

# Wireless Broadband Connectivity

## On Board and On the Ground

Learn how to provide an train-to-ground connection at more than 1Gbps at 160km/h





# Wu Ping (Daniel)

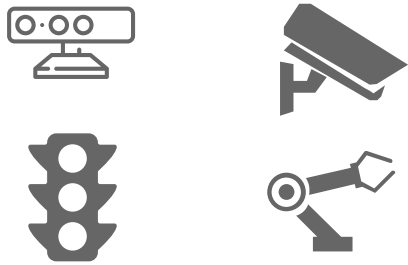
CTO of Huawei Datacom Product Line Europe Branch

- Joined Huawei in 2007, 15 years of experience in the data communication field
- Now based in Paris
- Take charge of market insight, solution architecture, customer requirement analysis and product management of the European market

# 3 Services Trends and Challenges of the Transportation Industry

## Services

### IoT/ Big data and Video&Audio



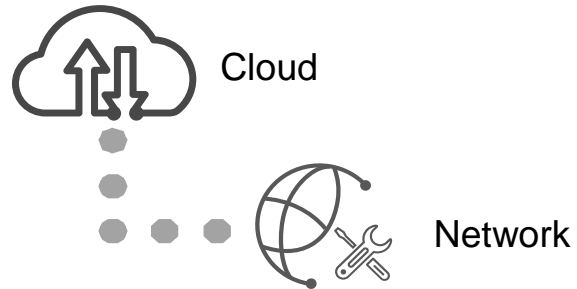
- More sensors and multidimensional data
- More cameras for intelligent environment identification
- More automated emergency response



All IoT things need to be connected to high bandwidth IP network

## ICT

### Cloudification



- Real-time data collection
- Cloud-based big data storage and analytics
- Multi-sites and Multi-clouds interconnection



