



Cambium Networks™

Rapidly Add Gigabit Wireless Capacity With PTP 820 Licensed Microwave



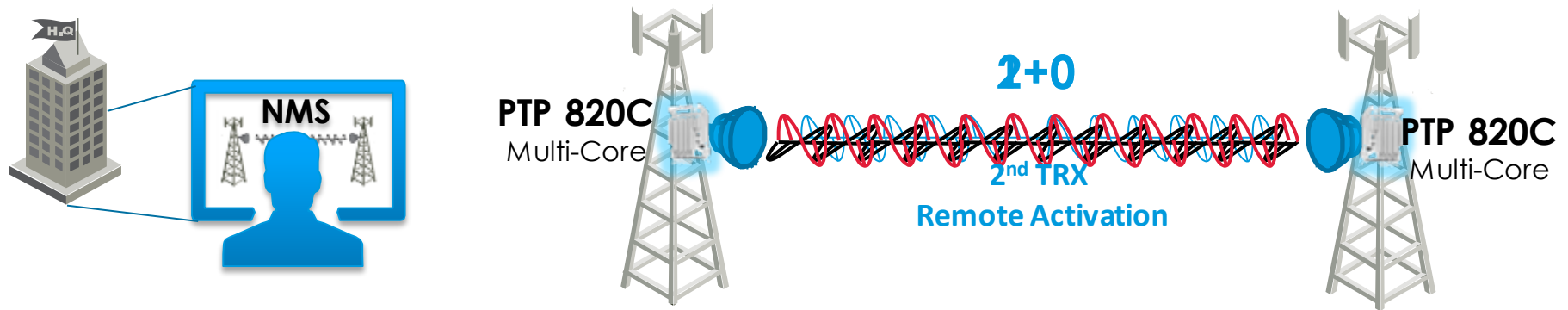
Options

1. Upgrade to full capacity for existing PTP 820S or PTP 820C links.
2. Upgrade existing Microwave link to PTP 820S or PTP 820C
3. 4x4 MIMO with PTP 820C
4. Advanced frequency Re-Use with PTP 820
5. Multi-band with E-band and Microwave

1 - Upgrade to full capacity

- Upgrade to full capacity
 - 500M using 60MHz channel
 - 650M using 80 MHz channel
- Enable ACM, set highest modulation mode to 2048 QAM
- Upgrade PTP 820C 1+0 to PTP 820C 2+0
 - New license coordination is required

PTP 820C 1+0 Upgrade to 2+0



Capacity upgrade from 1+0 to 2+0



1. Buy 2+0 Software License Upgrade



2. Remotely activate the 2nd carrier of the PTP 820C radio with no impact on existing service



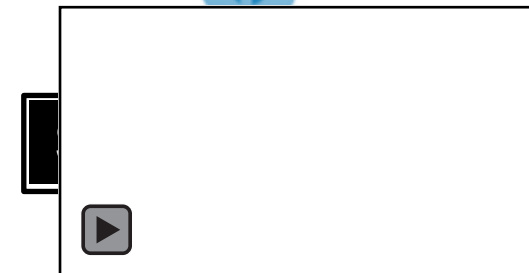
3. Enjoy the rest of the day

Want it

Click it

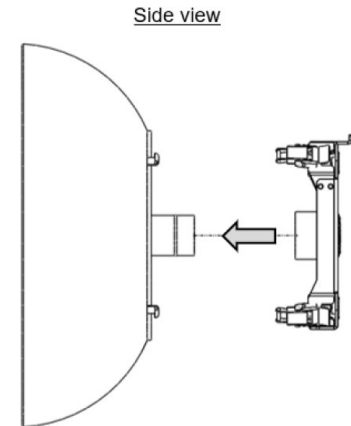
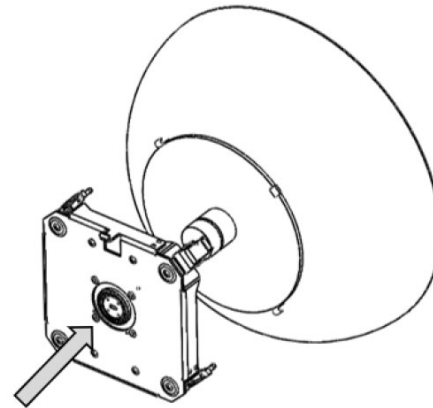
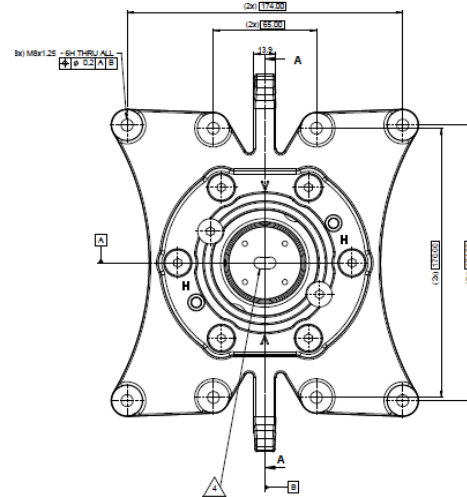
Have it

