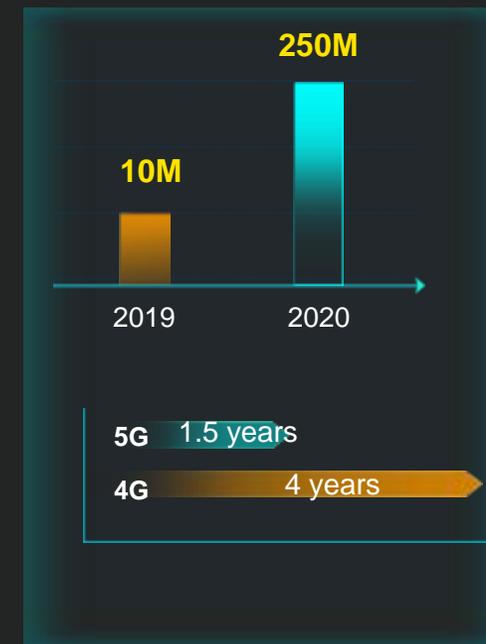
5G Commercial Networks



Number of 5G Terminals



5G Subscribers



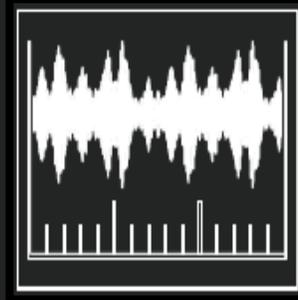
Top 2 5G Concerns

- ✓ **Technology:** Challenges of 5G network large scale deployment and user experience improvement
- ✓ **Business:** How to build 5G business ecosystem?

Continuous Product Innovation is Critical for Technical Challenges



Network Deployment Challenges



Spectrum Readiness

- C-band unavailable
- Discrete spectrum

All band to 5G



Site Acquisition

- Limited space
- Bad position

Simple sites

Experience Challenges



B2B Quality

- Higher UL speed
- Guaranteed SLA

B2B-oriented Innovation



B2C Experience

- Poor edge speed
- Mute, fake 5G

4G&5G Coordination



Indoor Coverage

- Weak coverage
- High cost

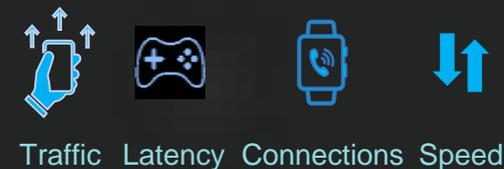
From DAS to Digital

Business Ecosystem Construction Enable 5G Business Success



① Business Mode Innovation

- How to monetize the multi-dimensional capabilities of 5G?
- What business models are best for new 5G B2B services?



② Local Ecosystem Integration

- Which industries are the best targets for 5G?
- How can local 5G ecosystems be build in markets around the world?



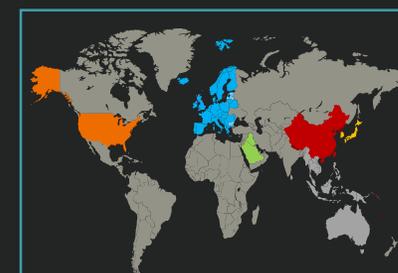
Target industry based on local advantage

③ Real Use Cases

- Are existing use case just branding or real business offerings?

④ Global Best Practices

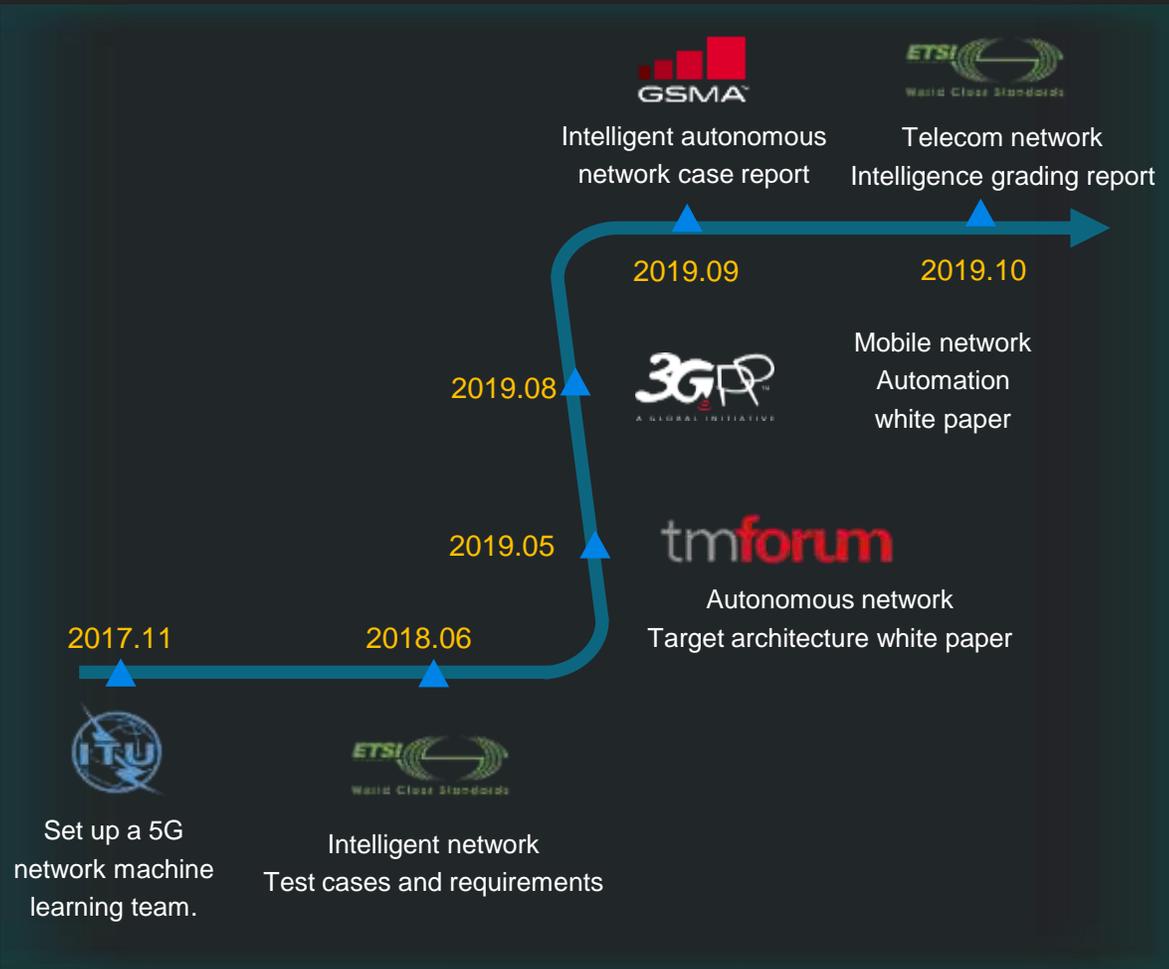
- Which 5G success stories can be replicated in other countries?



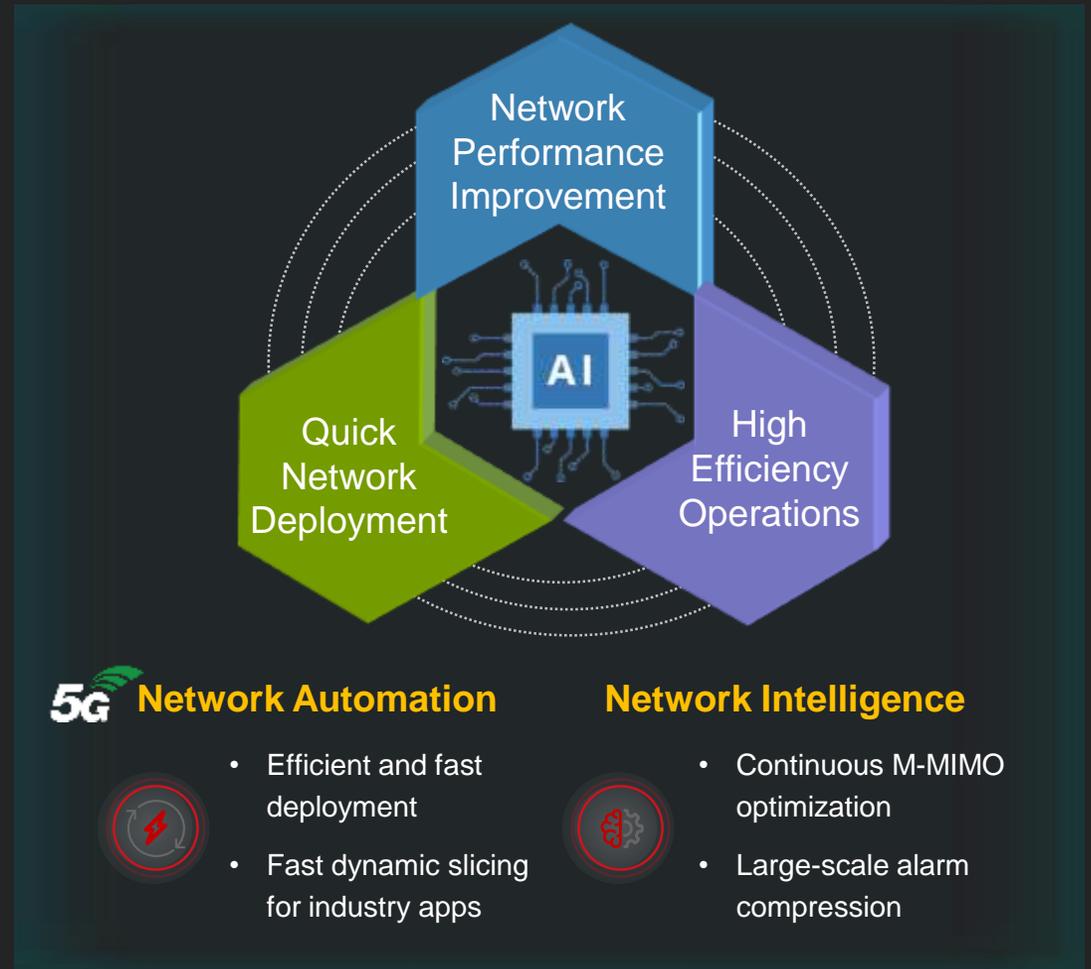
B2C @ Korea, China, ...
B2H @ ME, Finland, ...
B2B @ China, Switzerland

AI Plays an Increasingly Important Role in Network Construction & Operation

Many Groups are Exploring Operation Automation and Intelligence



3 Types of AI Applications in Telecom Networks



Carriers Use Target Network 2025 to Guide Strategy Update

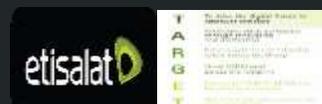
2019–2020: a critical period for operator's strategy update



Released Engage 2025 strategy, and built a new organization



New CEO released new brand and new services in October 2019



Target strategy, focusing on business growth and improved efficiency



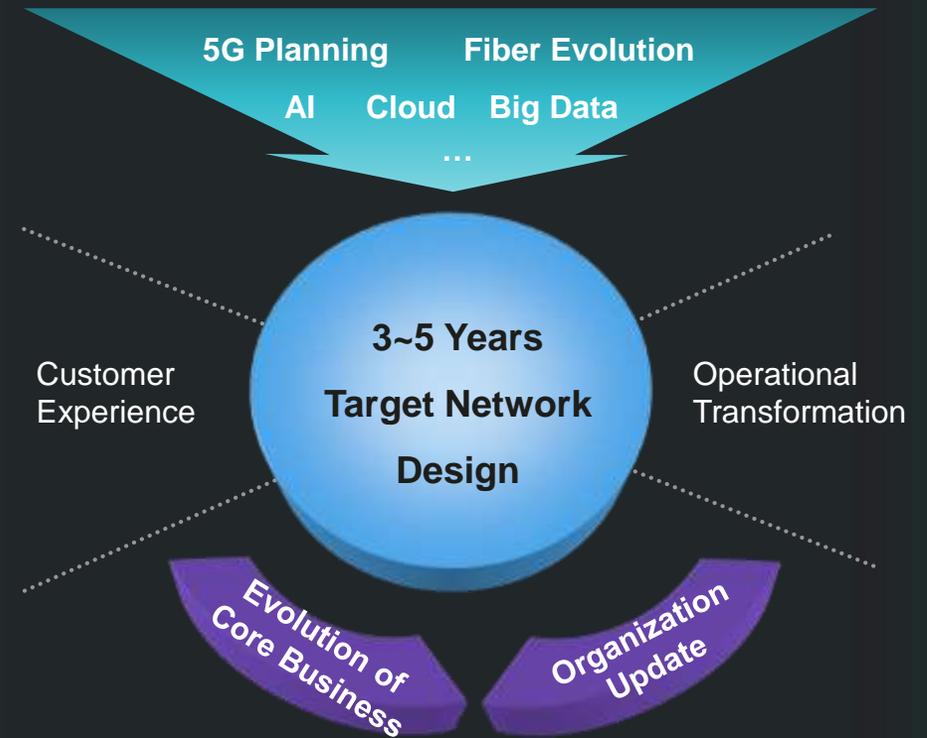
The BRIGTH strategy to realize digital Africa and pragmatic operations



In November 2019, Turkcell released new strategy focusing on new services

...