Guaranteed cloud application experience and highly reliable network

## Network

### Wireless

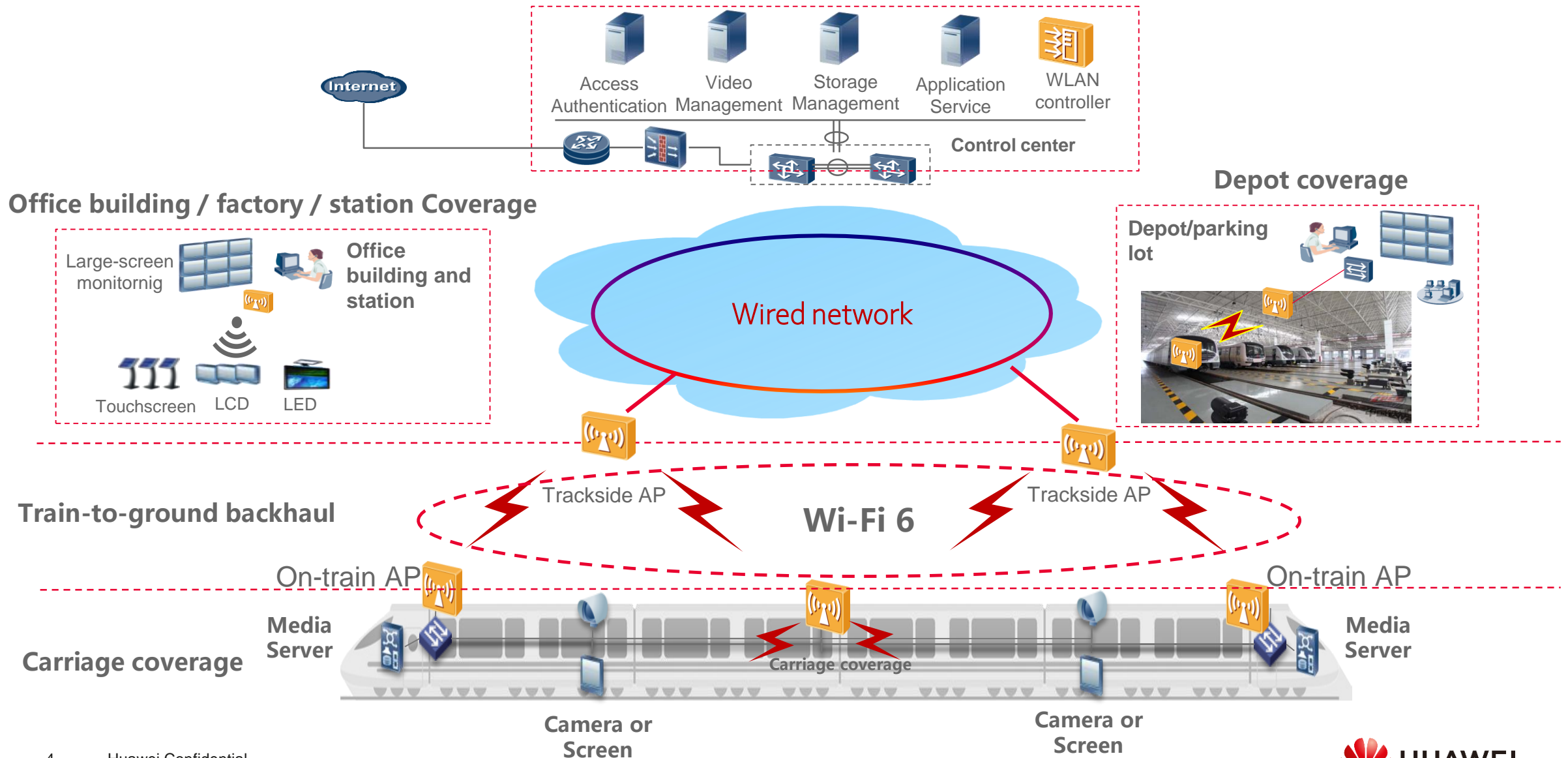


- Real-time data backhaul during fast movement using wireless technology
- 5G for public wireless network and Wi-Fi 6 for self-build wireless network