Upgrade COSTS



2- Upgrade existing Microwave link

- Re-use existing Antenna
 - Converter
 - Commscope
 - Valuline Series, 6-38 GHz
 - Radiowave
 - 6 – 23 GHz
 - Adaptor
 - REMEC interface adaptor
 - 6, 11, 18 & 23 GHz
 - Dragonwave interface adaptor
 - 11, 18 & 23 GHz



3. MIMO with PTP 820C

Sets a New Standard in Microwave Transmission

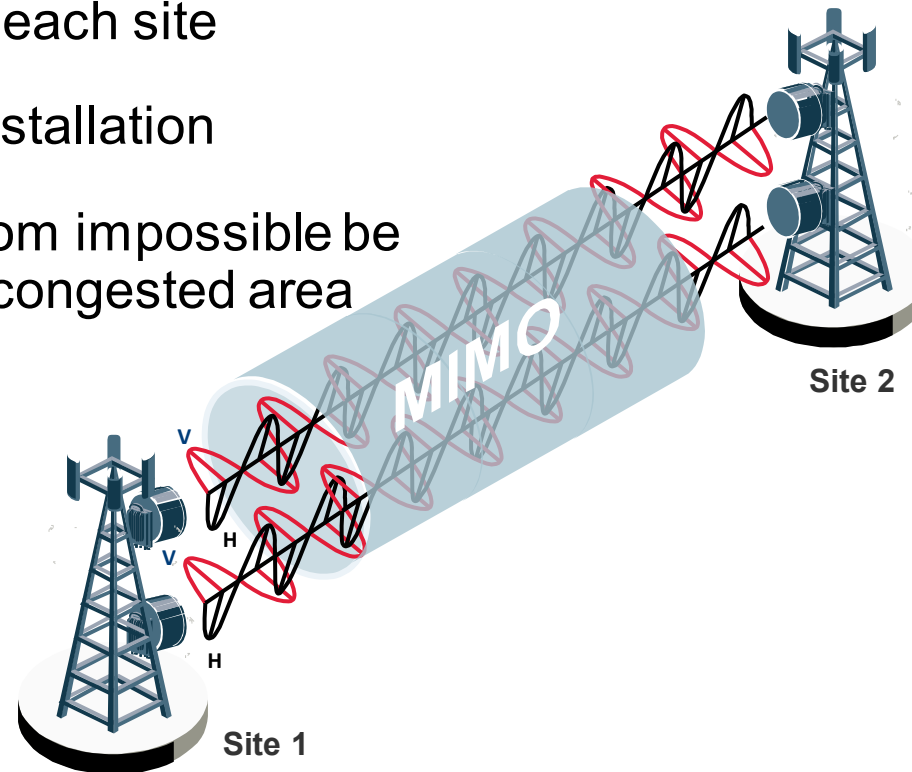


LoS 4x4 MIMO

Quadruples radio throughput using the same spectrum, at half the form-factor

PTP 820C Line-of-Sight (LOS) MIMO on the **SAME CHANNEL!**

- Using a single channel to quadruple the capacity
- 2 x PTP 820C units at each site
- Simple direct mount installation
- Double the capacity from impossible be available in spectrum congested area

