Mar. 30, 2021

2021 CanWISP Conference

Connectivity : Wireless Technology Evolution

HUAWEI

CanWISP
Canadian Association of Wireless Internet Service Providers
Association des fournisseurs de service internet sans fil (CANWISP)

Our goal is to ensure **all Canadians** have access to our interconnected world.

Contents

- Need for Connectivity
- Wireless Technology Evolution

Need for Remote and Rural Connectivity

- Higher Standard of Living
- Food, Health and Well-Being
- Clean Water and Sanitization
- Affordable and Clean Energy
- Education

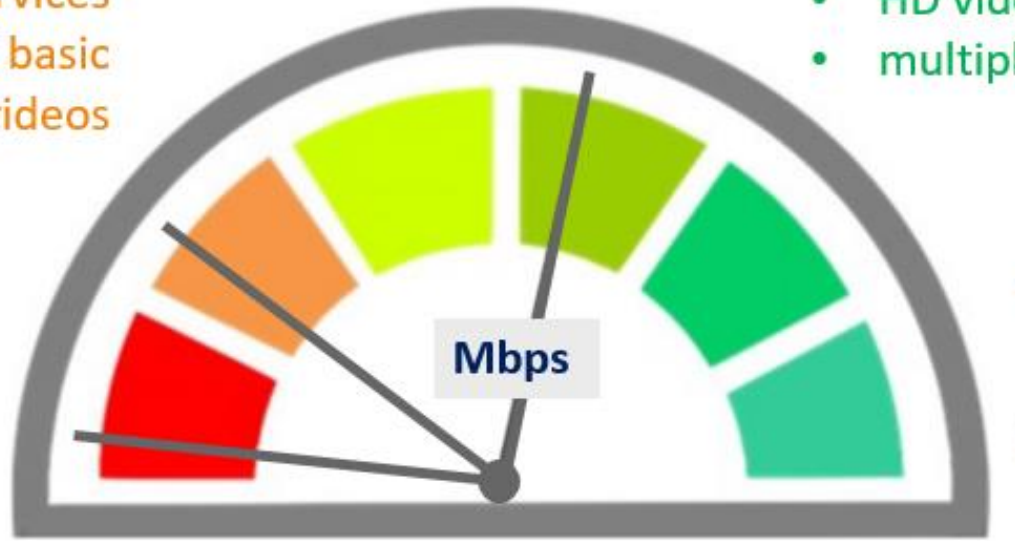
+

- Public Safety
- Media, Weather, Sports
- Industry, Innovation
- Business, Jobs and Economic Growth
- Commerce and Finance, etc., etc.

Need for 50 Mbps DL / 10 Mbps UL

5 Mbps Down
- Single User
- Basic internet services
- Social media and basic streaming videos

1 Mbps Down
- Browsing, email,
- Insufficient for meaningful participation online



50 Mbps Down
- Cloud-based SW applications
- Telehealth, business, on-line learning
- HD video, streaming
- multiple simultaneous users

December 2016, CRTC declared BB internet access a Basic Service with speeds of 50 Mbps DL, 10 Mbps UL, unlimited data option for fixed