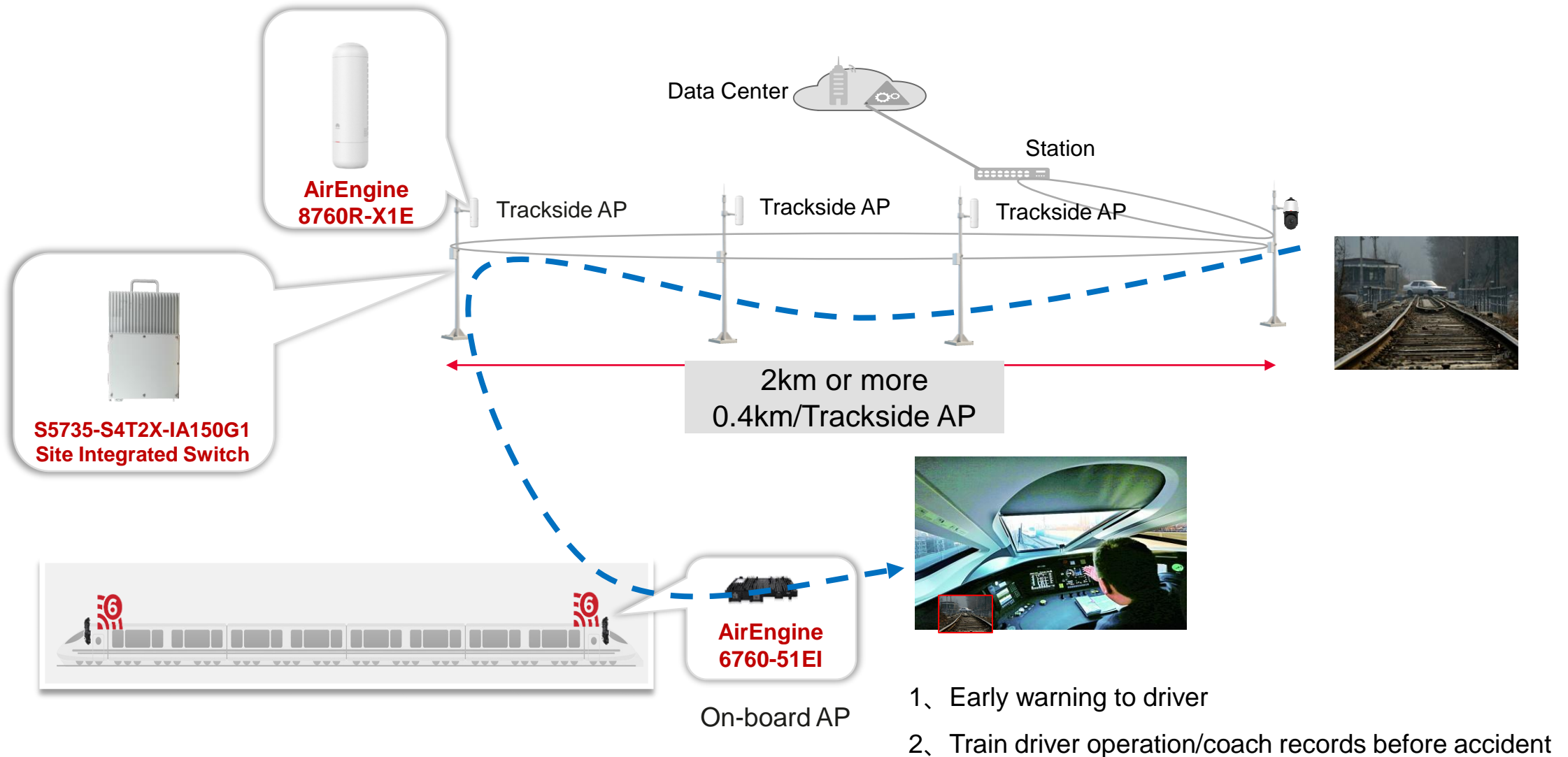


High bandwidth **Train-to-Ground Wireless Connection** in high speed mobility

# Overall Wireless Scenarios for Rail Transportation



# Use Case: Live Warning on the Road Ahead

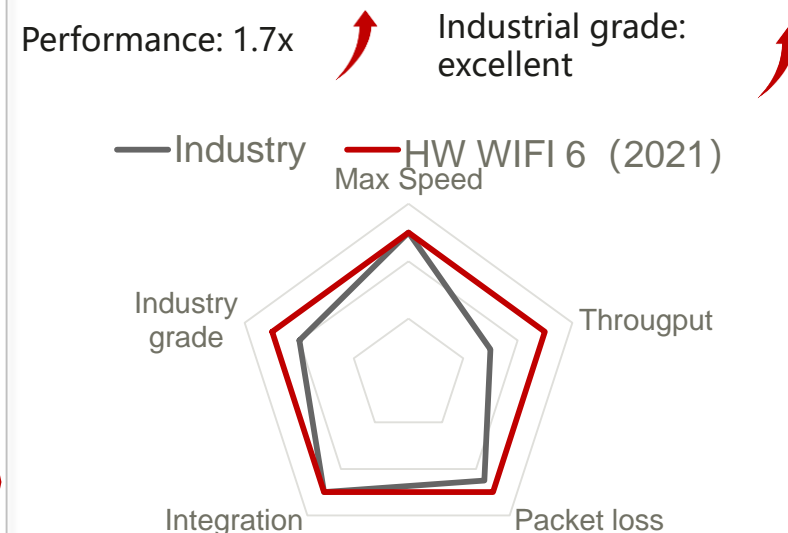


# Real-time Backhaul Bandwidth Requirement: A Single train > 492 Mbit/s

## Bandwidth Requirement Analysis

	Head	Device Monitoring	Carriage
Camera Configuration	3 / Head * 2	1/ pantograph*2	6/car*8(max)
Monitoring Standards	1080P	1080P	1080P
Bandwidth requirements	$(3*2+2*2+6*8) * 8M=464Mbps$		
PIS Video	8 Mbit/s (multicast)		
Vehicle TCMS Business	20Mbps		
<b>Total Bandwidth Requirement</b>	<b>492Mbps (8-section grouping)</b>		

## Huawei Brings Better Connection



## Test results of One Wi-Fi6 AP

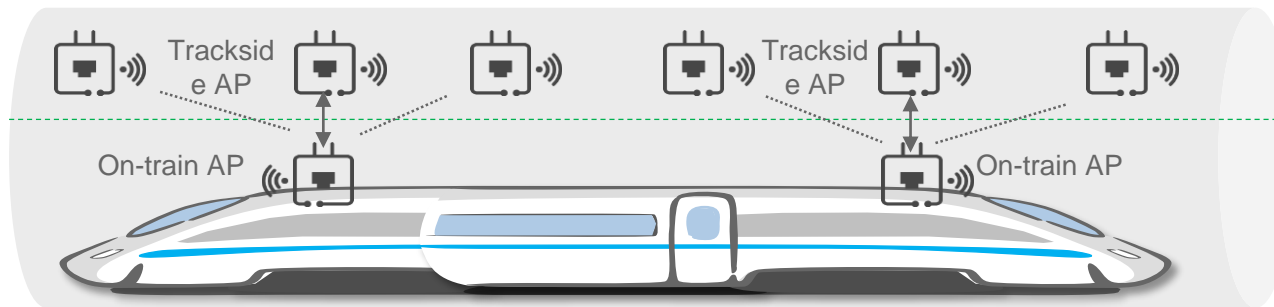
Speed	Protocol	HW	industry
80km/h	TCP	900Mbps	481Mbps*
120km/h	TCP	800Mbps	374Mbps
<b>160km/h</b>	<b>TCP</b>	<b>720Mbps</b>	352Mbps

\* The industry data is the test data of China Iron Science Institute.