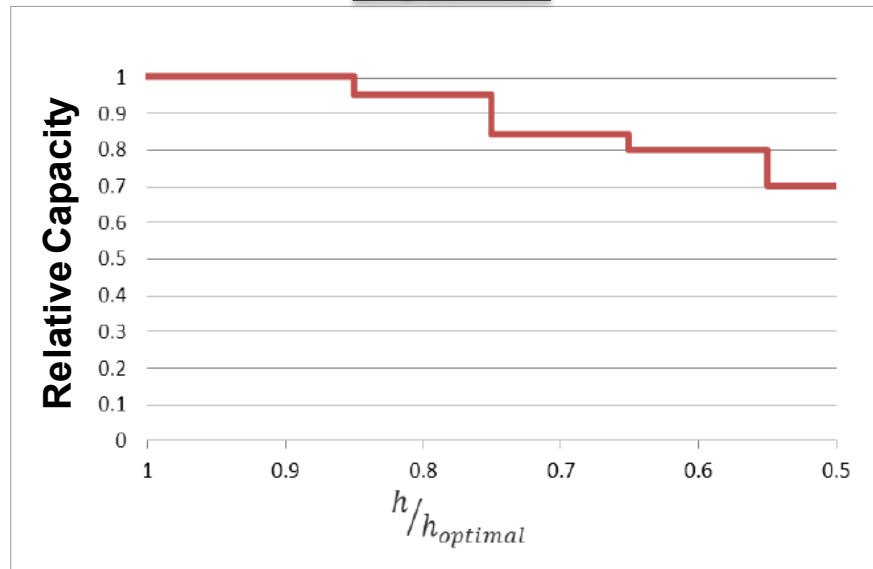


**1Gbps on a single
30/28 MHz channel**

Upgrading the Capacity without network re-planning

LOS MIMO – Low Sensitivity to Antennas Installation

Capacity vs. Antenna Separation



Relative Separation (Optimal/Actual)

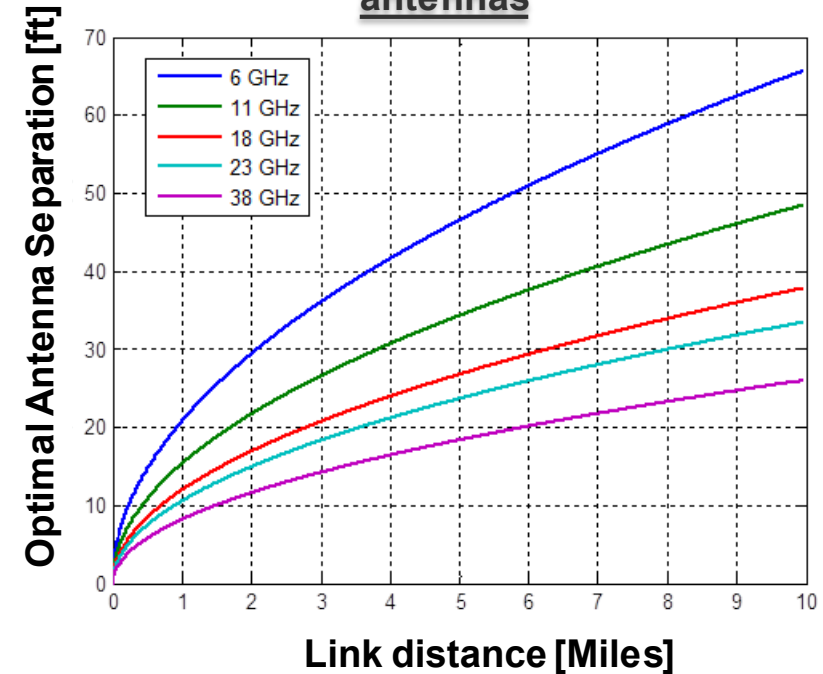
$$h_{opt}^2 = h_1 \cdot h_2 = \frac{D \cdot C}{2 \cdot f}$$

D – Distance [m]

C – Speed of Light [m/sec]

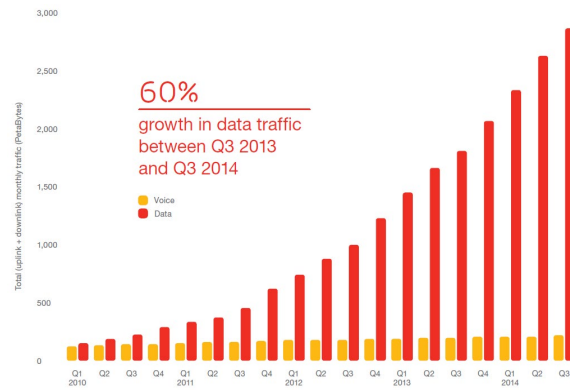
F – Frequency [Hz]

