



5G Mid-band Spectrum is a Game Changer for connected Enterprise

A Global Trend

Globally, 5G mid-band (3.5G to 6 GHz) spectrum specifically 3.5GHz that offers reliable private wireless services to enterprise is becoming a preferred choice in many industry verticals. Healthcare to Smart Factory, enterprises are deploying reliable private wireless to enhance connectivity and improve operational efficacy. The mid-band spectrum provides benefits of low-band signals for higher indoor penetration and high bandwidth capacity and lower latency of higher band.

Solution

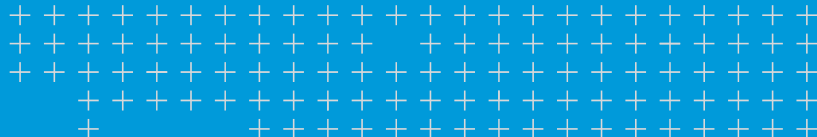
Thunderbolt GM200

Industry leading edge grandmaster and boundary clock.

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overview

Many global vendors offering 5G mid band solutions have partnered with Trimble's Timing & Frequency division to enhance their solution for enterprise private wireless network services. Timing solution is critical imperatives of CBRS and other 5G solutions due to the fact that 5G spectrums are transmitted in precise timeslots. Without precise synchronization, 5G service would render in failure. Trimble offers a range of products that best suits operators and vendors offering 5G services.



CHALLENGE

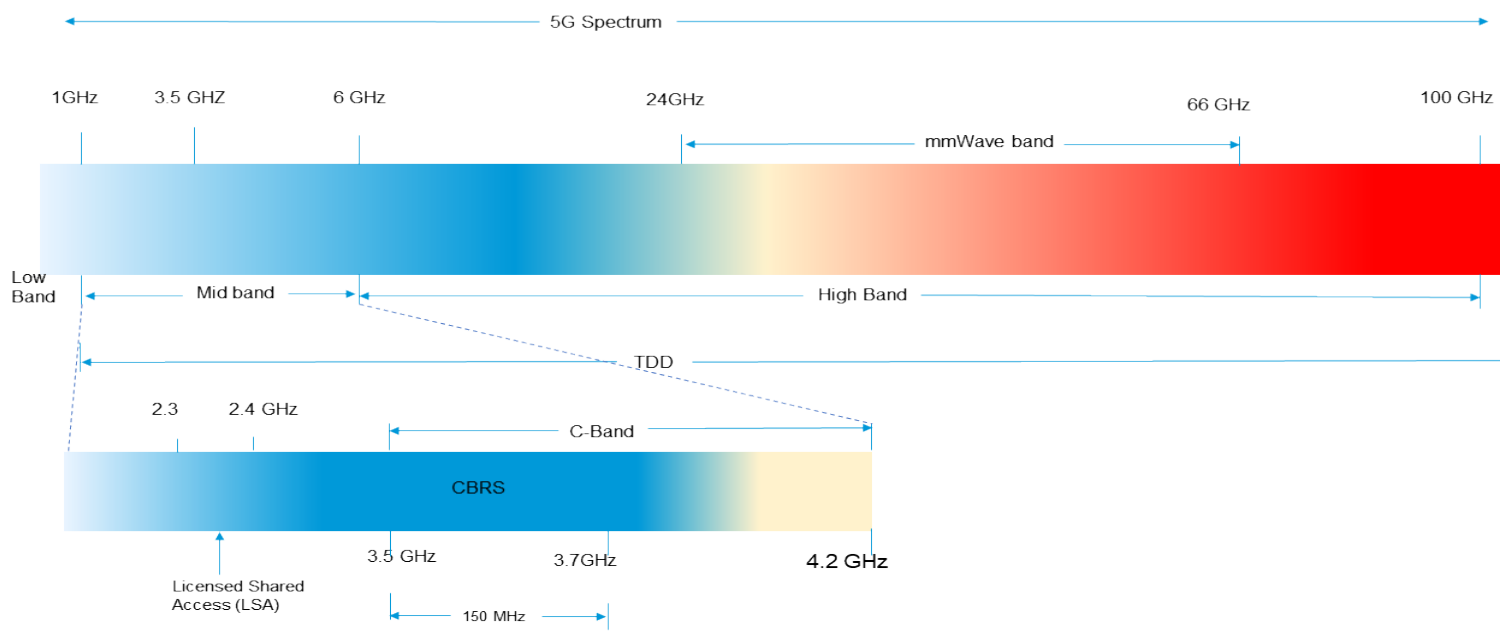
Though CBRS provides high capacity and reliability with quick coverage which can result in significant business value to the service providers, there remains some inherent challenges. First, operators in the USA must access the CBRS spectrum based on a tiered category. Tier 1 providers have better access to the CBRS spectrum than tier 2 and tier 3.

However, PAL (Priority Access License) also provides guaranteed access of CBRS spectrum to tier 2 providers depending upon geographic location. On the other hand, tier 3 providers get GAA (General Authorized Access) to CBRS spectrum provided that there is no

conflict on spectrum sharing with Tier 1 and tier 2 providers in a given location.

In Japan, the 5G mid band spectrum similar to CBRS is only distributed to tier 1 providers.

Moreover, the CBRS and other 5G spectrums use TDD (Time division duplex) for uplink and downlink transmission requiring precise synchronization end to end. While many vendors offer sync solutions, very few can match the performance and price that Trimble product offers. Additionally, Trimble timing modules are also inherent part of Radio Units providing nanosecond level accuracy at radio endpoints.