Target network is guiding the strategy update



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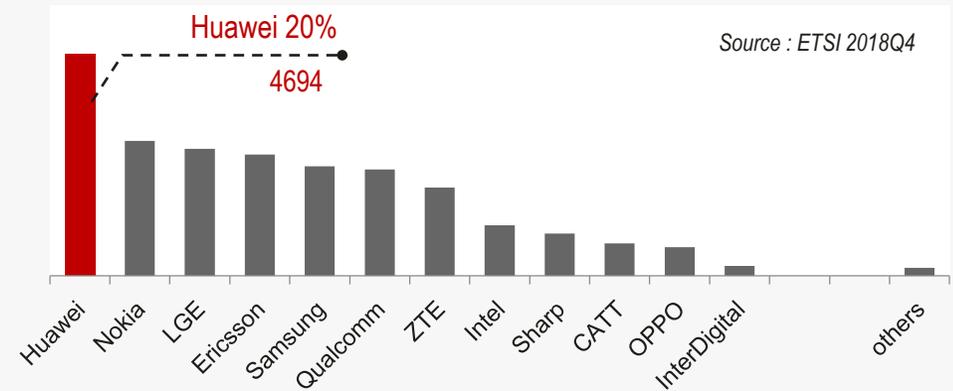
Industry No.1 R&D Investment Assures Long-term Technology Leadership

Huawei ranks **No.5** by total R&D investment



- 2018 EU Industrial R&D Investment Scoreboard

No.1 in 5G Essential Patents Declaration

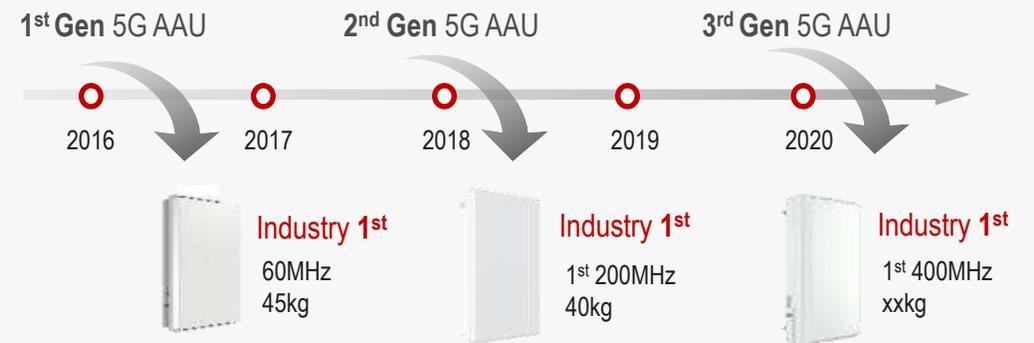


Source : ETSI 2018Q4

Unique with Self-developed 5G device

<p>RAN</p>  <p>Tiangang</p> <p>World's 1st 5G base station chipset</p>	<p>Smartphone</p>  <p>Kirin 990</p> <p>World's 1st 5G SoC</p>	<p>CPE</p>  <p>Balong 5000</p> <p>World's Most Competitive 5G CPE</p>
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~2 years ahead of industry



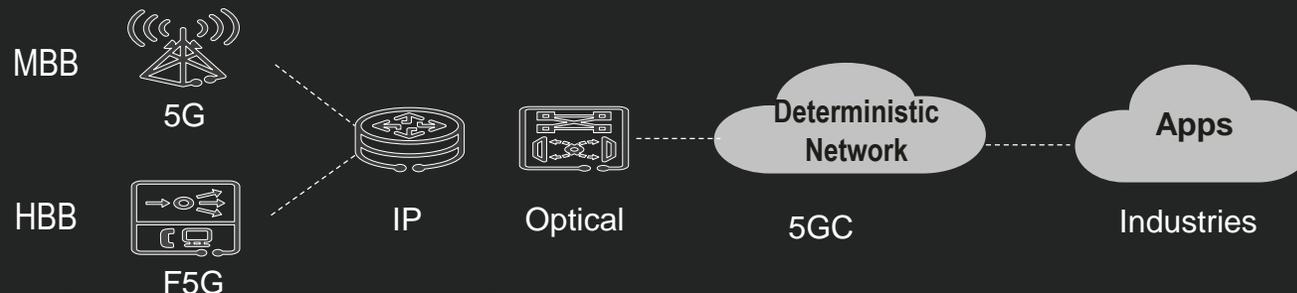
Huawei Solutions Empower Operators to Gear Up with 5G



Individual Services Innovation

Business Services Innovation

Home Broadband Connection



10 Leading 5G Product Solutions

1. Super M-MIMO
2. Simplified Site
3. 4G & 5G Coordination
4. 5G Tech Powered MW
5. Maximizing Sub-3G Value
6. Guaranteed SLA IP
7. Optimal Cost / Bit Optical
8. DN-oriented Core
9. Redefined Data Infra.
10. Intelligent 5G Services

6 Scenario-oriented Biz Solutions

1. Fast HBB Connection
2. Giga Home & Premium WI-FI
3. Rapid & Affordable Business Connection
4. High Quality Private Line
5. Digital Indoor Coverage
6. Connect the Unconnected

3 Types of 5G Business Practices

1. 5G Enriches Life
2. 5G Inspires Industries
3. 5G Empowers Wireless Fiber

2 Proposals of Future Network Transformation

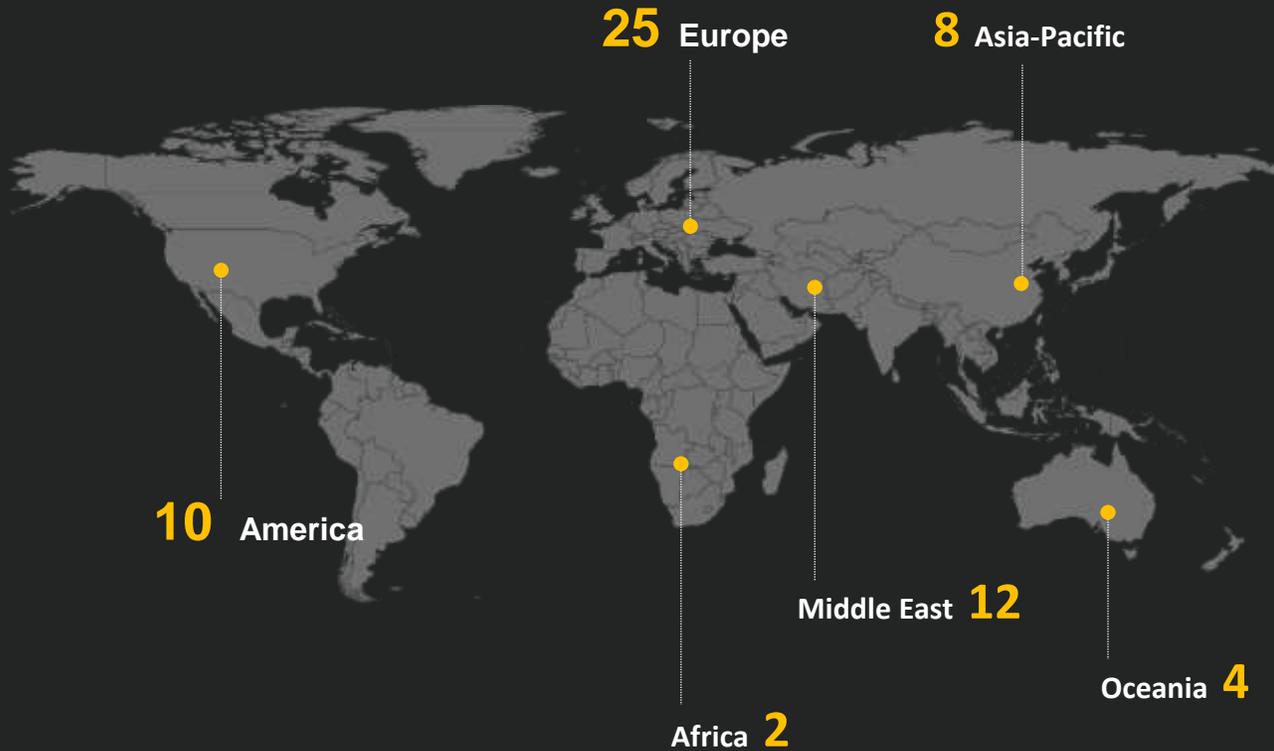
1. Autonomous Driving Network
2. Network 2025

Infinite Connectivity & Digital Trust

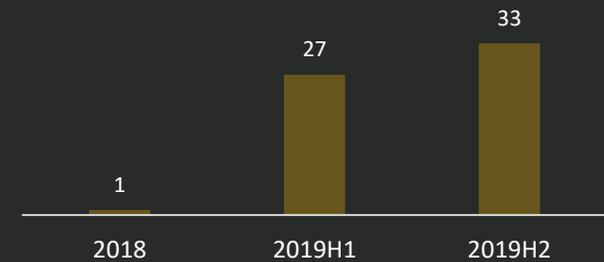
5G Commercialization Accelerating

61 commercial networks

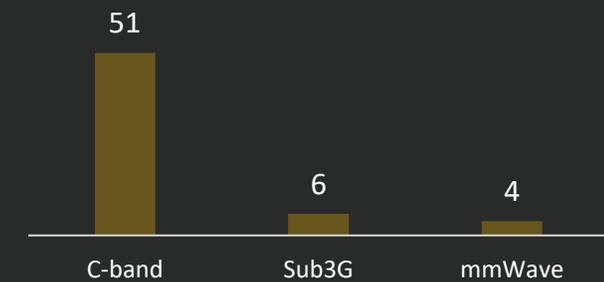
41 are powered by Huawei



5G commercialization expedite



C-band is the primary choice





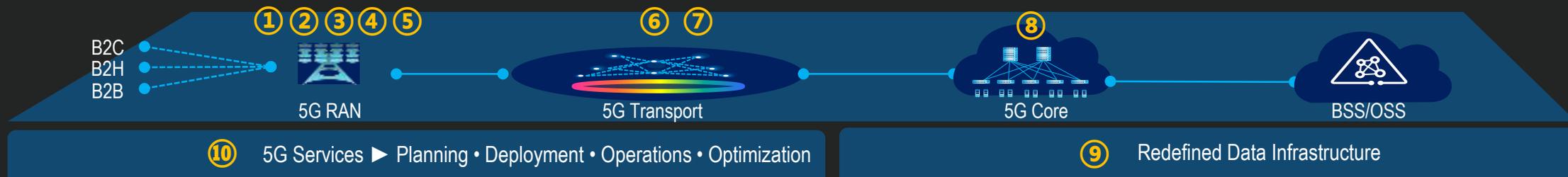
1 **10** 5G Leading Product Solutions

2 **6** Scenario-Oriented Innovative Solutions

3 **3** Types of 5G Business Practices

4 **2** Proposals of Future Network Transformation

10 Innovative Product Solutions to Energize 5G Roll Outs



① Super M-MIMO



- 400MHz
- 64T64R @ 25Kg

② Simplified Site



Super Blade Site
1st Sub 6GHz all-in-one



Simple & Intelligent Power
TCO 30% ↓

③ 4G/5G Coordination



- Smart anchor
- SuperBAND 2.0
- Consistent voice quality

④ 5G Tech Powered MW



- 1st 50 Gbps
- P2MP MW with 5G Tech

⑤ Maximizing Sub-3G Value



- 1 board to 5G
- Super Uplink

⑥ Guaranteed SLA IP



FlexE + SRv6 + iFIT

⑦ Optimal Cost / Bit Optical



- 120λ @ Super C, 800G/λ
- One service one subrack
- One direction one board

⑧ DN-Oriented Core



- All in one MEC
- Intelligent Slicing
- Automation Engine

⑨ Redefined Data Infrastructure



Mgmt eff 5x ↑, TCO 30% ↓



OceanStor Dorado V6
20M IOPS, Seven 9s



Distributed Storage
Industry's highest-Density

⑩ Intelligent 5G Services



- Digital Rollout
- AI Acceptance
- Accurate Planning

① Super M-MIMO: Next Generation Solutions



Largest Bandwidth	Lightest Weight	Lowest Power Consumption	Highest Output Power
400MHz IBW	25Kg	500W	320W Output
Discrete Spectrum 	Simplified Installation 1000€/site ↓	240W AAU Power 30% ↓	320W vs 200W 2dB ↑

