Building a Fully Wireless, Intelligent Cloud Campus Network

Huawei CloudCampus 3.0 Solution

HUAWEI

Cities, Excluding Roads, Are Composed Entirely of Campuses

90%+
of urban citizens work and live in campuses

80%+
of GDP is created in campuses

90%+
of innovation happens in campuses

5h & 22h
on average spent using intelligent terminals and residing in campuses, respectively, every day

HUAWEI

However, Enterprise Campus Networks Face New Challenges in the Cloud Era…

Digital transformation trends

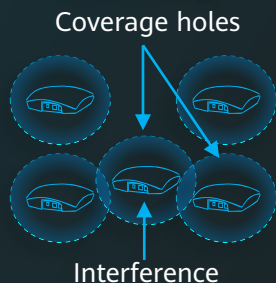**100x**
wireless terminal connections
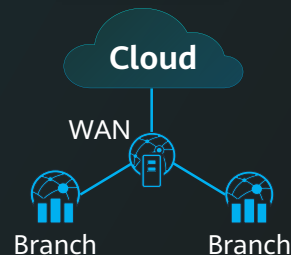
1 network
with global service interworking

80%
of applications deployed on clouds
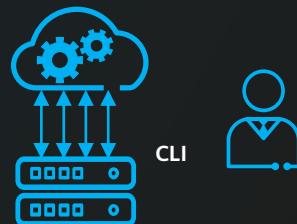
Campus network evolution challenges

Discontinuous Wi-Fi networking

Coverage holes

Interference

Cross-domain fragile architecture

Cloud

WAN

Branch   Branch

Cloud outpacing network

CLI

Trouble ticket-driven operation

Engineers

HUAWEI

Post-Pandemic Enterprises Embrace Digitalization of Work and Production, Posing New Expectations for Campus Networks

Working from home is the new normal

Twitter employees don't ever have to go back to the office (unless they want to)

Google says that the majority of its employees will work from home until 2021
Some essential staffers will be allowed back in June or July
By Chaim Gartenberg | @cgartenberg | May 8, 2020, 2:10pm EDT

Microsoft updates WFH policy, lets employees work remotely through October

Morning Coffee: JPMorgan bankers will be working from home forever.

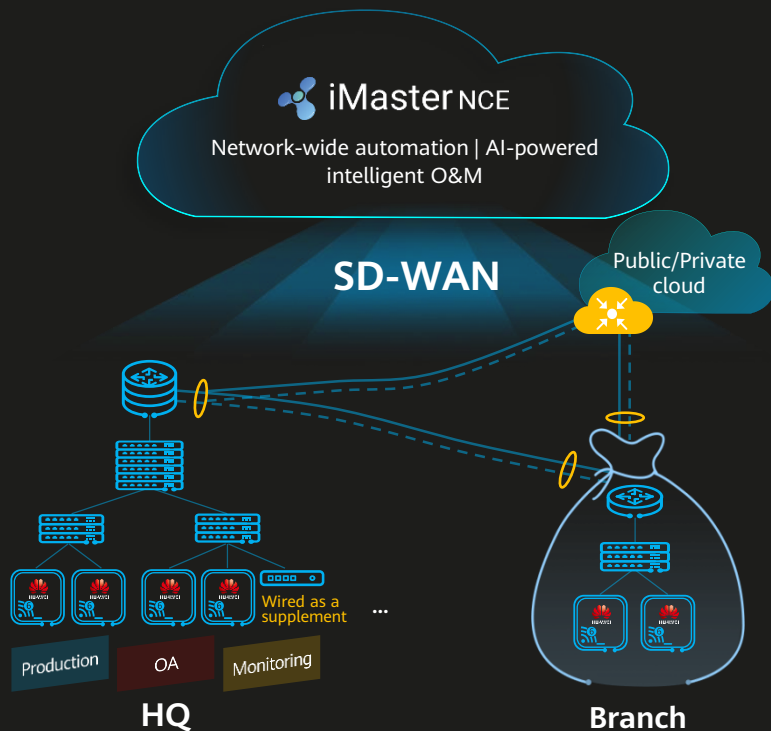**Social distancing requires contactless workspaces**

Audio and video have become new production tools

New characteristics of future campus networks:
Super Capacity | Intelligent Experience | Autonomous Driving