Optimal distance between antennas

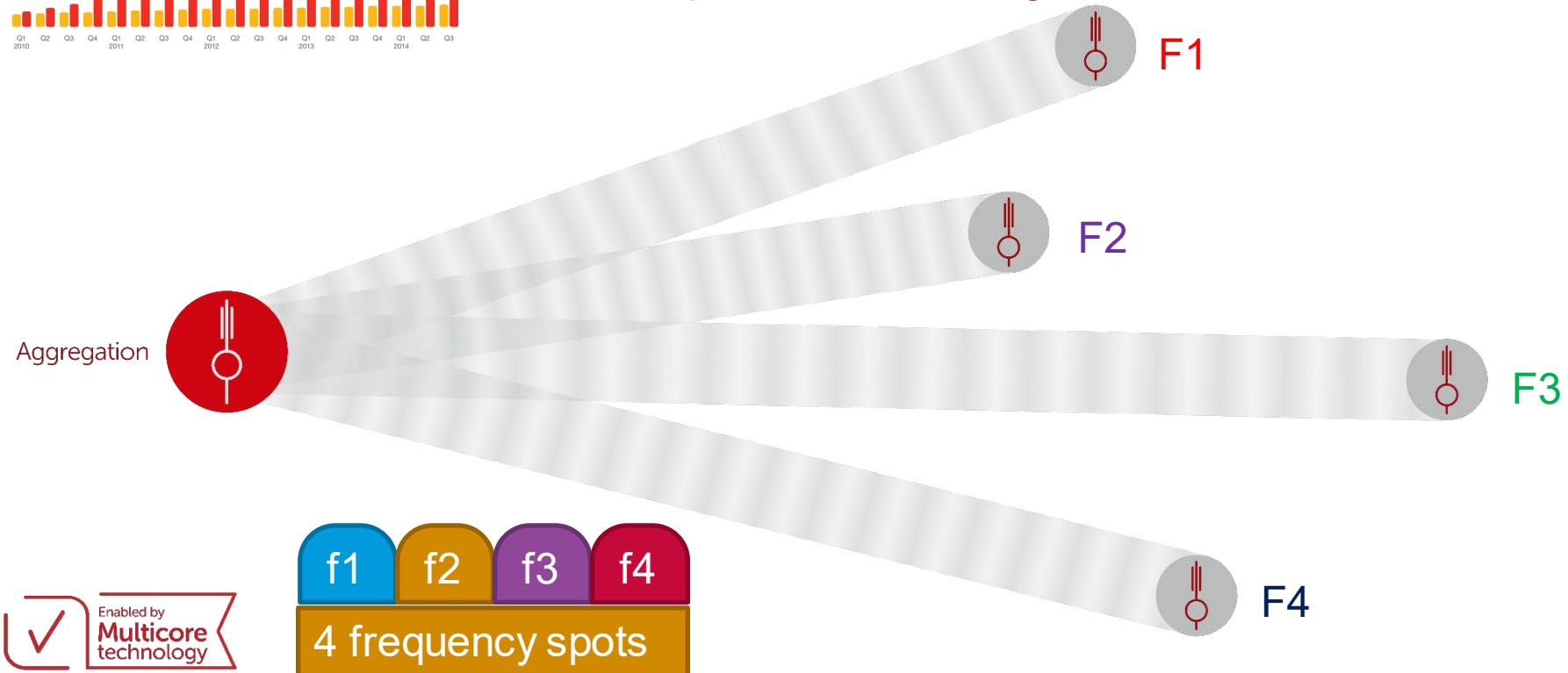


Achieve 70% of max capacity at half the optimal antenna separation (On both ends!)

4 – Advanced Frequency Reuse (AFR)