5G Advanced Algorithm

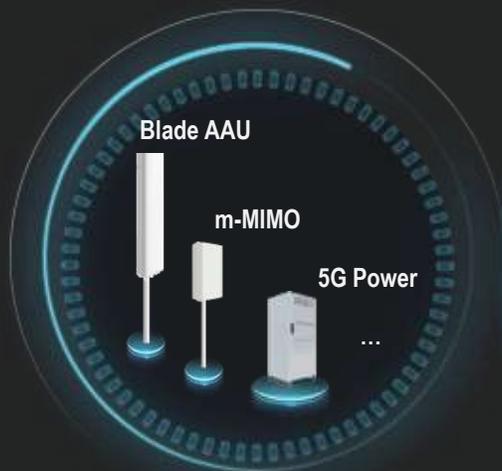


Wide Coverage	Superior Experience	High Capacity								
<p>Super Beamforming</p> <p>60% Coverage Radius extends</p>	<p>SRS Antenna Switch</p> <p>30% user rate ↑</p>	<p>VR Turbo</p> <table border="0"> <tr> <td>Off</td> <td>On</td> </tr> <tr> <td>Bit Stream</td> <td>VR Frame</td> </tr> <tr> <td>+60%</td> <td>-40%</td> </tr> <tr> <td>Cloud VR Volume</td> <td>VR User Latency</td> </tr> </table>	Off	On	Bit Stream	VR Frame	+60%	-40%	Cloud VR Volume	VR User Latency
Off	On									
Bit Stream	VR Frame									
+60%	-40%									
Cloud VR Volume	VR User Latency									
		<p>MU-MIMO</p> <p>8 Layers 2.9Gbps</p> <p>16 Layers 5.9Gbps</p>								

② Simplified Site Solutions Enabling Fast 5G Expansion

Simplified Radio & Antenna

Simplified Site Solutions



More convenience for single person operation



1st Sub 6GHz All in One A+P



No impact on antenna gain
4G/5G share the tower sweet spot

Blade Antenna



Independent upgrade for upper & lower module

PoleStar



Accelerates large scale 5G deployments

Simplified Energy

Full-scenario High Density



1 Site 1 Cabinet for 10 Bands
24KW@3U, 600Ah battery



1 Site 1 Blade for 5G Band
6kW@15L, Natural cooling

Simplified Installation

Engineering Innovation, Easy Deployment



New Standard kits for m-MIMO
-40% Weight, -20% Size



Bracelet Kits For AAU/RRU
No auxiliary pole



RRU tunnel wall kits
Anti-vibration

③ 4G/5G Coordination: No-Edge Experience

Smart Anchor

Enabling Always On 5G

- Intelligently select optimal frequency band to anchor
- 5G Online rate: 40% to 100%

SuperBAND 2.0

Enabling Seamless 5G Data Experience

Without SuperBAND 2.0: L1800 20 MHz, L2100 20 MHz, L2600 20 MHz, L800 10 MHz, NR 80 MHz

With SuperBAND 2.0: L1800 20 MHz, L2100 20 MHz, L2600 20 MHz, L800 10 MHz, NR 80 MHz

One LNR Logical Band

1~3s vs 180ms

- The LNR logically one band
- Fast DC activation and intelligent unified scheduling at one frequency with 70% delay and 20% experience ↑

VoLTE Plus & Fast EPS FB

Enabling Better Voice Service for 5G

NSA: w/o VoLTE (7~8s), VoLTE (2s)

SA (w/o VoNR): w/o VoLTE (3~4s), VoLTE (2~3s) with Fast EPS FB

- 100% VoLTE bears 5G Voice
- Same vendor free of measurement: access delay 40% ↓

④ 5G Tech Powered Microwave

50 Gbps; +50% Distance

E-band

2.5x Capacity, 50 Gbps



+50% Distance



Pole-mounted Long Distance E-band

Dense Urban

4 in 1; +50% Distance

6~42 GHz

4 in 1 CA ODU



4 in 1 Modem



+50% Distance



Industry's only 10+ km MIMO

Urban/Suburban/Rural

PtMP 1 to 8; 12 Gbps

26/28 GHz

Massive MIMO Beamforming



Co-Platform with AAU
Co-Chassis, Co-Controller with BBU

4x Spectrum Efficiency



Phased Array Antenna at Hub Site



-80% Tower Space, -80% Alignment Cost

Dense Urban/Urban

⑤ Maximizing Sub-3G Value to Accelerate 5G

Sub-3G NR

Fast 5G, same spectrum, better experience

Baseband Add-on



- One Board to 5G
- Brings **100Mbps+** Average User Experience

Super Uplink

Meet the demand for video surveillance, live broadcast etc

C Band + Sub-3G, DL : UL = 4:1



UL Speed up to **500%** ↑

Latency **30%** ↓

The ultimate form of sub-3G

Multi Low-band 4T4R RRU



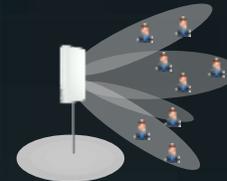
- 700+800+900 / 700+800 / 700+900 / 800+900
- Performance vs 2T2R:
Average user experience **+40~60%**
Cell Coverage **+4~6dB**

8T8R + SDA (Software Defined Antenna)



- 2G/3G/4G/5G 3/6 sector co-exist, flexible switch for multi-RAT
- Software Defined 4T6S/8T3S, Smooth Evolution to 5G NR

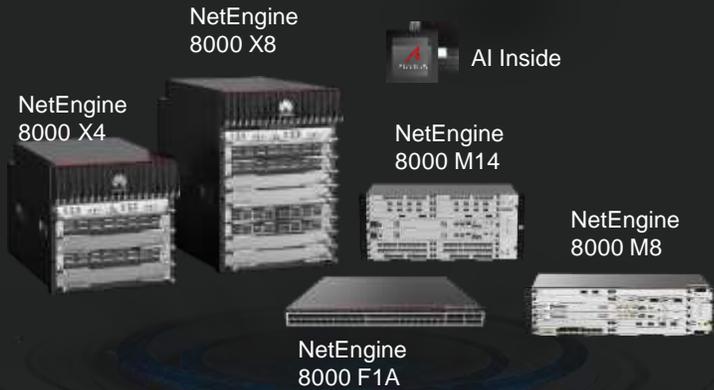
FDD Smart Massive MIMO



- FDD 1.8G+2.1G, 32T32R, 300W
- Intelligent Beam Shaping
- Intelligent Beam Scheduling

⑥ Intelligent IP Network: From Best Effort to Guaranteed SLA

NetEngine 8000 series



Solar R6

7nm, Enable 36*400GE

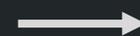
70+

Commercial Cases

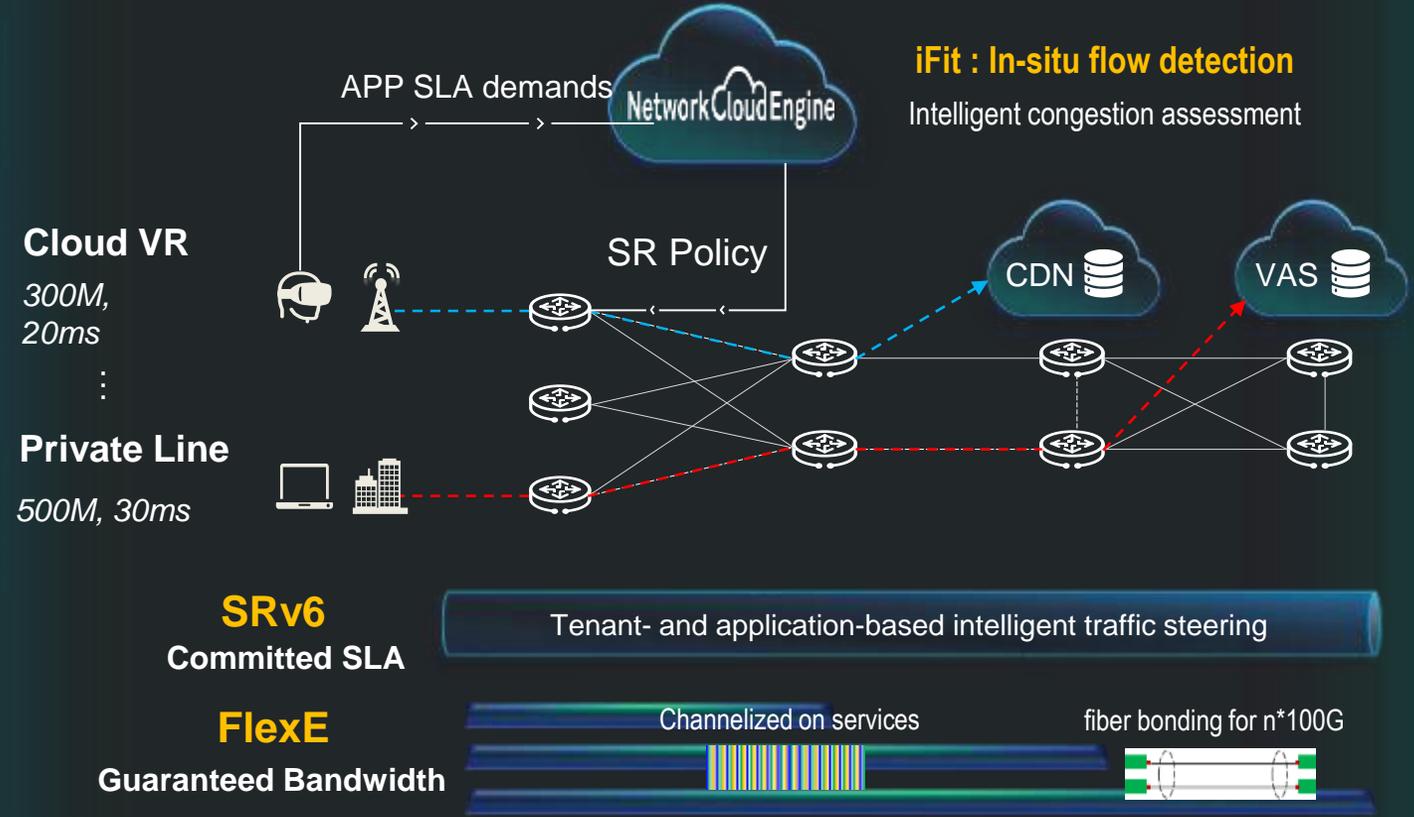
20+

SRV6 Commercial Cases

SLA assurance based on 8 traffic class



SLA assurance for each **Tenant/APP**



⑦ Optimal Cost Per / Bit Optical Network

New Speeds with Largest Fiber Capacity

OPTIXTREME

G7

- 7nm chipset
- Ultra low power 200G



Industry's 1st 200G CFP with PCS tech.

H7

- 7nm chipset
- 100G~800G



100G~800G Programmable MSA

Industry



C-Band 4.8 THz	42λ x 800G =33.6T	200G@50GHz 650km
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Huawei: Breaking the Limitation of Fiber

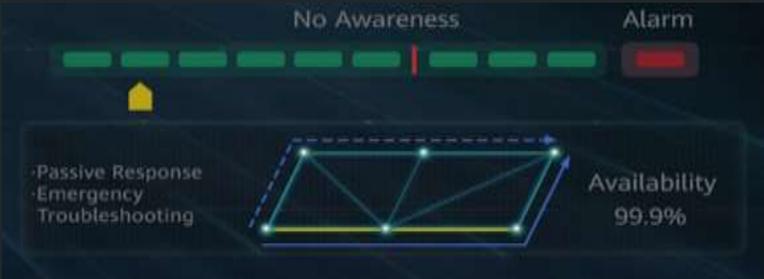


Super C 6 THz	60λ x 800G =48T	200G@50GHz 1100km
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Spectrum 25% ↑ Capacity 40% ↑ Reach Longer by 70% ↑