Huawei CloudCampus 3.0 Solution: Building a Fully Wireless, Intelligent Cloud Campus Network

iMaster NCE

Network-wide automation | AI-powered intelligent O&M

SD-WAN

Public/Private cloud

Wired as a supplement

Production   OA   Monitoring

HQ

Branch

Intelligent O&M
- Visualized user experience with CampusInsight
- Unique intelligent O&M of LANs and WANs, fault locating in minutes

90%
fewer complaints

Cloud management
- One controller across WANs, LANs, and WLANs
- End-to-end SDN automation

50%
OPEX savings

One global network
- SD-WAN intelligent traffic steering
- Unique SRv6 enables one hop to cloud

40%
lower interconnection costs

Fully wireless networking
- Continuous networking at scale, coverage with no blind spots, and interruption-free services
- PCC hybrid cables deliver ultra-large bandwidth

40%
higher productivity

HUAWEI

Wi-Fi 6 Wireless Network Replaces Wired Network Perfectly, Enabling More Innovative Applications

4K conference
70 Mbps bandwidth, latency < 100 ms

Immersive education
AR/VR, latency < 10 ms

Factory automation
AGV roaming: zero packet loss, latency < 10 ms

Extending from workplaces to production, and enabling more innovative applications

Scenario	Application	Bandwidth	Latency	Terminals	Wired	Wi-Fi 5	Industry Wi-Fi 6	Huawei Wi-Fi 6
Office application	4K conference	70 Mbps	100 ms	10–30	✓	✓	✓	✓
	AR/VR	100 Mbps	10–20 ms	30–50	✗	✗	✓	✓
Production application	AGV	512 kbps	10 ms	500–1000	✗	✗	✓	✓
	Production automation	10 Mbps	4–10 ms	20–50	✓	✗	✗	✓

HUAWEI

Huawei Wi-Fi 6 Enables Continuous WLAN Coverage and Independent Networking

Discontinuous coverage of traditional Wi-Fi
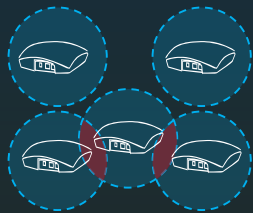
Challenges to traditional continuous WLAN networking

- Coverage holes
- Vulnerable to co-channel interference
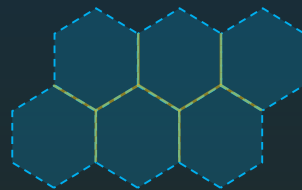- Prone to in-roaming interruptions

No blind spots

Exclusive 3D network planning

- **30-minute** planning for a campus with 10K users
- **3D** signal simulation and roaming, intuitively demonstrating the effects of planning

No coverage holes

Industry's unique 4-element smart antennas

- **Always-on signals** for users
- **20%** longer coverage range

Interruption-free roaming

Exclusive AI-powered roaming technology

- **Proactive** roaming
- **96%** roaming success rate

HUAWEI

Huawei's Concepts for Building a High-Quality Fully-Wireless Campus

Intelligent

- Real-time insight into network quality
- Intelligent network optimization
- Intelligent network O&M

X as a service (XaaS)

- Fast network provisioning
- Elastic device scaling

Experience first

- VIP and mission-critical application assurance
- KPI → KQI

Scenario-tailored

- Scenario: office, meeting room
- Hardware, service, and process orchestration

Fully wireless

- Fully-wireless campus
- Mobile office
- Tri-screen interaction

Real-time

- Real-time service handling
- Real-time decision making

On-demand

- On-demand resource acquisition
- On-demand service subscription

All-online

- Online experience
- Online transaction, delivery, and acceptance

DIY

- Self-service and customization
- DIY service orchestration

Social

- Social communication
- Collaborative work

ROADS experience

Fully-Wireless Campus: Bridging the "Last Meter" in Fully-Wireless Meeting Rooms

WeLink-Board

Send meeting minutes with one click using the e-whiteboard.

Wireless projection

Join telepresence meetings by scanning QR code.

"Last-meter" connectivity for more efficient team collaboration and higher efficiency

Send meeting minutes to a mailbox with one click using the e-whiteboard.

Wireless projection

Join meetings by scanning QR code.