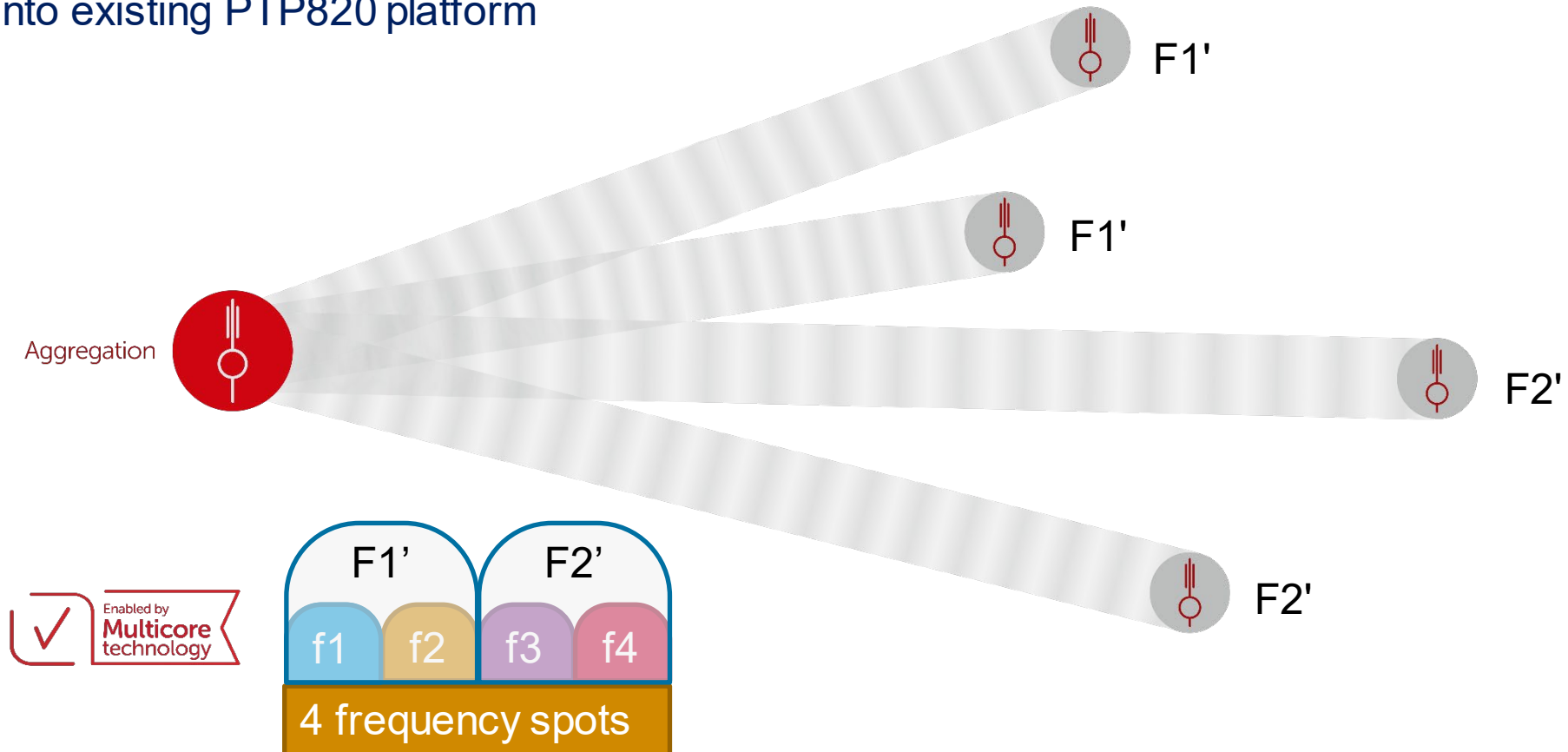
- I. Capacity challenge
- II. Densification challenge
- III. Spectrum challenge



Deploy services anywhere without backhaul constraints

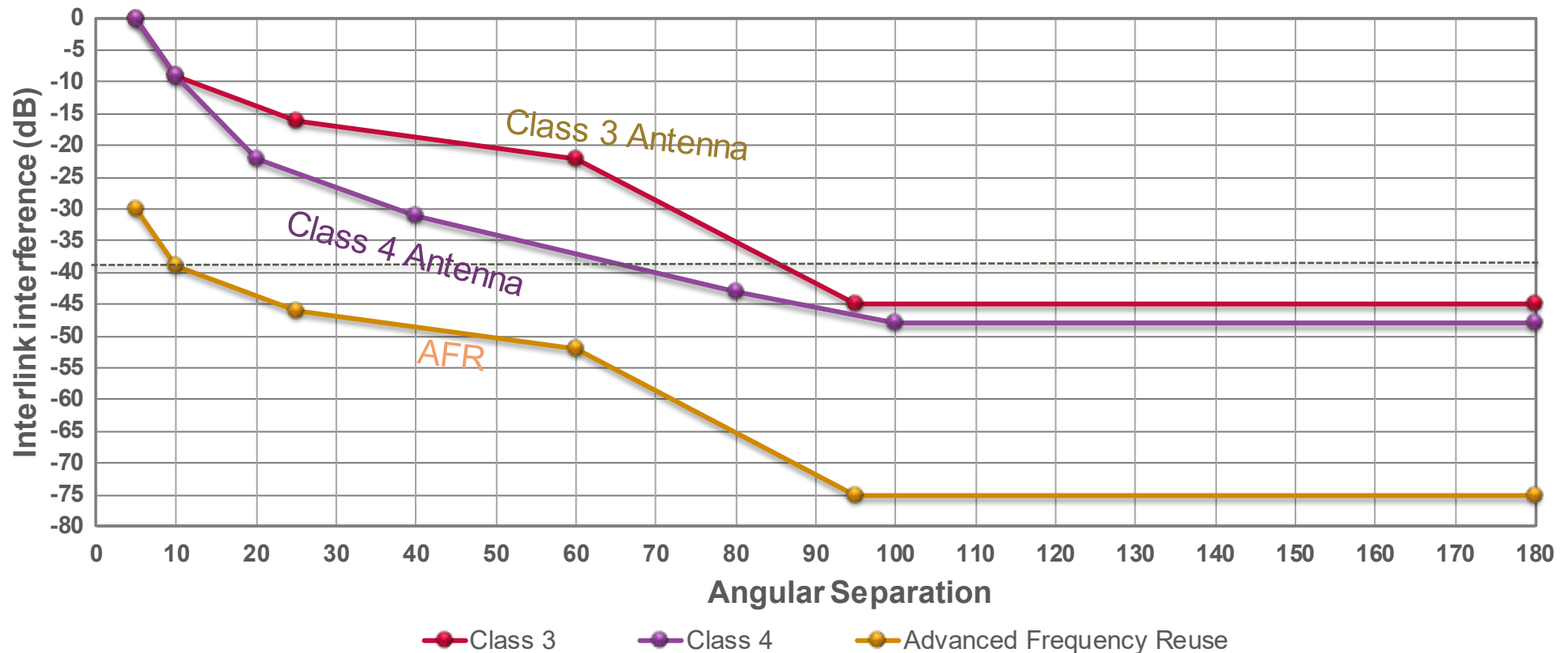
- Put frequency coordination challenges to rest