2021 90%

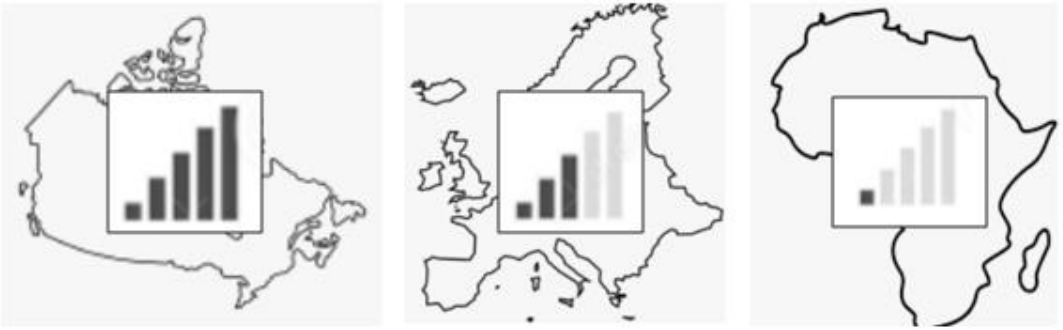
2026 95%

2030 100%

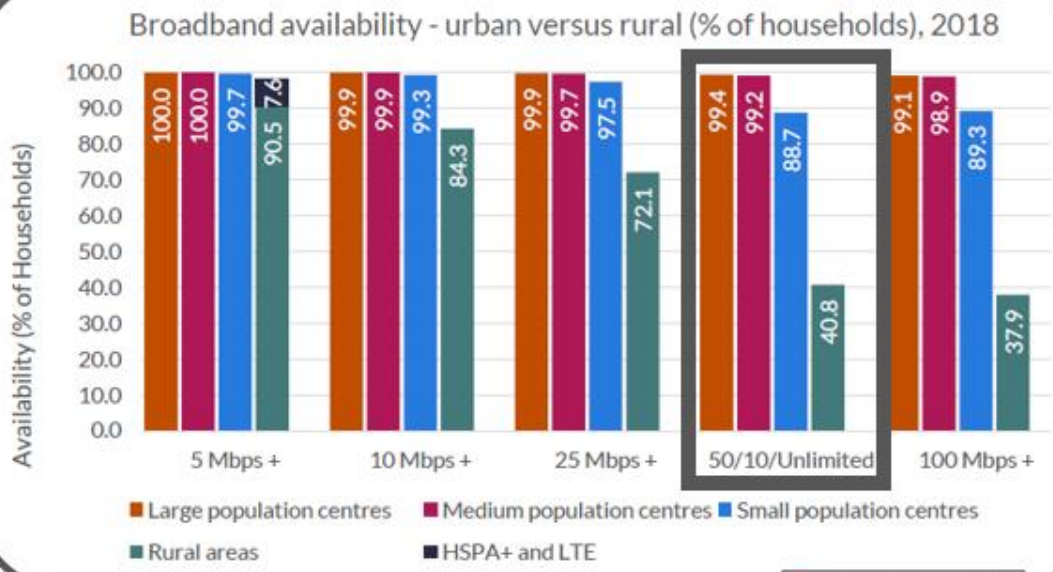
Canada Connectivity Scorecard

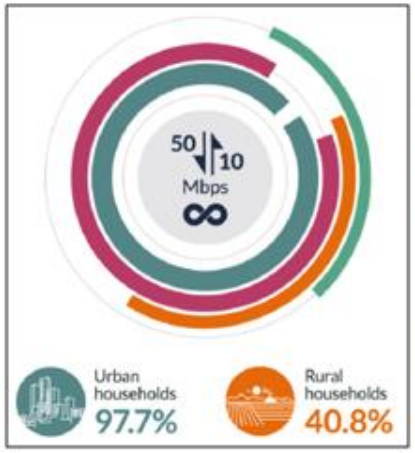
Basic Internet Access

Canada	Europe	Africa
98%	83%	28%



Broadband Availability





Contents

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- Wireless Technology Evolution

Wireless Technology Evolution to Support WISPs

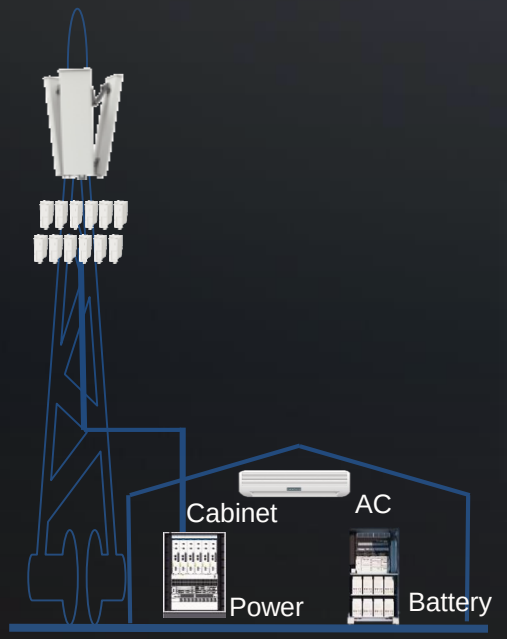
Spectrum	Ecosystem	E2E Cost	Ultra Reliable	Advanced Technology	Operational Efficiency
• Large contiguous blocks • Reasonable price	• Global standards • Economies of Scale	• Cost-Effective Sites • Energy efficient • Solar	• High quality • No cooling fans • Lithium Batteries	• MIMO • Beam forming • High capacity • High Speed	• Plug & Play • Software Technology upgrade • Fault isolation and diagnostics