Experience First: Shifting Focus from KPIs to KQIs and Constructing WLANs Based on User Experience

High-quality new apps				
	Videoconferencing	Live streaming	Wireless projection	Wireless VDI
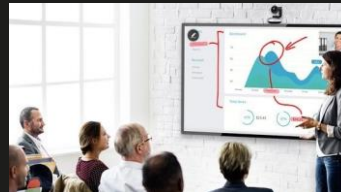
KQI		Videoconferencing/Live Streaming
	Initial buffering latency	< 2.8s
	Frame freezing times	≤ 1
	Frame freezing duration	< 2%

	Wireless Projection
Initial buffering latency	N/A
Frame freezing times	≤ 1
Frame freezing duration	< 2%

	Wireless VDI
Initial buffering latency	N/A
Frame freezing times	≤ 1
Frame freezing duration	< 2%

KQI (based on users' real impressions of applications): user experience-centric

KPI (based on device parameters, bandwidth, latency, jitter, etc.): centered on large bandwidth

KPI		720p	1080p	4K
	Bandwidth (Mbps)	8	16	32
	Latency (ms)	60	50	40

	Wireless Projection
Bandwidth (Mbps)	32
Latency (ms)	55

	Wireless VDI
Bandwidth (Mbps)	25
Latency (ms)	20

XaaS: Cloud-based Network Architecture Decouples Services from the Network, Implementing Network as a Service (NaaS)

Network deployment for numerous sites

- Rep office
- R&D center
- OpenLab
- Retail store

One network for multiple purposes

- Office, R&D, and production networks
- Red, yellow, and green zones

Instant provisioning of network services

- Guest Wi-Fi
- Proxy permission
- BYOD
- VIP network service

Management and O&M of numerous sites

- Remote site device replacement
- Traffic visibility
- Remote fault locating and rectification

Innovative services

- Asset management
- Terminal compliance check
- Traffic statistics
- Space management

Decoupling of services from the network

Cloud-based network architecture

Fully Wireless Networking: All-New AirEngine Wi-Fi 6, Ideal for Continuous Networking in All Scenarios

2x signal strength
@ hotel guest rooms

20% greater coverage distance
@ intelligent stores

Interruption-free roaming
@ mobile offices

50% higher concurrency
@ electronic classroom

AirEngine 5761-11W/12W

Dual radios (2+2),
up to 1.775 Gbps

AirEngine 5761-11

Dual radios (2+2),
up to 1.775 Gbps

AirEngine 5761-21

Dual radios (2+4),
up to 5.38 Gbps

AirEngine 6761-21T

Triple radios (2+2+4),
up to 6.38 Gbps

HUAWEI

Hybrid Cable: Optimal Choice for WLAN Data Backhaul in the Wi-Fi 6 Era

CloudEngine hybrid optical-electrical switch

AirEngine Wi-Fi 6 AP

- **15** patents, **industry's first** hybrid optical-electrical access
- Power supply at an ultra-long distance of **300 m**
- **Superfast** 10GE access via optical fibers

Hybrid cable　　**10GE**　　**25GE**

- Superconductor red copper material, industry-leading **100 W PoE** power supply
- Thin wall insulation, industry's thinnest **6 mm** hybrid cable
- **±6 kV** outdoor surge protection

		Hybrid cable	VS	Cat6A
3x PoE distance		300 m	VS	100 m
Nx transmission speed		N x 10 Gbps	VS	10 Gbps
5x cable service life		30 years	VS	5–7 years
30% Lower deployment costs		0.7 A	VS	A