Intelligent: Solving Fiber Gradual & Abrupt Fault

Industry



No Awareness → Alarm

- Passive Response
- Emergency Troubleshooting

Availability 99.9%

Huawei: O&M Efficiency Up by 30%



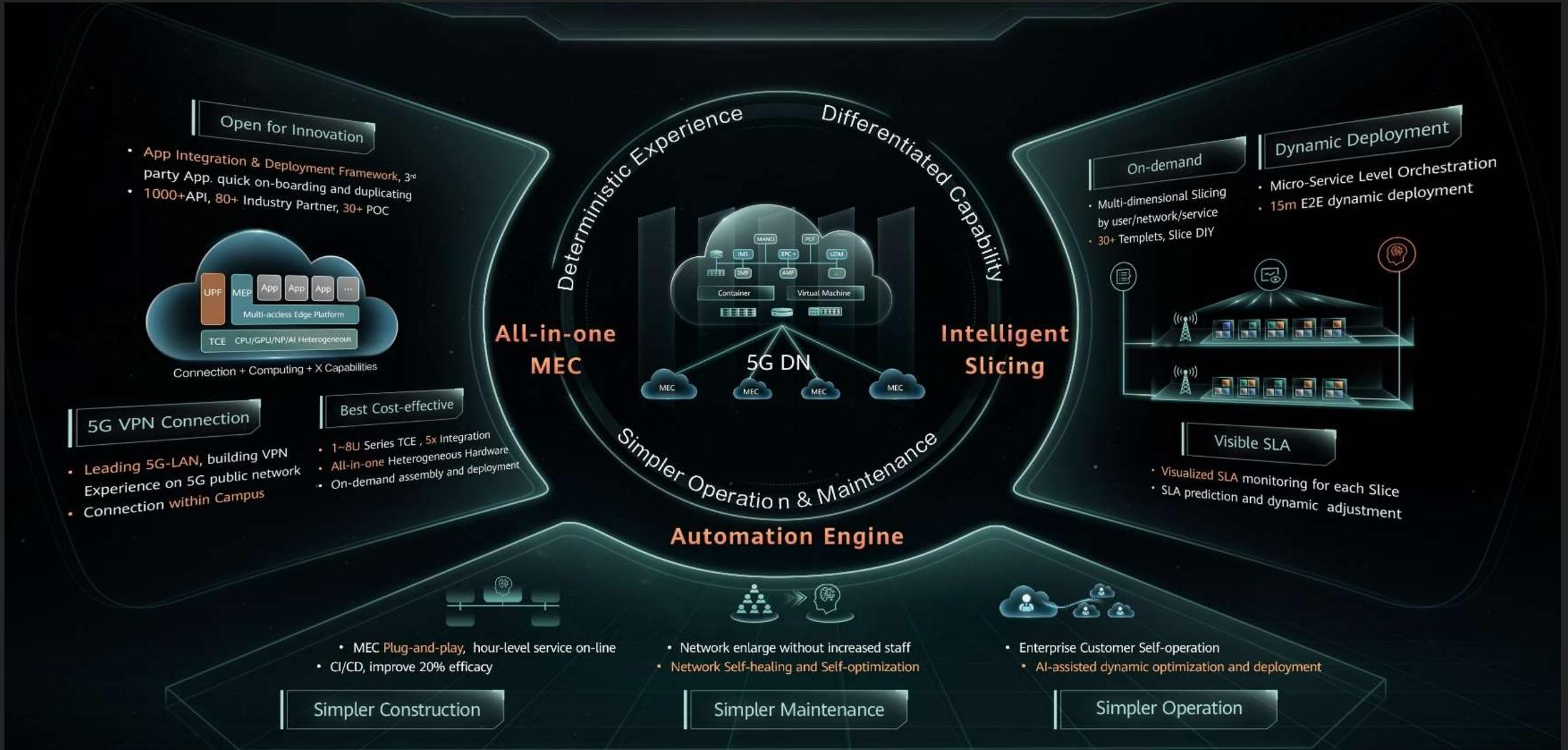
Health → Sub-health Prediction → Predictable Rerouting → Alarm

- Proactive O&M
- Eliminate Potential Risks in Advance

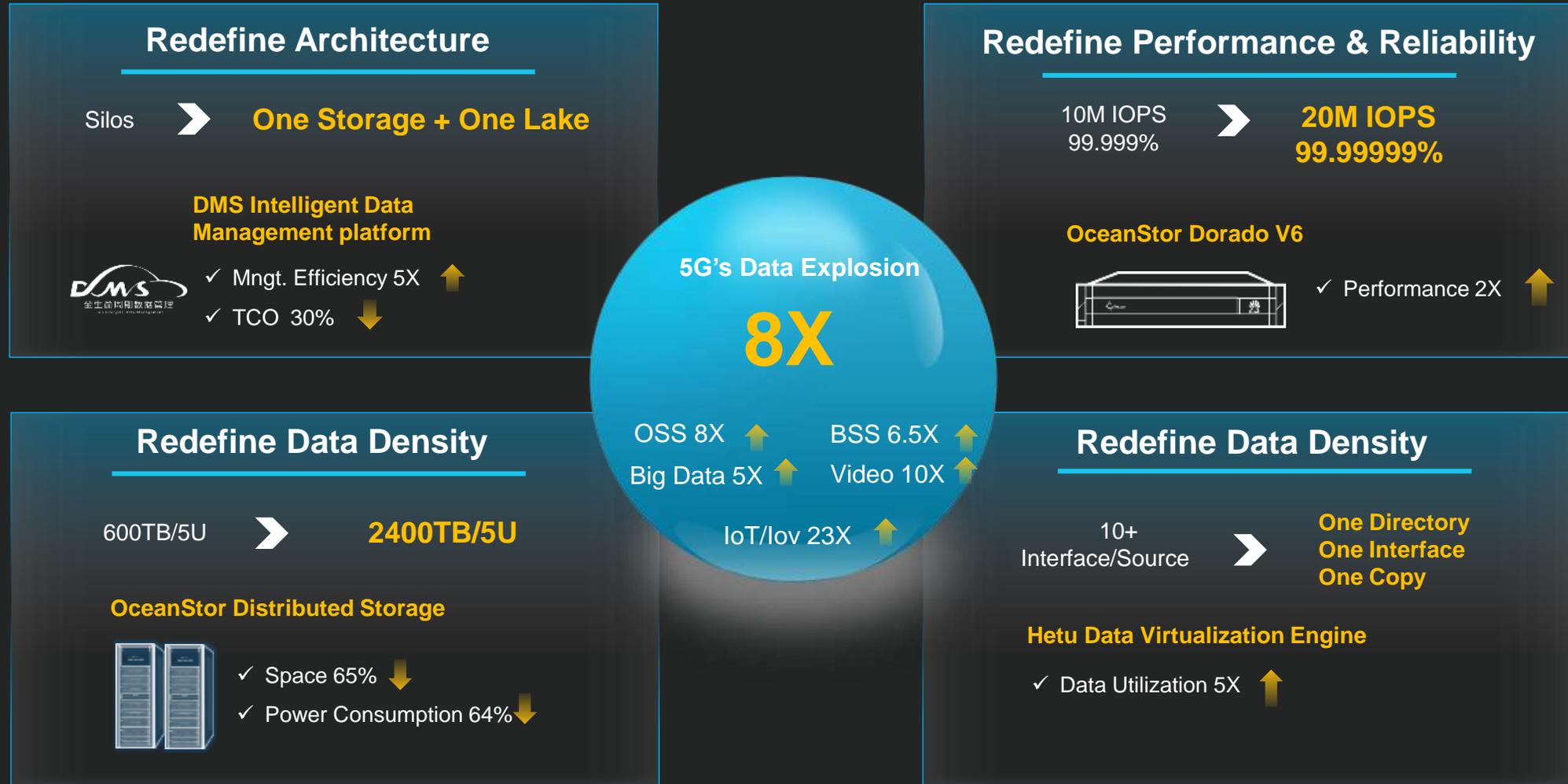
iMaster NCE, AI, Optical Sensor

Availability 99.99%

⑧ 5G Core Leads the **Deterministic Network** Era



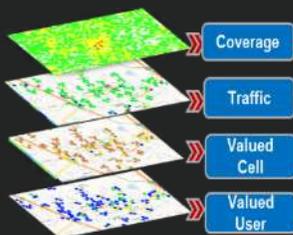
⑨ Redefine Data Infrastructure to Meet 5G's Data Explosion



⑩ Best Services, Best 5G

Planning

5G Value-oriented Planning



- Digital insights on **entropy weighted value model** :
 - ✓ High tariff package
 - ✓ High traffic volume
 - ✓ High priced device
 - ✓ The service they uses
- Accuracy of identifying high value areas **7%** ↑

5G Digital Rollout

Construction



T-BIM: Telecom Building Information Modelling

- **Site digital Twins** – the foundation for digital rollout and digital assets
- **2 Algorithms** - 3D modelling algorithm and collision algorithm
- **T-BIM** – propose for digital rollout standard
- **Practice** – accelerating operator A 5G rollout **30%** ↑

Best 5G Services

Operation

5G Intelligent Operation



AUTIN

- **SmartCare** digital platform
 - ✓ Cloud VR experience standard
 - ✓ High identification rate ($\geq 90\%$)
- **AUTIN** – new operation model: people & machine collaboration
- 5G 2C services, critical outages **35%** ↓

Intelligent Network Optimization

Optimization



- Tools & Rules:
 - ✓ Rule base **100+**
 - ✓ AI model base **50+**
- Best practice **400+**
- Ultimate experience assurance, support operator S P3 No.1



1 **10** 5G Leading Product & Solutions

2 **6** Scenario-Oriented Innovative Solutions

3 **3** Types of 5G Business Practices

4 **2** Proposals of Future Network Transformation

6 Scenario-oriented Solutions Inspire Business Success



- ✓ Providing best solution for specific scenario
- ✓ Resolving special scenario technology and business challenges

① Scenario-1: Fast HBB Connection 5G FWA, WTTx Suite



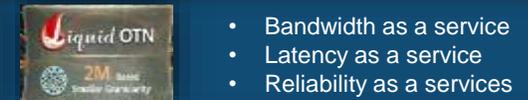
② Scenario-2: Giga Home & Premium Wi-Fi SingleFAN, eAI Powered Wi-Fi 6



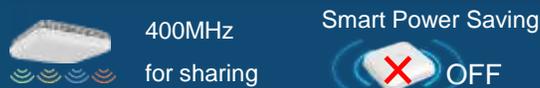
③ Scenario-3: Rapid & Affordable Business Connection IP Private Line, 5G Quick Connection



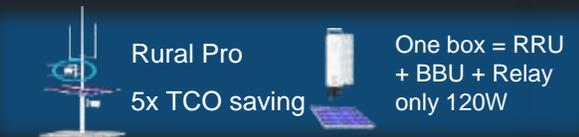
④ Scenario-4: High Quality Private Line Liquid OTN, Enriching SLA Monetization



⑤ Scenario-5: Digital Indoor Coverage 5G DIS, Adapted to Full Indoor Scenarios



⑥ Scenario-6: Connect the Unconnected Profitable Coverage for Remote Villages



Scenario-1: Fast HBB Connection - 5G FWA Series

5X Spectrum Performance Improve FWA Profitability



CPE High performance
 ✓ Higher antenna gain(11dBi)
 ✓ 4R/8R CPE, double capacity

WTTX Suite E2E Capability



- '1' minute service provisioning
- '1' hour easy digital installation
- '1' unified platform for operations

Dense Urban mmWave CPE



200m~300m

Urban CPE Win



500m~1km

SME N5368X

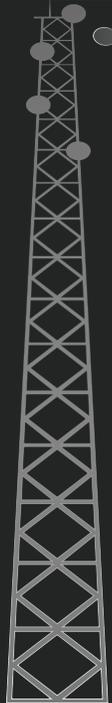


600m~1.2km,
Ave. Speed: 600Mbps

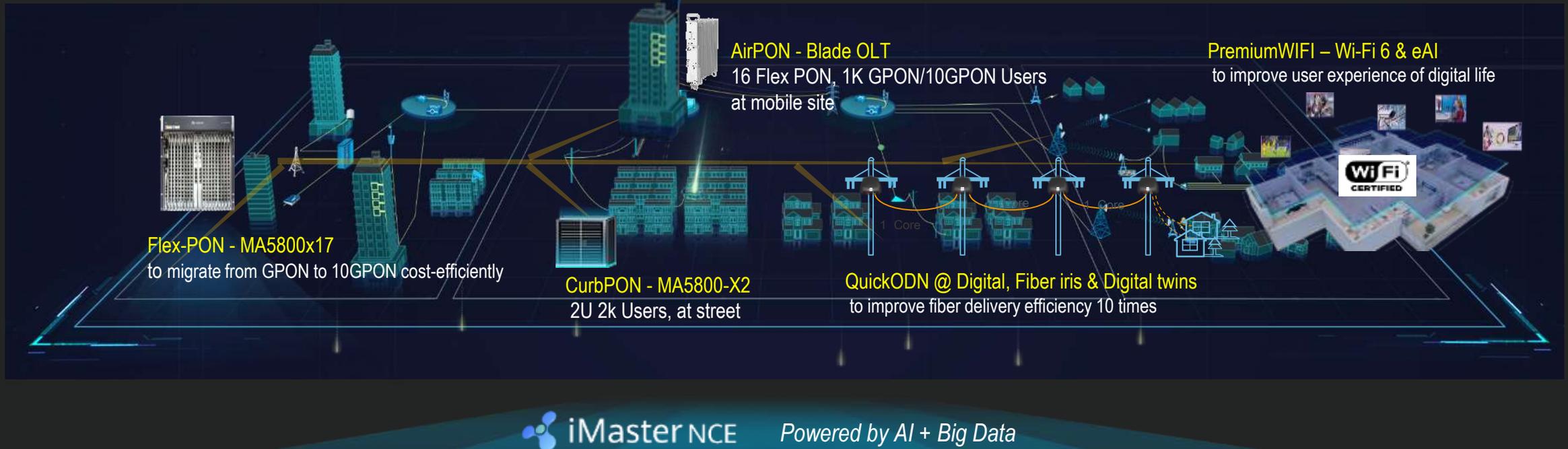
Suburban N5368X2



1km~2km, Ave.
Speed: 500Mbps



Scenario-2: Giga Home Powered by SingleFAN



1 Fiber for Multi-Services

- **1st Network Slicing** for 2H/2B/2C
- **2H:** Wi-Fi 6 + EAI for **Cloud VR, Gaming**