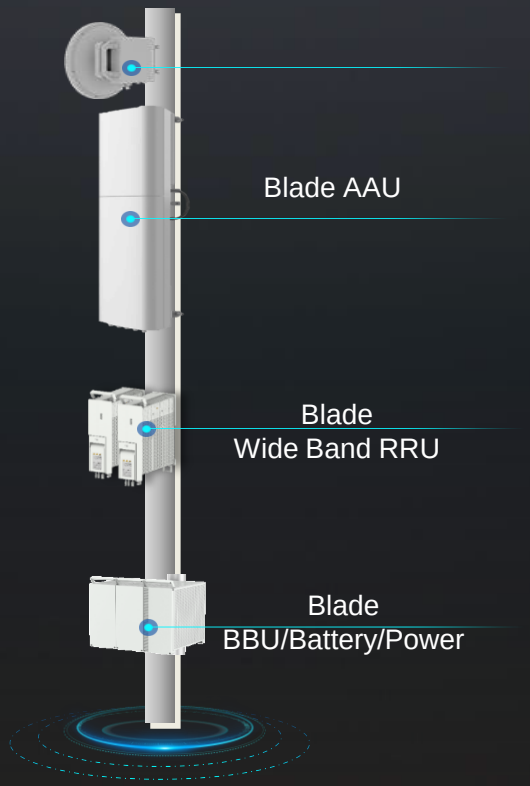





Site Simplicity

Super Blade site
“0” Footprint，Easy Deployment, Green





Easy Deployment
(weeks -> days)

TCO Saving，40% ~ 50%
energy，site rental, real estate

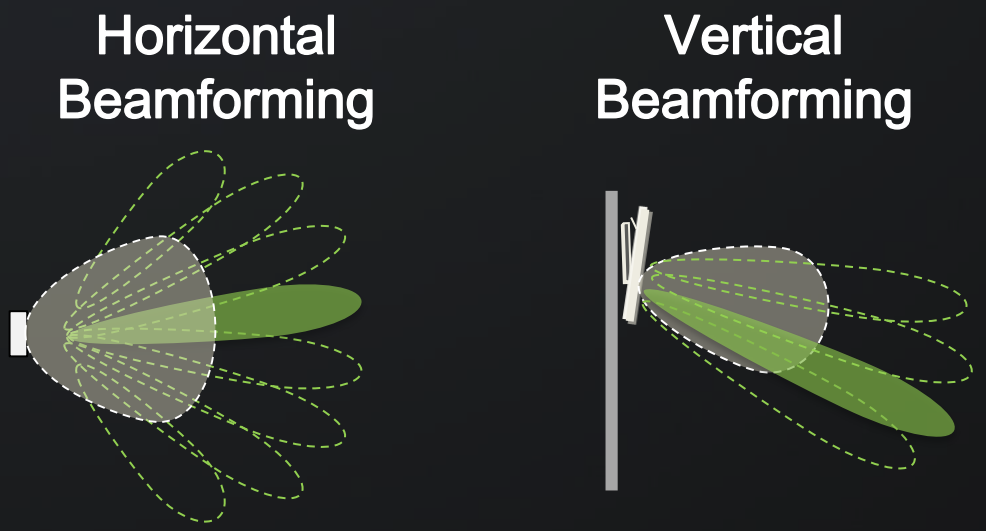
Massive MIMO

Beam – Forming
Beam - Steering

64T64R

- Beamforming to improve coverage, reduce interference and higher capacity via reuse of spectrum resource blocks (RBs)

3D Shaping Improves H+V Coverage



- Precise beam
- Up to 10dB coverage gain (64T64R vs 2T2R)
- Higher user SINR and better interference control

WISP Radio Units

5G-Ready RRU Family

RRU5258-3.5GHz
RRU5258-2.5GHz
(8T8R)

AAU5639w-3.5GHz
(Massive MIMO, 64TRX)

RRU Function

- Converting data to allow communications between the BBU and RRU.
- Converting baseband signals into radio frequency signals.
- Amplifying power through a PA and amplifying low noise through an LNA.
- Generate and sends the different signals like VSWR, RET, ACT etc.
- AAU contains 2 functions: active and passive. The active antenna works with the radio unit embedded in the AAU, while the passive antenna works with the external radio unit.

- **8T8R and Massive MIMO Radio Units for Rural and Towns.**
- **Industry Leading Specs in terms of Output Power, Spectrum & Features support.**
- **Low Power Consumption & Small Form Factors to help with Deployment & Opex challenges.**

WISP BaseBand Units (BBU)

5G-Ready BBU Family

5900 series Distributed Base Stations enable radio access for large to small eLTE wireless networks that provide services such as data acquisition, and data transmission. The base stations' modular platform consists of a Base Band Unit (BBU) and Remote Radio Unit (RRU). Both components feature flexible installation, easy site deployment, low power consumption, and low TCO.