HUAWEI

Innovative RTU: Pay-as-You-Grow, Building a Scalable Campus Network

CAPEX down 38%

40GE

10GE

2.5GE

RTU

RTU

RTU

Wi-Fi   Wi-Fi

100GE

25GE

5GE

Wi-Fi   Wi-Fi
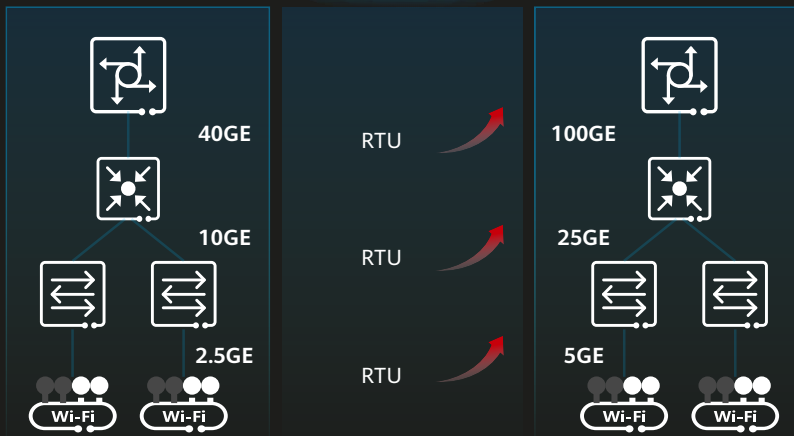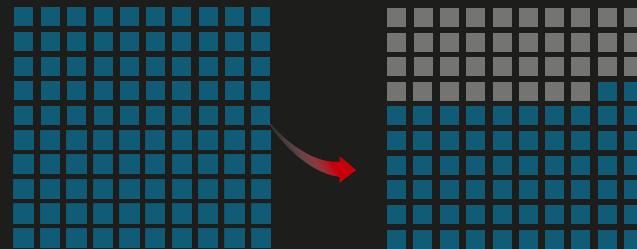
03 **Flexible network bandwidth upgrade** via RTU licenses to meet future needs

**02** **On-demand purchase of** 24-port or 48-port models (with all-2.5GE, all-5GE, or all-10GE rates)

01 **Improved ROI:** pay-as-you-grow

RTU is short for right to use. Customers can flexibly choose RTU licenses to improve the spatial streams of APs as well as the port speed and switching capability of switches.

salesforce
Skype   Google
zoom   aws   ZOHO

HUAWEI

One Global Network: Huawei SD-WAN Enables One-Network Reachability for Global Services
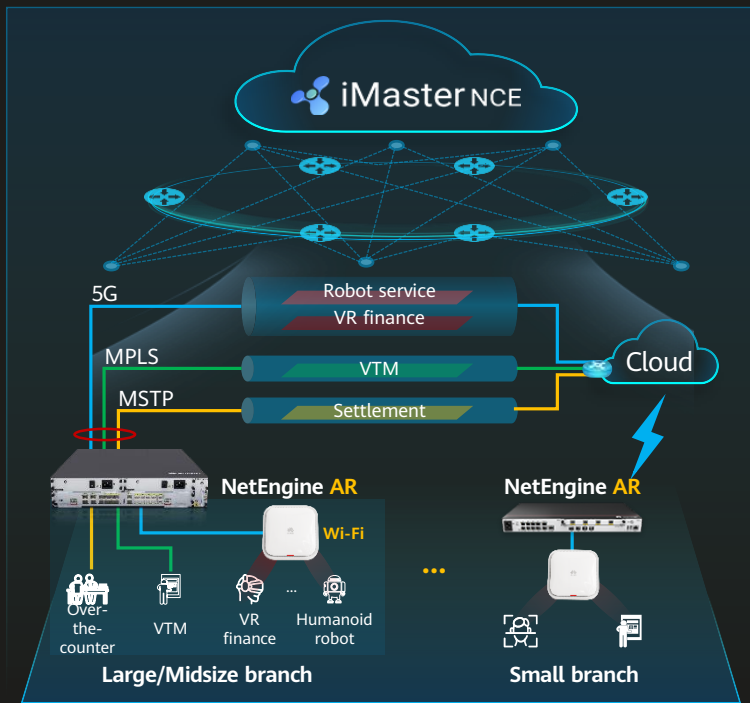
Flexible networking for on-demand interconnection
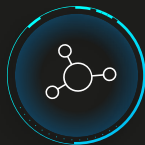
- 5G offers gigabit wireless, enabling fast deployment
- AR1000V enables one hop to five public clouds, achieving multicloud interconnection

**Intelligent traffic steering for optimal experience**

- Unique "SD-WAN + SRv6" guarantees SLAs
- Multi-fed and selective receiving technology, coupled with a high-performance redundancy algorithm, promises 0-ms switchover for key services

Unified management and control for Intelligent O&M

- Intelligent policy recommendation, policy provisioning with just three steps, and proactive prediction of final effects
- 50+ reports, visibility of network-wide status, and fast fault locating