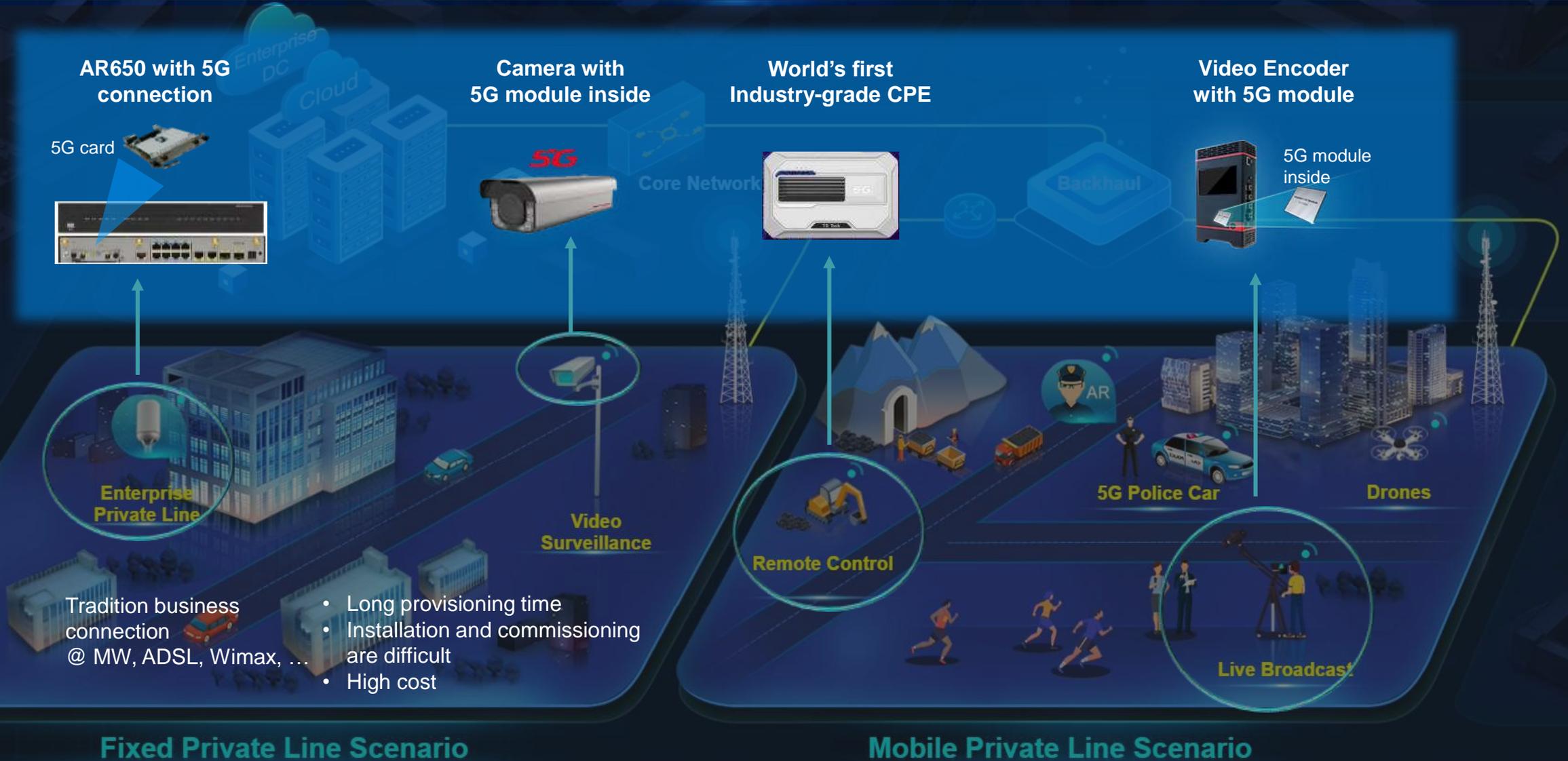
1 Network for Multi-Scenarios

- **AirPON:** Blade OLT Reusing Mobile Sites
- **CurbPON:** Copper to Fiber Reusing Fixed Cabinets

1 O&M for Multi-User Cases

- **AI & Big Data** Enables Proactive Wi-Fi O&M
- **Digital ODN** Visualize Passive Optical Network
- Application Acceleration Powered by **eAI**

Scenario-3: Rapid & Affordable Business Connection

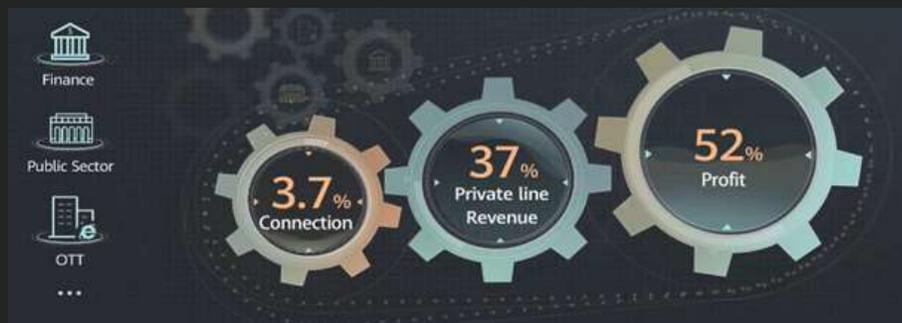


Scenario-4: High Quality Private Line - Liquid OTN

High Quality Everywhere

– Expand the market 50x

3.7% hard pipe connection contributes 52% profit

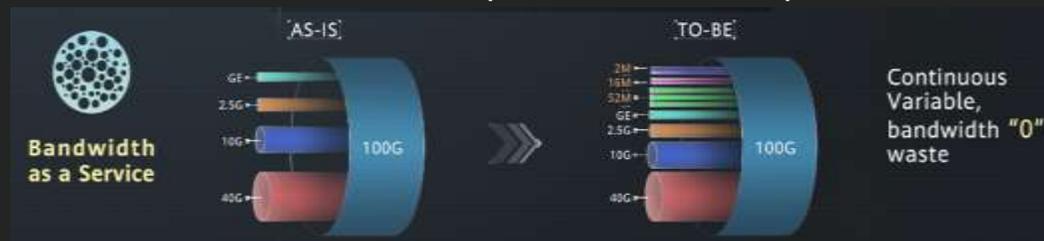


SME needs <100M hard pipe

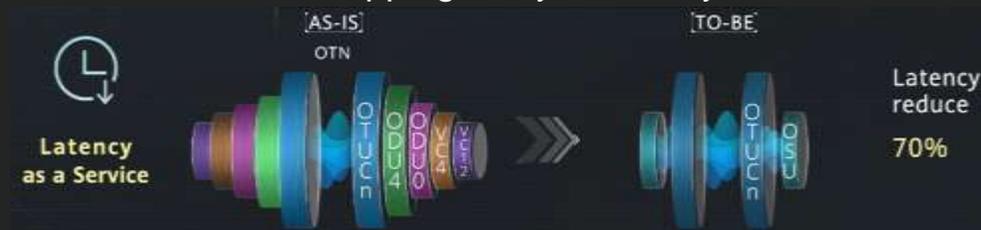


Liquid OTN: High-quality leased lines, granularity ranging from 2Mb/s to 200Gb/s with 5-level SLA

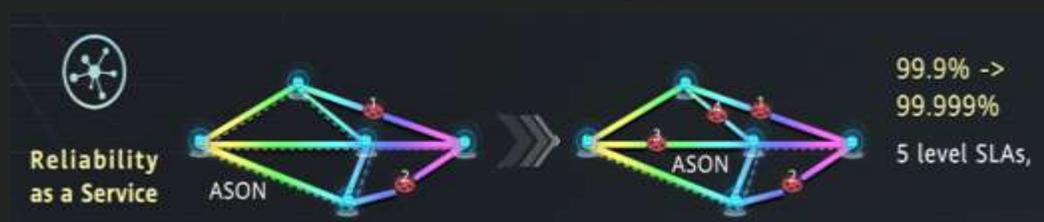
GE based step -> 2M based step



Mapping: 5 layer -> 2 layer



Traditional -> ASON

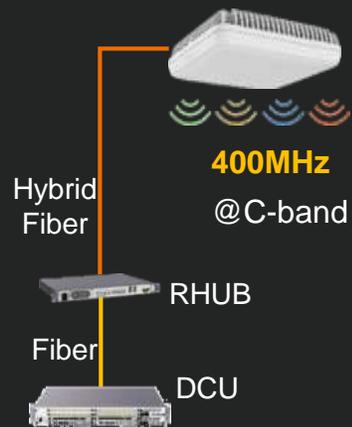


Scenario-5: Full Indoor Scenarios - 5G DIS Family

Continuous Innovation on DIS Solution

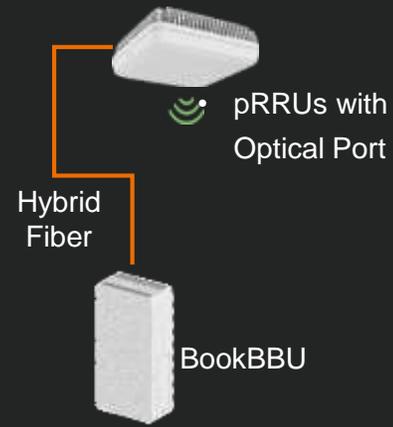
LampSite Sharing

- ✓ Multiple Operators Sharing @ **400MHz**
- ✓ Large Capacity

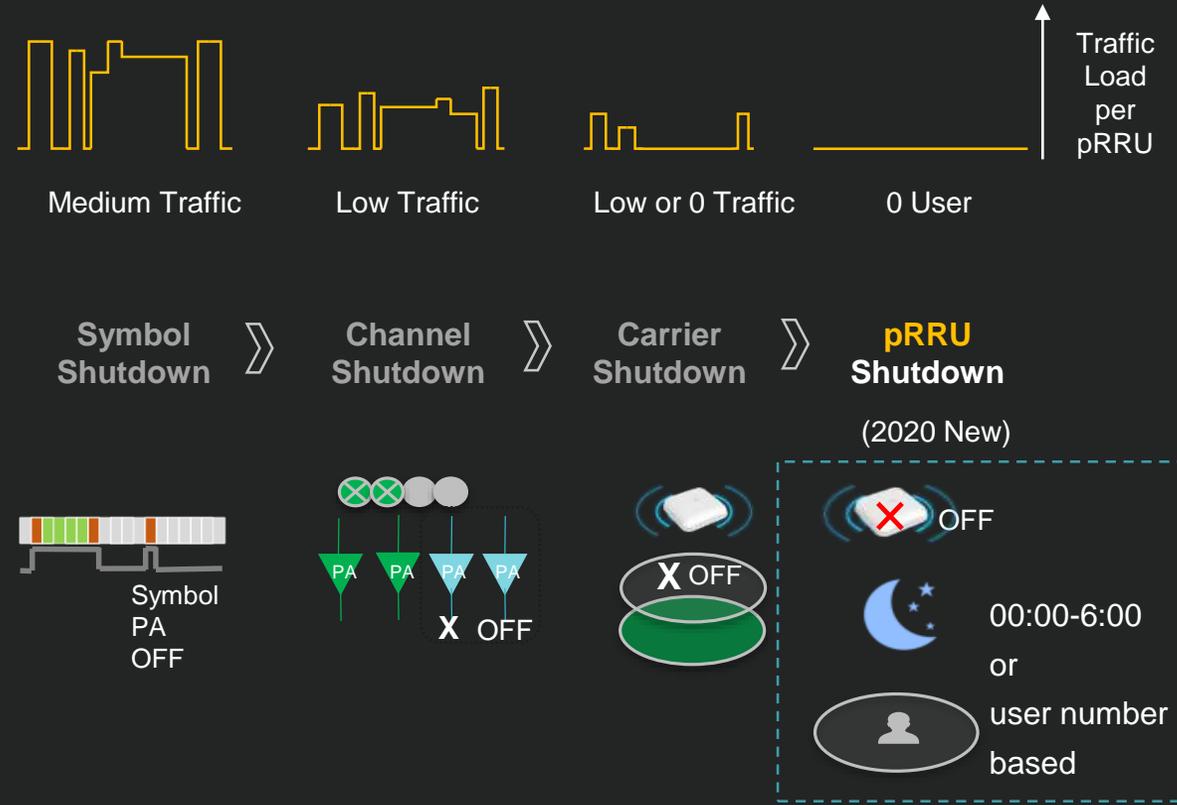


LampSite Spartan

- ✓ Simplified Networking for SME Coverage



Smart Power Saving Technology for Green 5G Building



Scenario-6: Connect the Unconnected - RuralStar Family

Optimized TCO, 3~5 years ROI, Profitable Coverage for Remote Villages



SAT †	Relay †	"0" Trans. OPEX
D.G. †	Solar †	"0" Energy OPEX
(A) Tower	Pole	55% civil work ↓