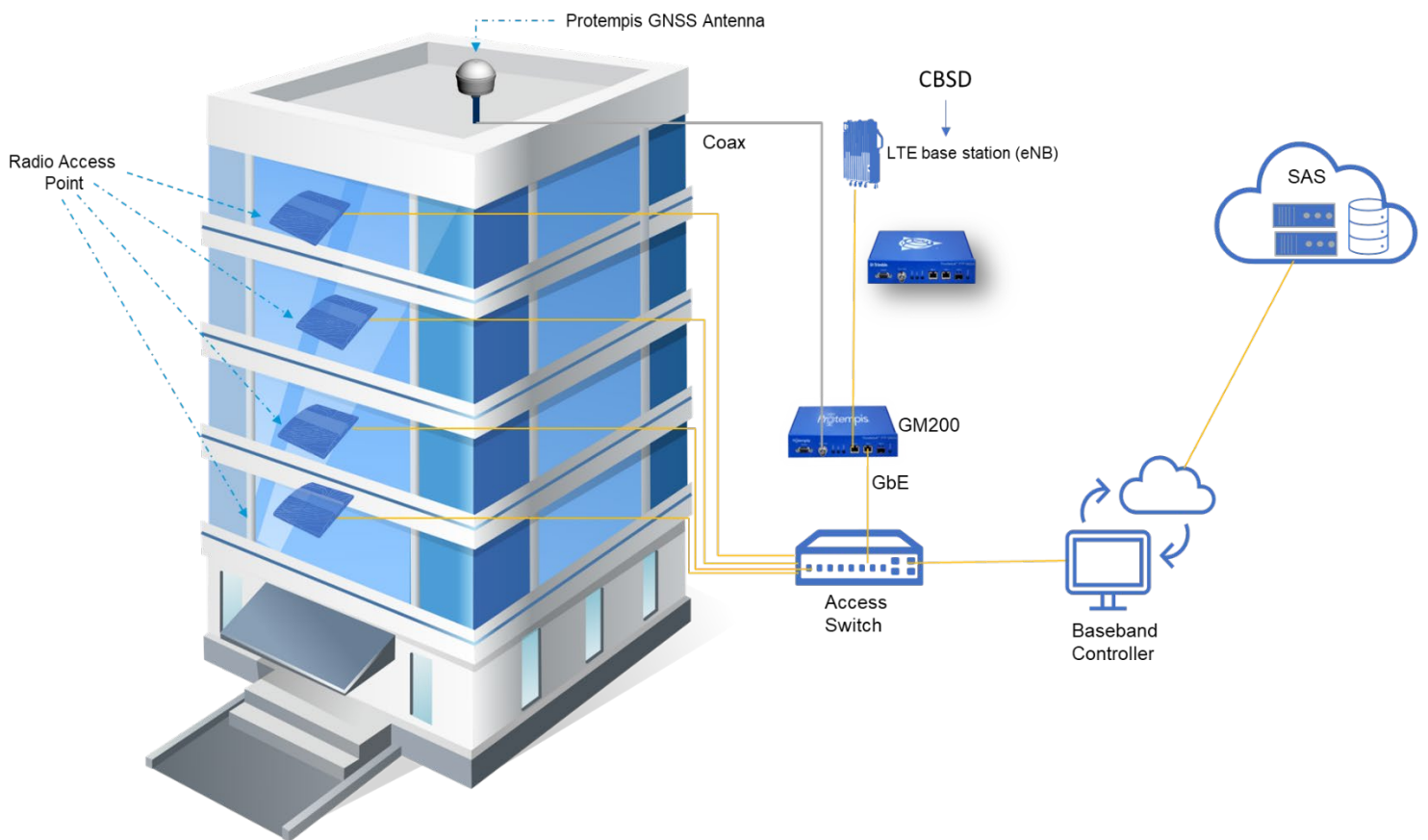




SOLUTION

The CBRS network in the USA and similar mid band deployments in Japan require synchronization solutions to meet few challenges: price, performance, customization and network asymmetry. The deployments in Japan are more of an extension of tier 1 network to business park where each enterprise is connected over fiber to Tier 1 xhaul

network. However, there is no direct xhaul connection in CBRS deployments. Each enterprise private CBRS network is connected to the SAS (Spectrum Access System) controller which provides environmental scanning to find available spectrum for the deployment.



contd.

The CBRS deployment that forms the enterprise private 5G/LTE eventually connected to the LTE backhaul network as needed.

CBRS operators of both the USA and Japan found Trimble's Thunderbolt® GM200 ideal edge sync product for several reasons: price, performance, flexibility, accuracy and holdover capabilities. Additionally, Thunderbolt® GM200 is a two-in-one product combining boundary clock and grandmaster capabilities in a half rack size box. The product is hardened to work in the worst indoor environments.

In the Japanese deployments, the product needed to compensate for network asymmetry conditions, an anomaly that is often difficult to deduce for optimal synchronization. The device was flexible to

accommodate boundary clock scenarios while giving the capabilities of holdover that comes with expensive grand master clock devices. Moreover, Thunderbolt® GM200 provided microseconds level accuracy for the network with flexibility to deploy it as boundary clock or grandmaster to extend network reach while failover clock sync is assured through holdover capabilities.

The solution needed customization as well to support various requirements including PoE and GNSS antenna placements. Trimble T&F team worked with operators to adequately consult and provide engineering services for the successful completion of CBRS deployments. Trimble's T&F division has 35 years of time sync experience with thousands of deployments which enables the team to offer unparalleled engineering and product services to vendors and operators.

RESULTS

- Better Total Cost of Ownership (TCO).
- Reduced installation and configuration time.
- Precise synchronization.
- Failover capabilities.
- Network specific profiles and standards ideal for the CBRS networks.



Thunderbolt GM200