HUAWEI

Cloud Management: SDN for Global Interconnection and Cloud-Network Synergy
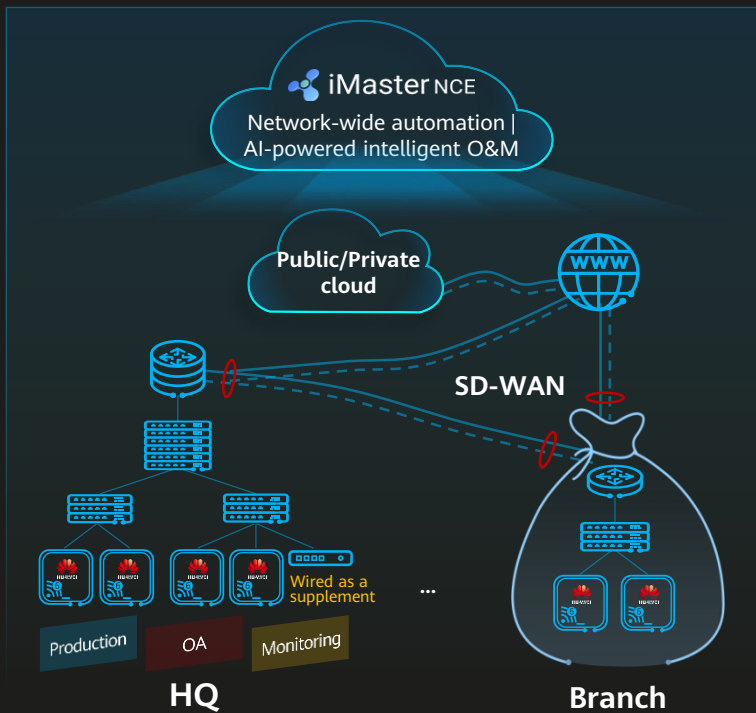
Model-driven approach, SDN-powered easy integration

- Virtual Private Cloud (VPC)-like models and dynamic preconfiguration
- Automatic configuration of virtual networks and fast service deployment

Intelligent verification, error-free SDN-based configuration

- Unique network-wide topology simulation in minutes
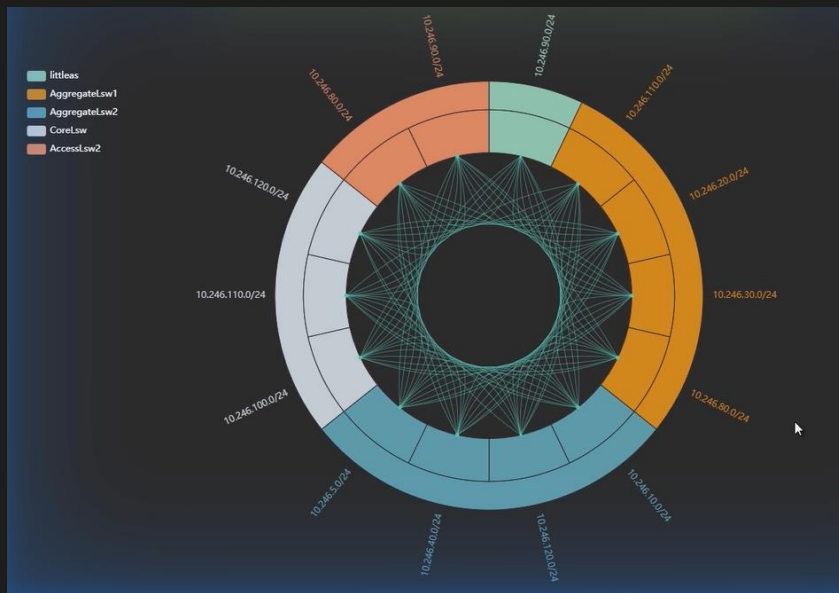- Unique multi-tiered simulation algorithm, ensuring zero errors

One-click deployment, SDN-based E2E configuration

- One-click deployment of service configurations
- Full-lifecycle management

Intelligent Verification: Zero-Error SDN-Based Configuration, Worry-free Deployment

Unique data plane verification (DPV)

Network-wide snapshot comparison
Network-wide information backup and rapid discovery of inconsistencies, facilitating fault locating