BBU5900
(Indoor BBU)

BBU5900A
(Outdoor BBU)

- **Scalable BBU Units from Large to Small – Indoor and Outdoor**
- **High Capacity to support Multiple Technologies & Spectrum Evolution within a Most Compact Form Factor.**
- **Modular Format for easy & Flexible Expansion.**
- **Industry Leading Specs in terms of Throughput, Cell Capacity & Feature Support.**

Blade “Zero Footprint” Power

Blade Site Solution

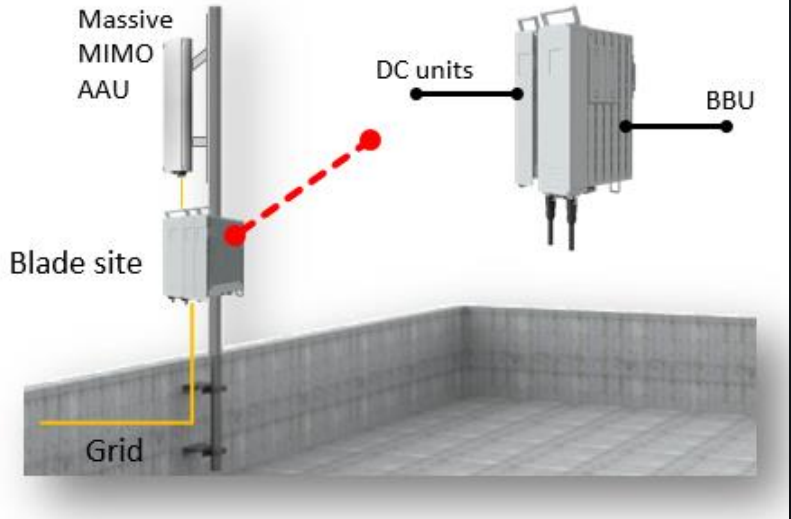
In some special scenarios, WISPs might have difficulty in building the outdoor cabinet for the BBU, either due to space or cost. Blade outdoor solution was designed to address the pain. Benefits of blade site solution:

- Save CAPEX and OPEX
- Easy and fast installation

Blade power is part of the blade site solution, blade power can be easily installed right next to the blade BBU.

DPU40D
(Outdoor Rectifier)

BBU5900A
(Outdoor BBU)



- **Low Real Estate and Cost Effective Power.**
- **Easy to Deploy, “0” Footprint, Natural Cooling & Low Maintenance.**
- **Enables Complete Outdoor Site Construction, no need for Shelter!**

Indoor Power

Indoor Site Power Solution

5G and Massive MIMO expansion will significantly increase site power consumption and will require higher site power system capacity and more space to maintain backup time. New high efficiency rectifiers and small size Lithium batteries can help to save extra battery cabinet. Smart Site Management and Intelligent lithium battery control enable hybrid use of new and old power systems with a mix of lithium and lead acid batteries for smooth expansion.

ETP48600
(AC/DC Power Rectifier, up to 600A, 24kW)

ESM-48100B1
(LFP Lithium Battery, 100Ah)

Indoor Cabinet

- **E2E Power Solutions for the Telecom Market Including Best-in-class Rectifier, Lithium Battery & Cabinets.**
- **Industry Leading Specs, Converged Architecture enabling Smooth Evolution & CAPEX/OPEX Savings**