1 10 5G Leading Product & Solutions

2 6 Scenario-Oriented Innovative Solutions

3 3 Types of 5G Business Practices

4 2 Proposals of Future Network Transformation

B2C: 5G Enriches Life

5G Brings More Innovative Services

New Videos: More Details, More Immersive



1080p
120°2D



4K/8K, VR/AR
360°3D/4D



New Broadcast: "0" Distance to the Field



One
View



Free
View



New Game: Any Game, Any Device



Console
Game



Cloud
Gaming



5G is Creating New B2C Markets



330+ Millions

VR/AR Users @2025



\$150+ Billion

5G Cloud Game Market @2025

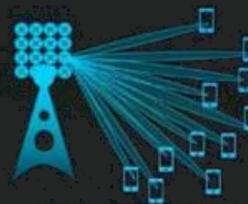


8%+ B2C

Revenue Increase @2025

Source: Huawei MI

Key Factors for Success in 5G B2C



Best Network Performance



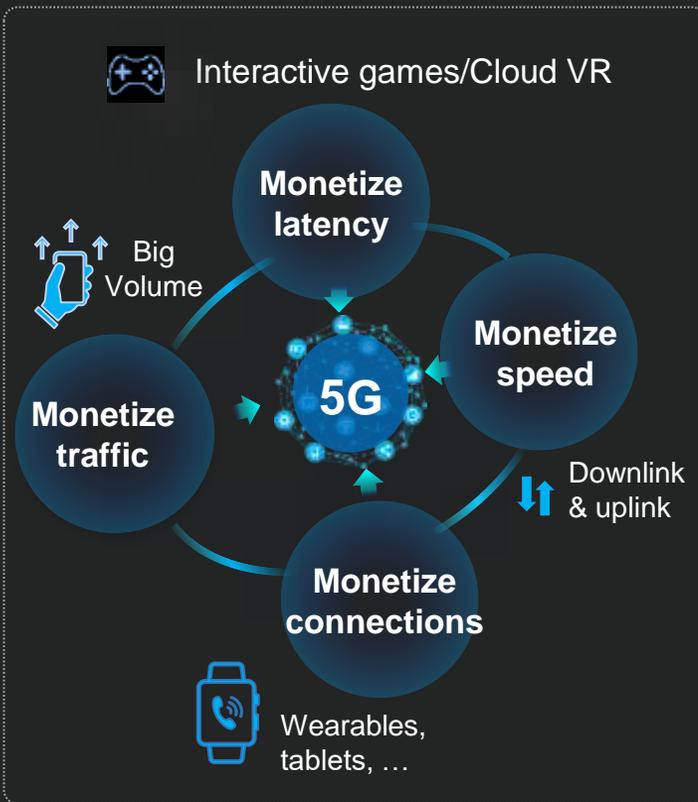
Innovative Contents



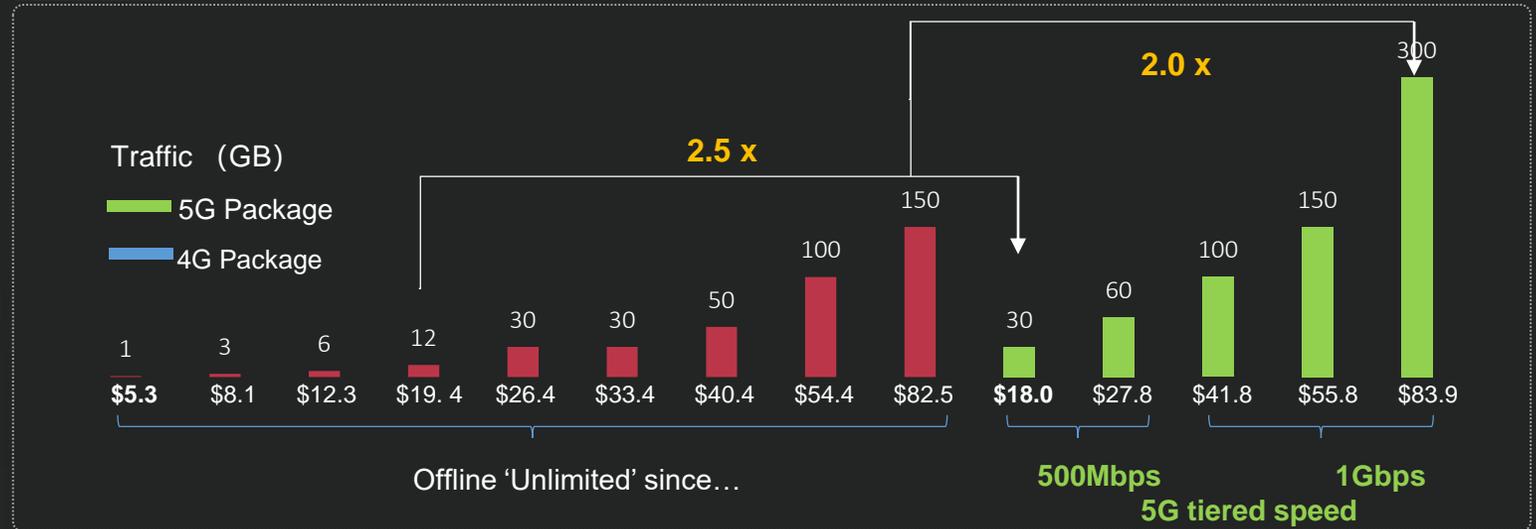
Smart Tariff

5G B2C Benefits from New Content and Smart Tariff Design

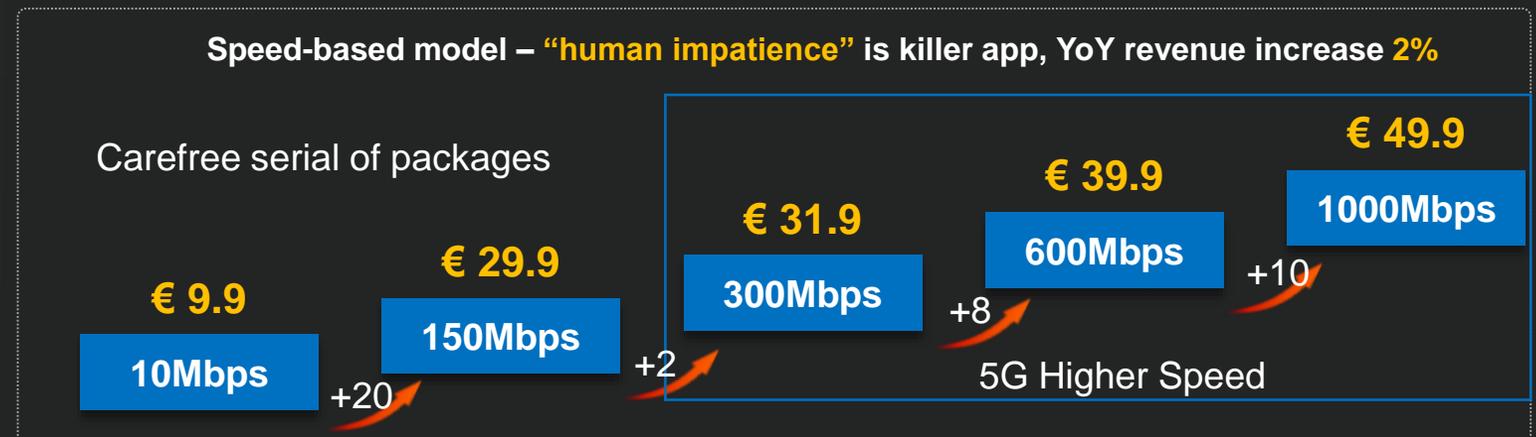
Redefine Tariff with New Metrics



Tariff design for traffic & speed

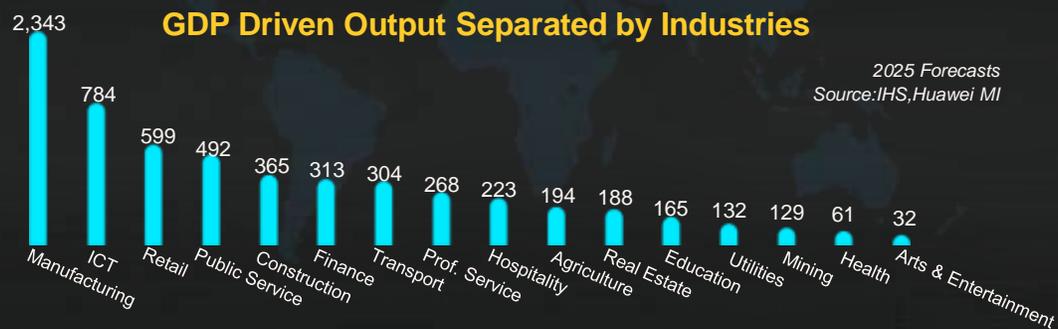


Tariff design for speed



B2B: 5G Inspires Industries

B2B Service is the Blue Ocean of Carrier Growth



The Journey for 5G B2B Success Begins with Connectivity



5G Leased Line



5G Campus



5G Public Safety



5G Transportation



5G Port

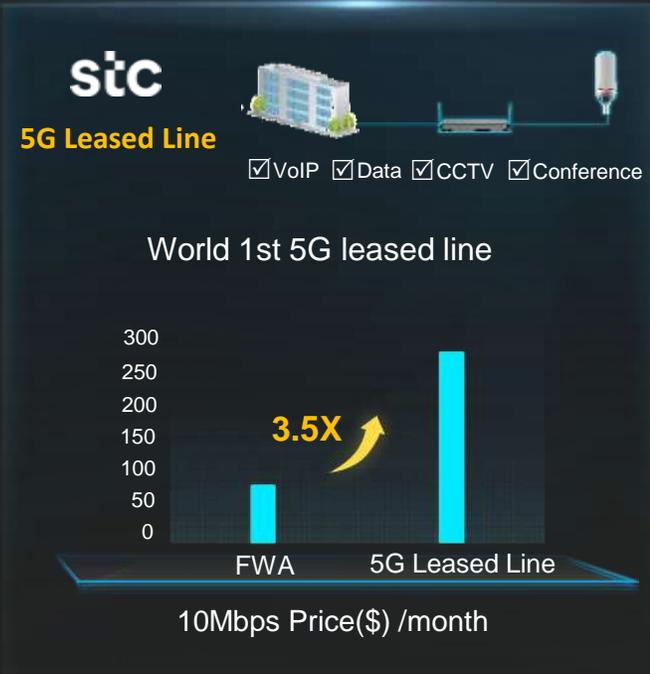


5G Manufacturing



Pioneers Start to Benefit From 5G B2B Market

Industry Connectivity



Connectivity with Cloud



Connectivity & Cloud Synergy



More Cases Expected at MWC



B2H: Wireless Fiber Provides HBB Last Mile Flexibility



Ultimate Giga Experience

- 4G FWA** 5-50Mbps
- 5G FWA** 100-1000+Mbps
- Same Profitability as eMBB**
5x Spectrum Efficiency VS eMBB
- High Performance Outdoor CPE**

Mobile Phone 100Mbps
 Outdoor CPE 100Mbps
 30+dB Coverage

Full-Scenario Support

- 4G FWA** Basic Broadband
- 5G FWA** Premium Broadband

- Connect the Unconnected
- Zero Copper
- Fiber Alternative

Better Business Prospects

- 4G FWA**
 - Volume Based
 - "Up-to" Speed
- 5G FWA**
 - Experience Based
 - Guaranteed Speed
- Flexible Investment**
 - C-Band & Sub3GHz: Hybrid eMBB / FWA
 - mmWave: On-Demand Deployment
- Fast ROI**
2 Years ROI @ FWA+eMBB



FWA Accelerates Home Broadband Deployments

Connect the Unconnected



Globe Innovative prepaid for the unconnected



Friendly and Affordable

Flexible and low-entry price



Nationwide LTE Network Available

Volume based tariff

Copper Killer



Telkom

FWA will replace copper over 5 years

Copper Pain Points

- **30%** Experience complains
- **68%** Copper Fault Rate
- **200K** Subscriber loss in 2018

Migration to FWA



Fiber Alternative



FWA directly hit the traditional fixed market

Clear Strategy : 5G FWA for Home

- Segment** **30M-100Mbps** high end users
- Experience** Peak Speed **428Mbps**, Average **215Mbps**