- Advanced Frequency Reuse (AFR)
 - Double the capacity with the same spectral resources
 - Built into existing PTP820 platform



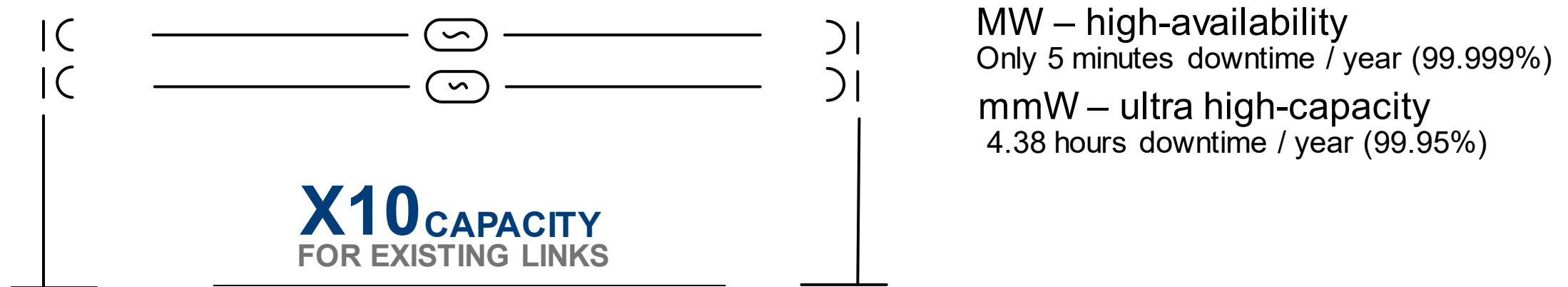
AFR level of interference vs. antenna class

- AFR delivers higher interference rejection of AFR Link Pairs compared with ETSI Class 4 Antennas



5 - Multiband (5G capacity, 4G reliability)