Antennas

4T4R 3.5G

ADU4518R13

- 3300-3800MHz
- 17.7dBi
- 1100*259*135mm
- 10.7kg

8T8R 2.5G

ATD4516R5

- 2300-2690MHz
- 17.5/18dBi
- 1445*299*109mm
- 16kg

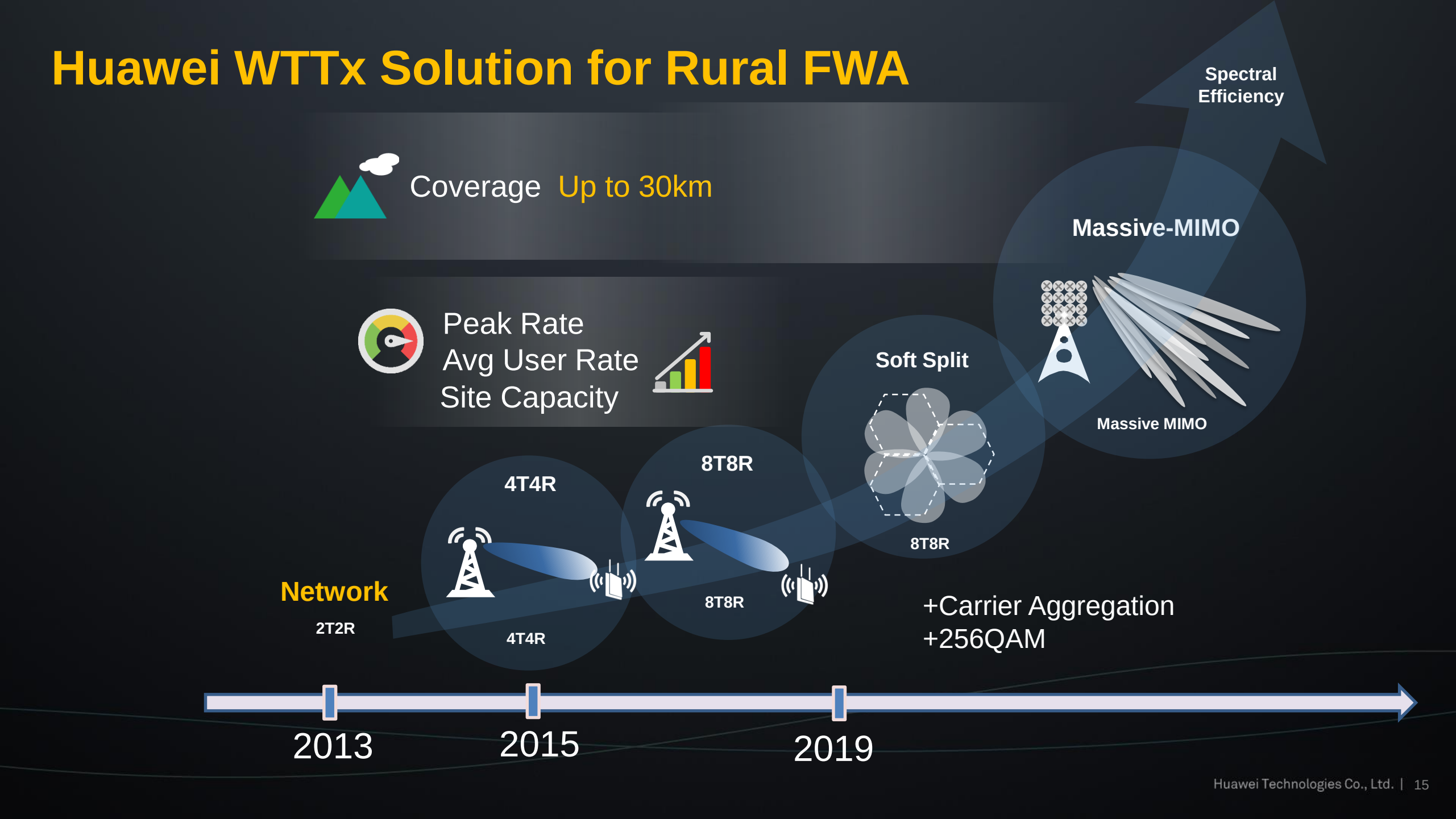
8T8R 3.5G

ATD4516R8

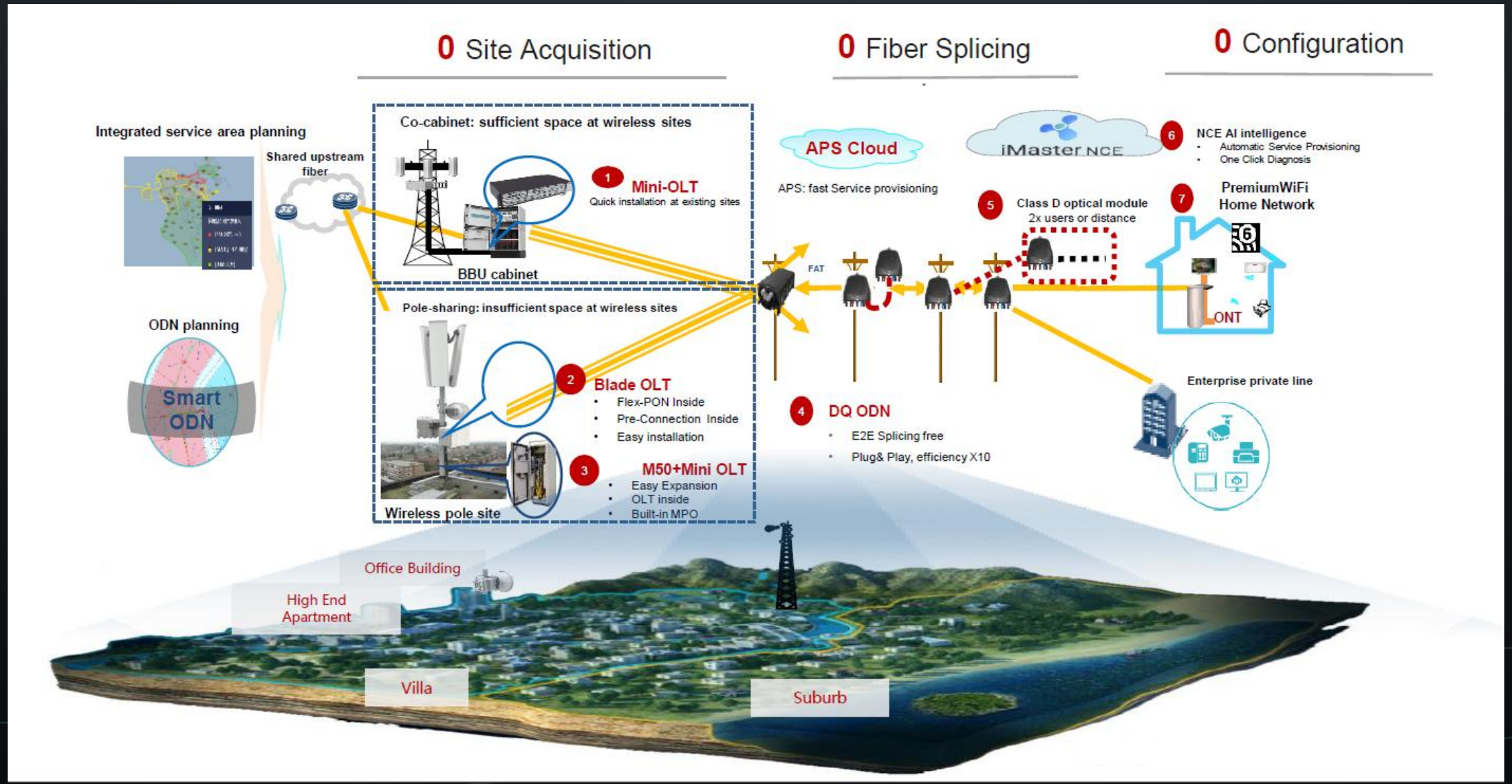
- 3300-3800MHz
- 17dBi
- 1100*259*135mm
- 13kg

High Performance 4T4R and 8T8R Antennas

Huawei WTTx Solution for Rural FWA



Huawei Rural E2E PON – Leverage Existing Site for FTTH