5G Precise Investment

Market Requirement



Network Requirement

Value area identification





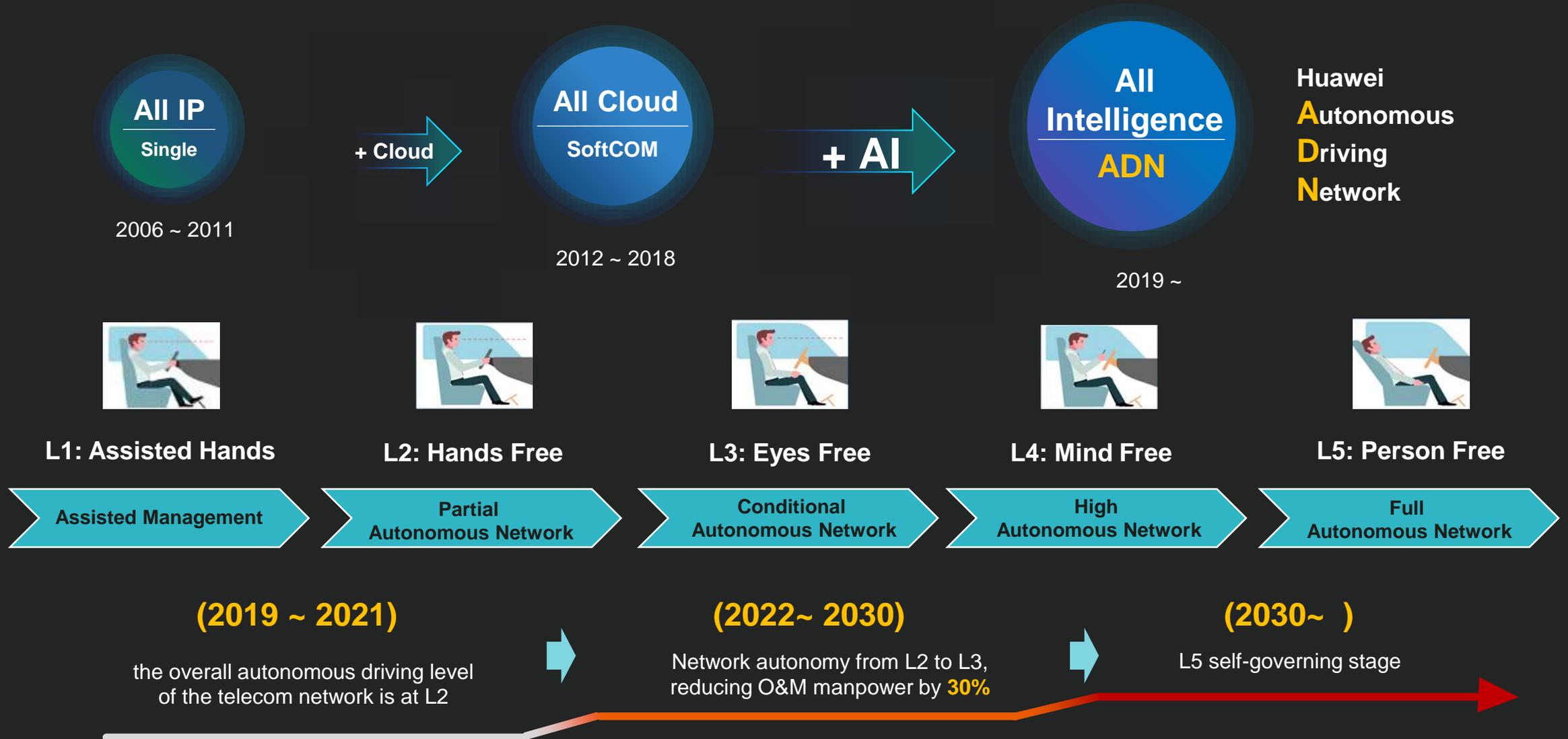
1 10 5G Leading Product & Solutions

2 6 Scenario-Oriented Innovative Solutions

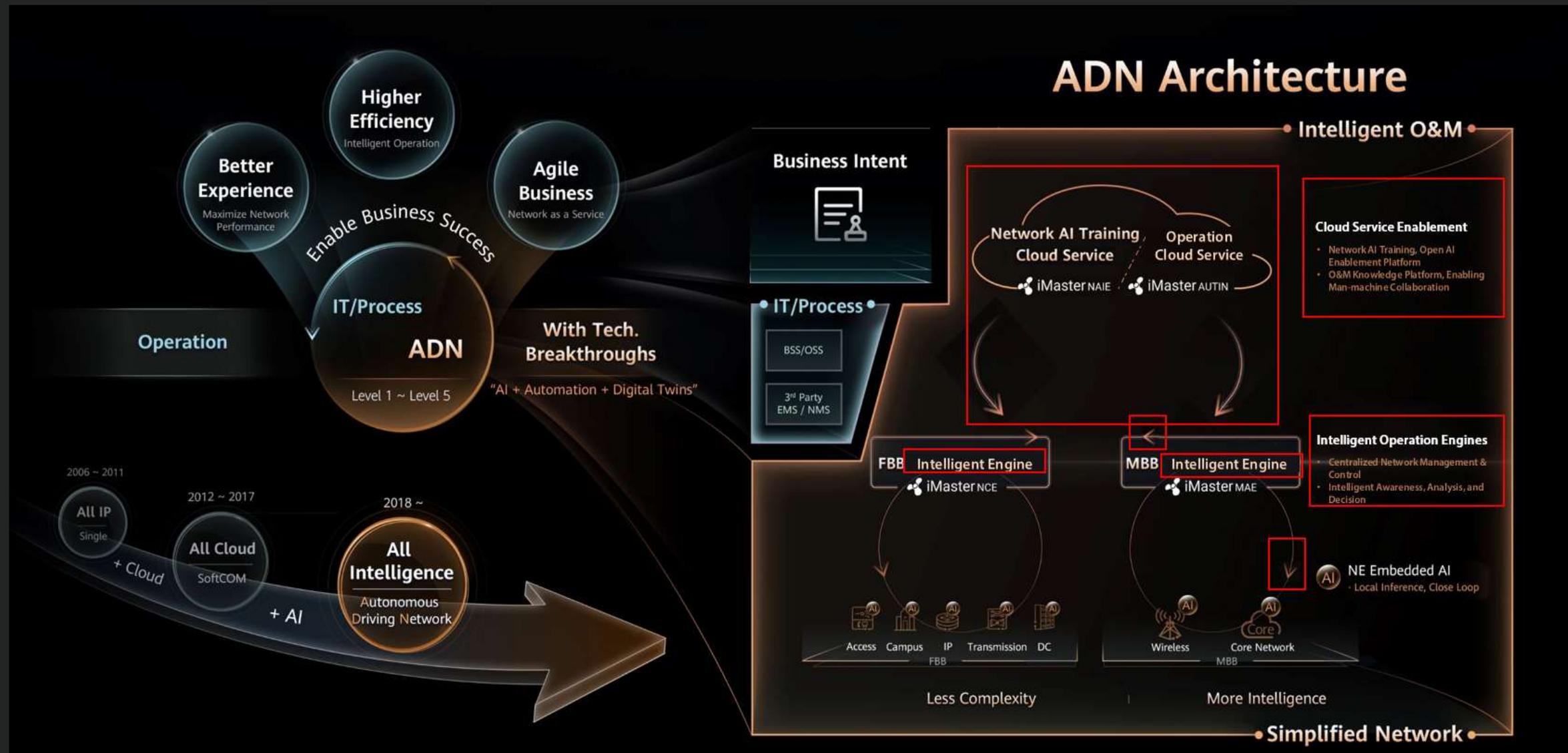
3 3 Types of 5G Business Practices

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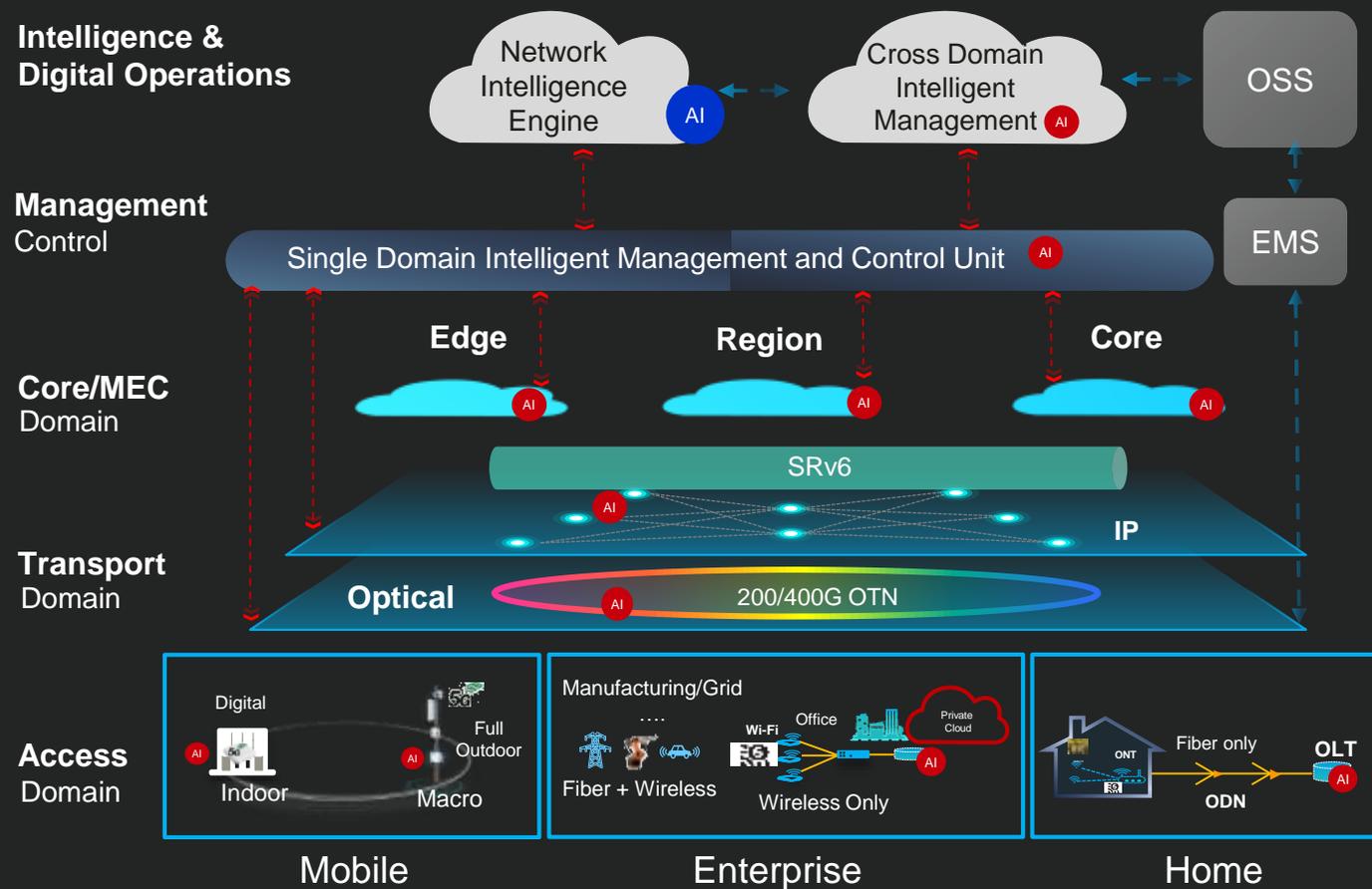
Future Networks Will Go Autonomous



Proposal-1: AND, Network Transformation for Long Term



Proposal-2: Network2025, Target Network for Middle Term



1. Intelligence

- three-layer AI : Device, network, and cloud

2. Simplified

- Simplified site, simplified architecture...

3. Congestion Free

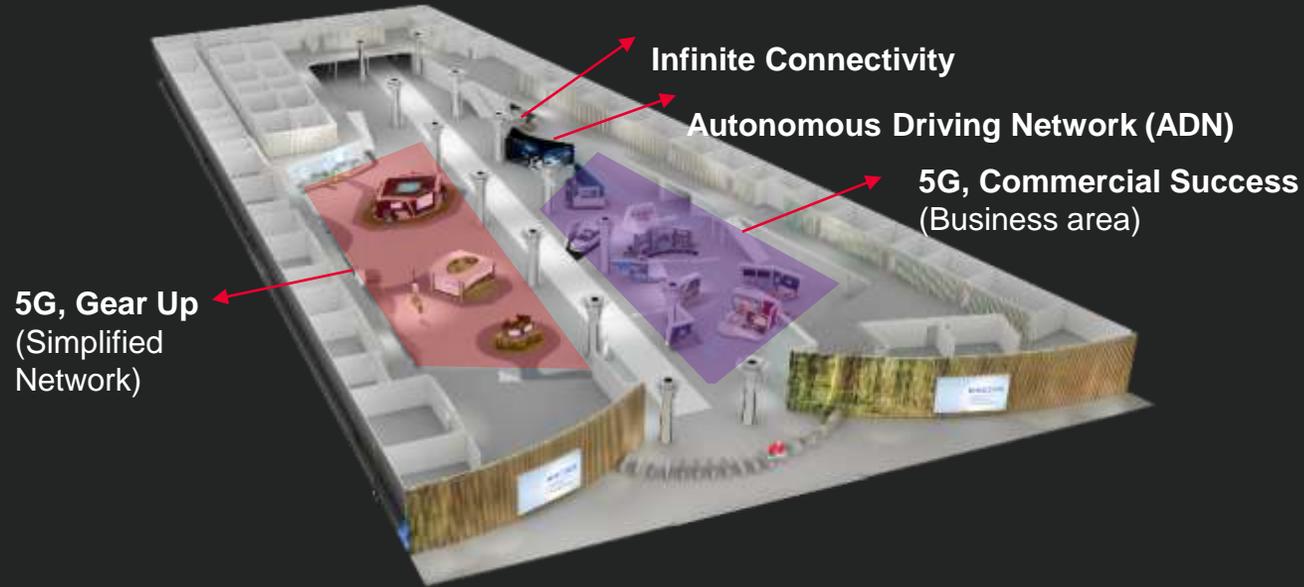
- Wireless, Transport, and Core bandwidth evolution

4. Deterministic Network

- Convergent MEC, E2E slicing ...