# AirEngine Series APs for Rail Transit: Real-Time Backhaul of Intercity Railway

Industry's strongest train-to-ground backhaul solution for rail transit, far ahead of those offered by other vendors

PIS and compartment surveillance video must be backhauled in real time to the control center.



**Vehicle-mounted AP**  
AirEngine 6760-51E1



**Integrated chassis for vehicle-mounted AP**  
Compliance with EN50155



**Full-series (low-, mid-, and high-end) trackside APs**  
AirEngine 87/67/57



**Integrated chassis for trackside AP**  
Compliance with trackside shockproof specifications; IP66-rated protection



## Huawei's competitiveness

### High bandwidth

- Built on self-developed chip; Midamble channel estimation algorithm
- Max 1.4 Gbps @ 160 km/h, 2x that of the industry rivals**

### Fast handover

- MBB ultra-fast soft handover technology
- < 30 ms @ 160 km/h, zero packet loss for services**

### Stable running

- Professional shockproof, waterproof, and fireproof
- Active-active links for high-reliability assurance, zero disconnection for services**

### Easy deployment

- Integrated chassis
- Easy deployment, reducing labor costs by 70%
- Installation period shortened by 80%

## Success stories



深圳地铁



大连地铁  
Dalian Metro

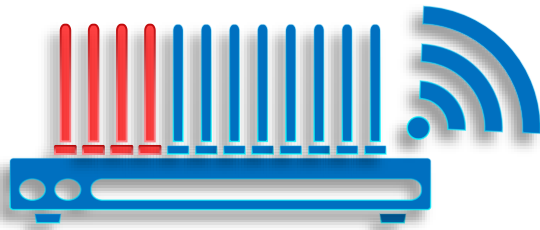


Istanbul Metro

# Why Huawei Wi-Fi6 can Provide Max 1.4 Gbps @ 160 km/h for One Train

## The Unique 12T12R Radio

OFDMA+MU-MIMO



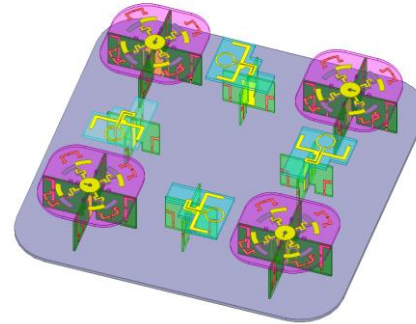
5GHz 12T12R

( Number of spatial streams x 1.5 )

8T8R@HE160MHz

( Effective frequency bandwidth x 2 )

## The Unique 4 Element Smart Antenna



AP coverage area

40% ↑

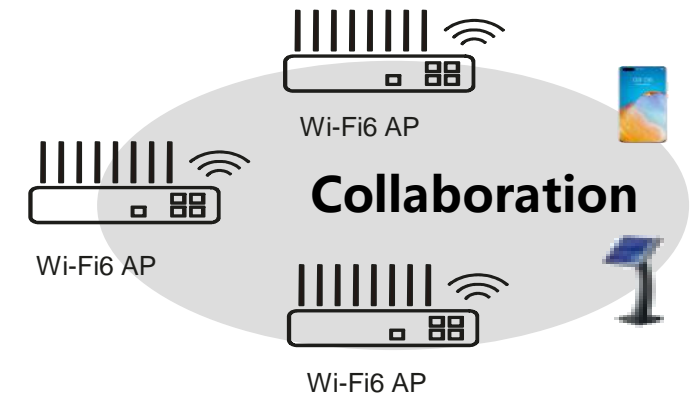
Signal strength of STAs  
in the same location

100% ↑

Network construction  
cost

20% ↓

## 5G-Powered Smart Radio Algorithm



Whole Network  
Bandwidth

35% ↑

Fast roaming  
packet loss

0

Switching time at  
160 km/h

<30ms





# Thank you.

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

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