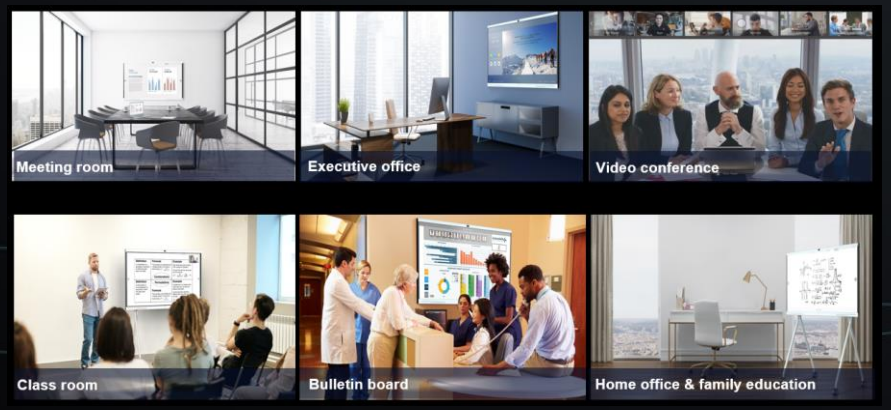


IdeaHub

Legacy projector & screen

digital whiteboard

Video conference endpoint



signage monitor

laptop & mobile device

Summary

- Tremendous value of connectivity in underserved, remote and rural communities,
- Wireless technology is evolving to better support WISP deployment .. better services at lower total cost of ownership (TCO),
- You are invited to visit the Huawei virtual booth for more details.