MULTIBAND - high capacity through mmW, with the link availability of MW spectrum

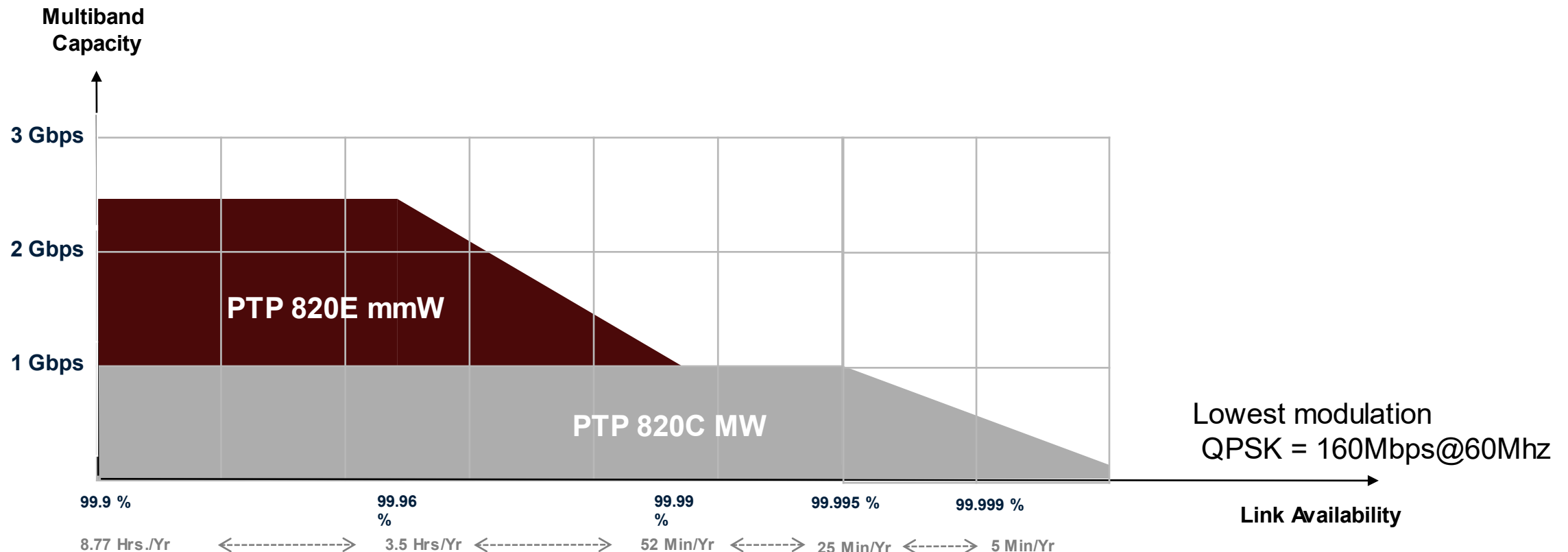


- In normal circumstances, both links transmit simultaneously, dividing the traffic between them.
- In the event of RF link failure in one device, the other device continues to operate to the extent of its available capacity.