Summary: MWC2020, 5G Bring New Value

Hall-1 Layout



X-zone Hall



Huawei AAU



5G MW



NetEngine 8000 Series



Solar R6



600Gbps@4U

E9000H



MA5800



35DB
ClassD

Thank you.

把数字世界带入每个人、每个家庭、
每个组织，构建万物互联的智能世界。

Bring digital to every person, home and
organization for a fully connected,
intelligent world.

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① Simplified Energy Deployment in Full Link, TCO Saving 30%

Peak Shaving, Free of Grid Modernization

TTM 80% , Grid Modernization \$ 20k

Lithium Battery Discharged



One Site One Cabinet, Free of Adding Cabinet



- Power Capacity 36 kW
- Lithium Battery 600 Ah
- Power Multi-output, MEC Ready
- Solar Access

Voltage Boosting, Free of Trick Cable

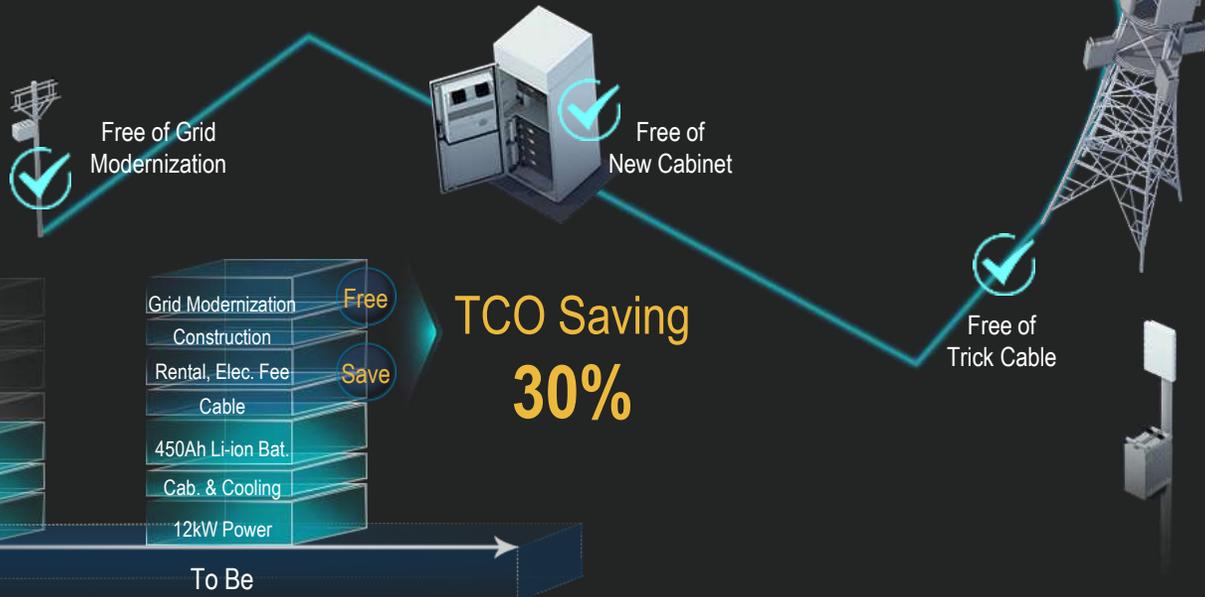
Power Distance 1.6x ↑ Elec. 1.9k KWh/(Year* Site)



Huawei



Industry



As Is	To Be
Grid Modernization	Grid Modernization Free
Construction	Construction Save
Rental, Elec. Fee	Rental, Elec. Fee Save
Cable	Cable Save
300Ah Lead Acid Bat.	450Ah Li-ion Bat.
Cab. & Cooling	Cab. & Cooling
12kW Power	12kW Power

TCO Saving 30%

One Site One Blade, Free of Cabinet

E2E Power Supply Efficiency 6% Improved

Huawei **6kW@15L**

Industry **6kW@33L**



Natural Cooling, 0 Maintenance



Fan Cooling, Twice Main./year

① Pole Site, Supersized 5G Experience on Demand

Scaled pole resources

- ▣ China Tower: **10+ mil.** Street poles
- ▣ Europe: **60 mil.** Traffic lights

TCO Saving

- ▣ No civil work
- ▣ Rental reduced by **73%** in Brazil

Fast Deployment

- ▣ **Easy** site acquisition
- ▣ Small/light, **Easy** installation

▪ CBD ▪

Easy Macro 3.0

- ▣ 1.8 + 2.6, 2.1 + C-band
- ▣ 4T4R + 8T8R
- ▣ 18 L / 18 kg

“Huawei Only” 4T+8T

▪ Residential ▪

Book RRU 3.0

- ▣ 2.1 + C-band
- ▣ 4T4R + 4T4R
- ▣ 12 L / 13 kg

“Huawei Only” Dual 4T

Book BBU

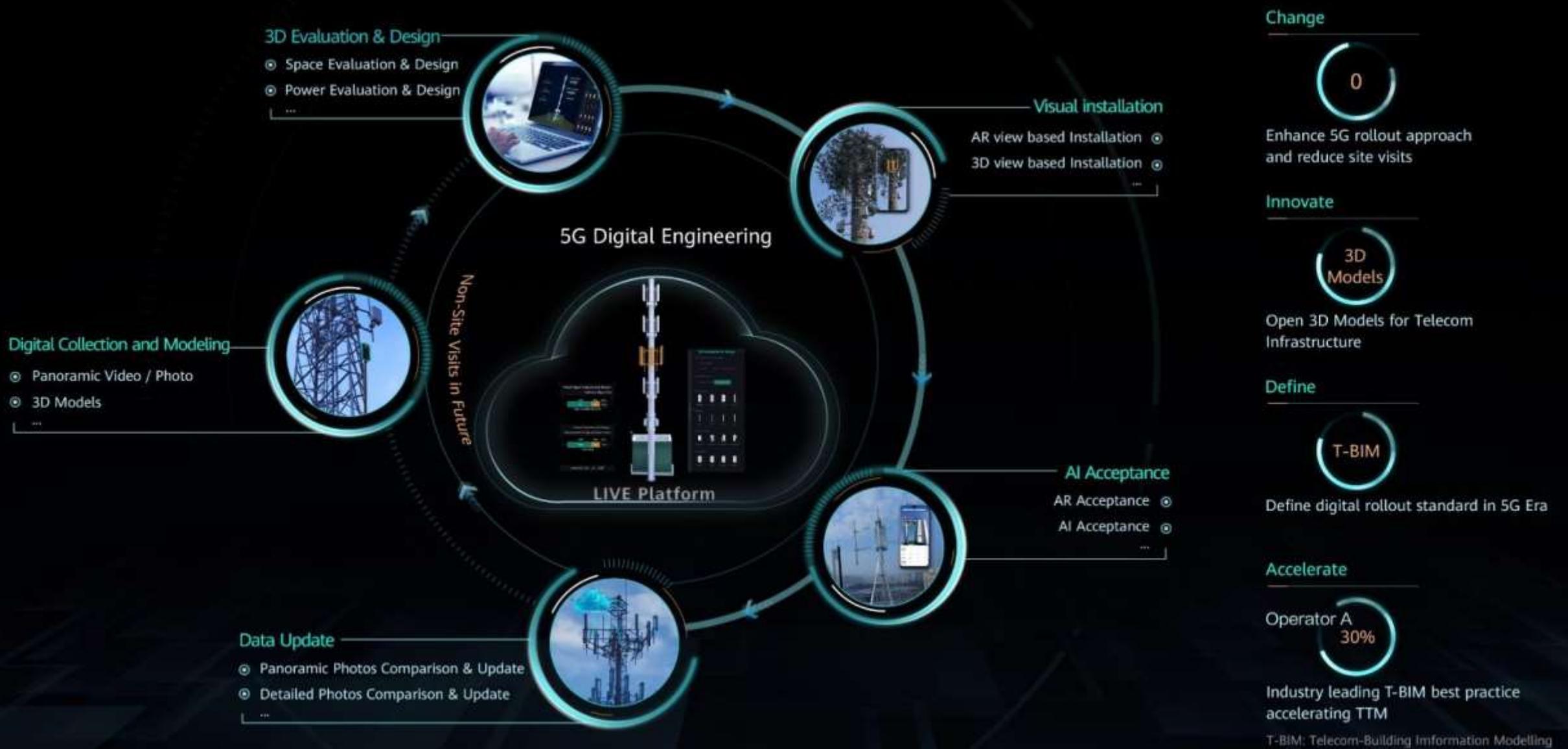
- ▣ Most compact BBU
- ▣ GUL, LTE & NR
- ▣ 8 L / 8 kg

▪ Villa ▪

Smart Pole Site

- ▣ Hidden BTS
- ▣ Support Easy Macro / Book RRU / mmWave
- ▣ Multiple functions

⑩ 5G Digital Engineering, Accelerate 5G Rollout



⑦ Industry's 1st All Optical Cross Connect Platform

Multi-Degrees Scenarios of OXC

Imbalanced traffic driving 3D reconstruction



Video and 5G service driving OTN to CO and flatten the network



Higher reliability & low latency driving backbone evolve to Mesh



OptiX OSN 9800 P32C



Optical line board
(1D1S + 1D1U)

All-optical backplane
("0" fiber connection)

CDC tributary board
(Ports per board: 16 + 48)

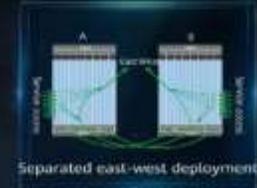
Global commercial shipments: 500+ subracks

Spain OXC Case

China Telecom OXC Case

Three Key Features of OXC

Dual Subrack Cascade



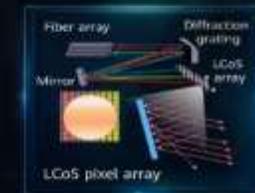
- East-west separation for cascade and redundancy
- Digital O&M for visible optical management

Optical Backplane



- Optical backplane: "0" fiber connection
- High-density connector; stable for 20 years

LCoS Based WSS



- MEMS + LCoS: CDC with 0 failure
- 2M + 10M pixels; Insertion loss < 50%

Pioneers Already Dig to the First Barrel of Gold in 5G 2B

Industry Connectivity

VIVA World 1st 5G leased line

Why replacing microwave with 5G leased line?

Capex	\$2,000	VS	\$500
Coverage	LOS Restriction	VS	No Location Restriction
TTM	2 Weeks	VS	2 Hours
Visibility	No Visibility	VS	24H Visibility

Benefits

Committed SLA

- SLA: 99.9%
- Latency≤100ms
- Jitter <4ms

More Services

- Data
- VoIP
- CCTV
- ...

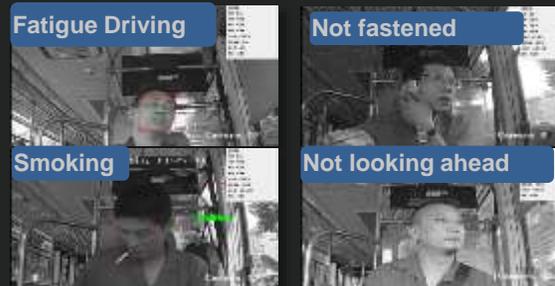
Better Operation

- 3X operation efficiency
- 2X better user experience

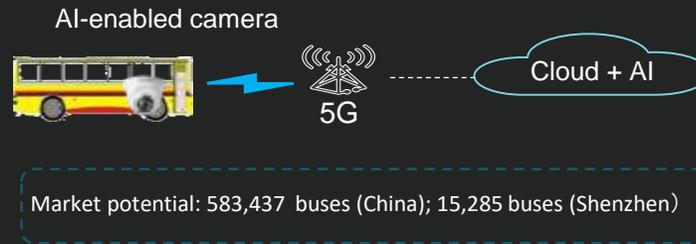
Connectivity with Cloud

China Unicom 5G for a safer transportation

Dangerous driver actions



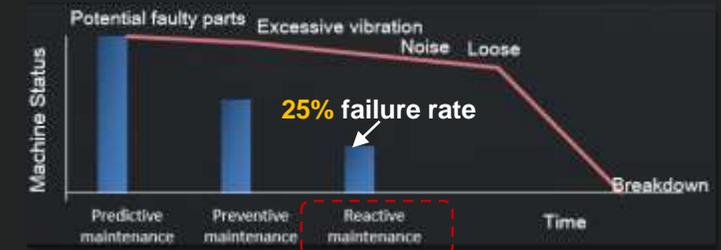
5G+AI+Cloud for driver action identification



Connectivity & Cloud Synergy

Sunrise 5G for precision manufacturing

Traditional reactive maintenance causes faults



Predictive maintenance requires 5G

- Low latency : <10ms
- Money saving: 20M Euro per factory per year

Georg Fischer + Industry partners

- Precision equipment
- Predictive maintenance sensor
- Data analysis APP/Dashboard

Sunrise + Huawei

- 5G Indoor Coverage
- MEC Solution
- E2E network integration

More Pioneers Cases: Seen in MWC