Subnet verification
Real-time intelligent verification of network connectivity and multipath tracing, quickly identifying faulty NEs
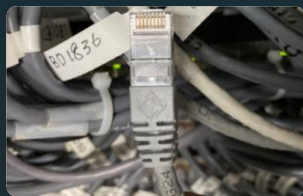
Terminal access simulation
Real-time simulation and verification of terminal access permissions, building secure and trustworthy networks

AI-powered Intelligent O&M: Proactive Fault Prediction and Intelligent Network Optimization, Reducing Complaints by 90%
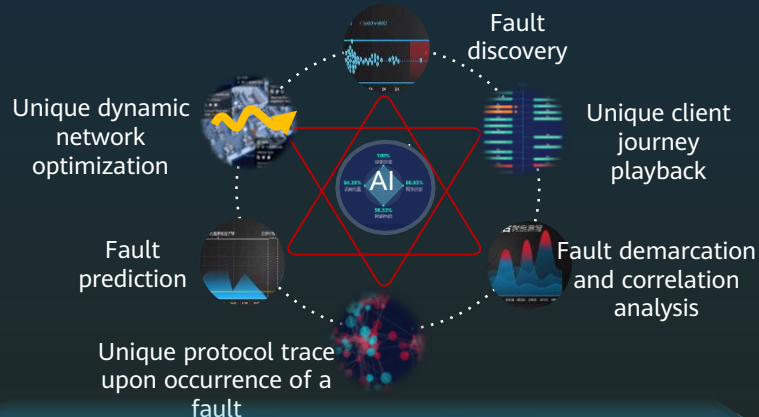
As-Is

- Exponential growth of wireless users
- Complex and time-varying wireless scenarios

- Fast increase in wired ports
- Complex network configuration

Passive response	Post-event troubleshooting
4 hours Fault rectification	**> 4 hours** Post-event troubleshooting
162 Mbps Average bandwidth	**1650+** Network faults

To-Be

Fault discovery

Unique dynamic network optimization

Unique client journey playback

Fault prediction

AI

Fault demarcation and correlation analysis

Unique protocol trace upon occurrence of a fault

Proactive fault prediction	Pre-event health check
10 minutes Fault rectification	**10 minutes** Pre-event prevention
58% Increase in network-wide performance	**85%** Reduction of potential faults

HUAWEI

Award-Winning Products and Solutions, Proven Leadership

Frost & Sullivan

2020 Global Campus Switch Enabling Technology Leadership Award

CloudEngine S12700E series switches

No.1

Highest score
A high-end campus core switch for the Wi-Fi 6 era

Interop Tokyo 2020

Best of Show Award Special Prize

NetEngine 5G AR series enterprise routers

A full lineup of 5G enterprise routers capable of 5G SD-WAN

Gartner

Peer Insights "Customers' Choice"

Wired and wireless LAN access infrastructure

No. 1

Only Chinese vendor to receive this honor
Highest rating by customers

CloudCampus 3.0 + X: Enabling Digital Transformation Across Industries

X1: smart city

Unique: power supply via solar energy

Intelligent video backhaul SmartX switch

Solar energy
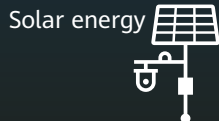
Video backhaul

X2: smart energy

5G interconnection, **2x efficiency**

EC-IoT gateway AR502H-5G

Electric power

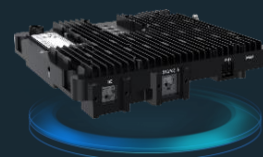## X3: industrial Internet

40% higher efficiency

Unique industrial-grade Wi-Fi 6 CPE

Wireless factory

X4: smart transportation

380 Mbps data transmission for trains @ **160 km/h**

Vehicle-mounted Wi-Fi 6 AP AirEngine 6760-51EI

Rail transportation

CloudCampus 3.0, ideal for building a fully wireless, intelligent cloud campus network

HUAWEI

CloudCampus 3.0
Building a Fully Wireless, Intelligent Cloud Campus Network

Fully Wireless Networking

One Global Network

Cloud management

Intelligent O&M

Breaking boundaries, inspiring innovation

One hop to cloud, always-on services anywhere

Agile provisioning of services, faster TTM

O&M with intelligent experience, reliable services

HUAWEI

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.

HUAWEI