What you need to know about Multi-band

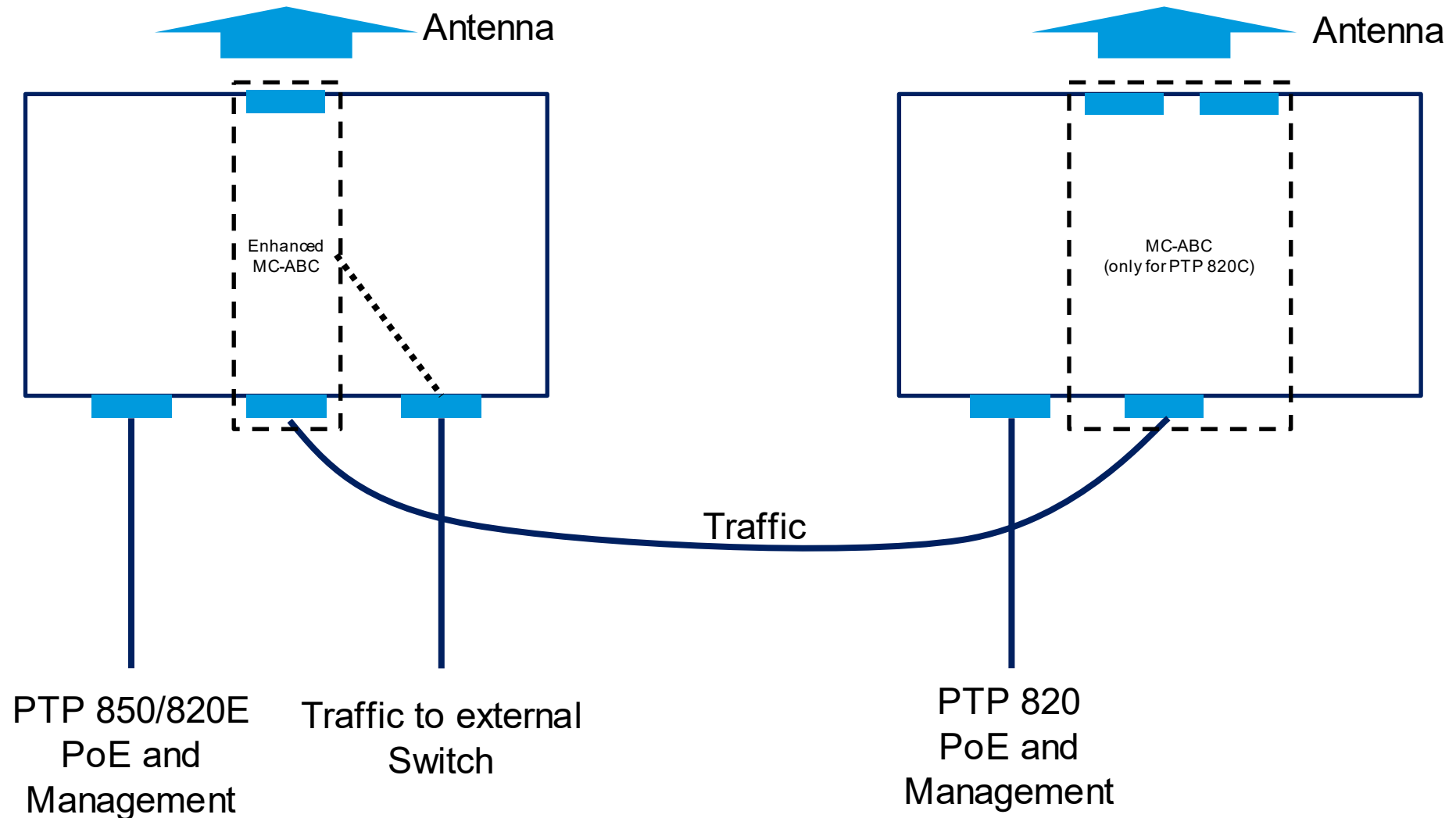
- When PTP850/820E paired with PTP820 microwave, the following must be configured on the microwave radio
 - Automatic State Propagation, with **ASP trigger by remote fault** enabled.
 - Radio **Bandwidth Notification**
- When PTP850/820E paired with third party microwave, the following must be configured on the microwave radio
 - The unit's switching mechanism must be set to **Pipe mode**
 - Automatic State Propagation must be configured, with **ASP trigger by remote fault** enabled.
 - **802.3X Flow Control** must be enabled
- The latency differential between the PTP 850/820E and the paired microwave unit SHALL not be more than 1.6 ms
 - Under all foreseeable conditions, such as a high ACMB profile on one unit and a low ACMB profile on the other unit, there should be no more than a 1.6 ms difference between the latency of the two radio carriers in the Multiband link.

More Capacity most of the time – High Priority service all the time!



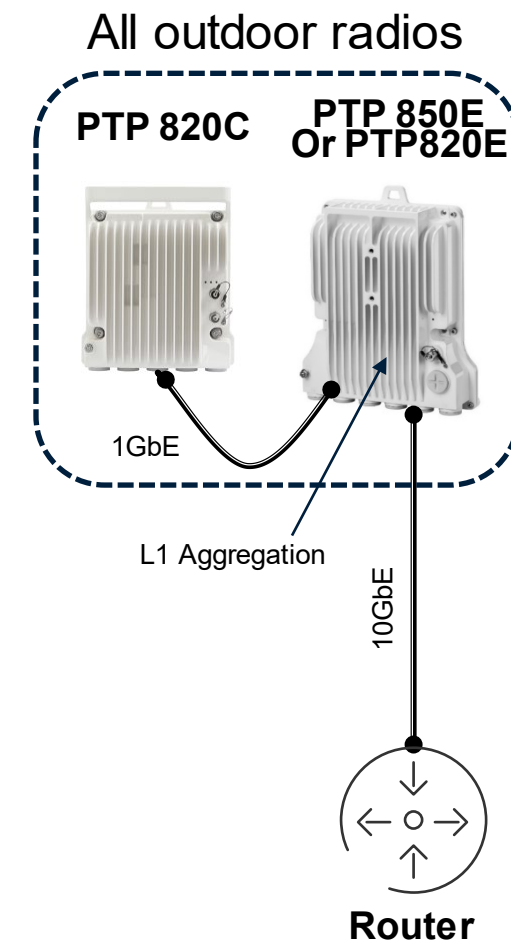
- 2.8-mile link, rain zone-K
- E-band: 500MHz, 2 ft antenna
- MW (18GHz) : 60MHz, 2+0 XPIC, 2 ft antenna

PTP850/820E + PTP 820



Multiband Support

- Combine 2 MW carriers and 1 mmW carrier with 2 units.
- Support PTP 820C, PTP 820S and 3rd party MW and Fibers equipment





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