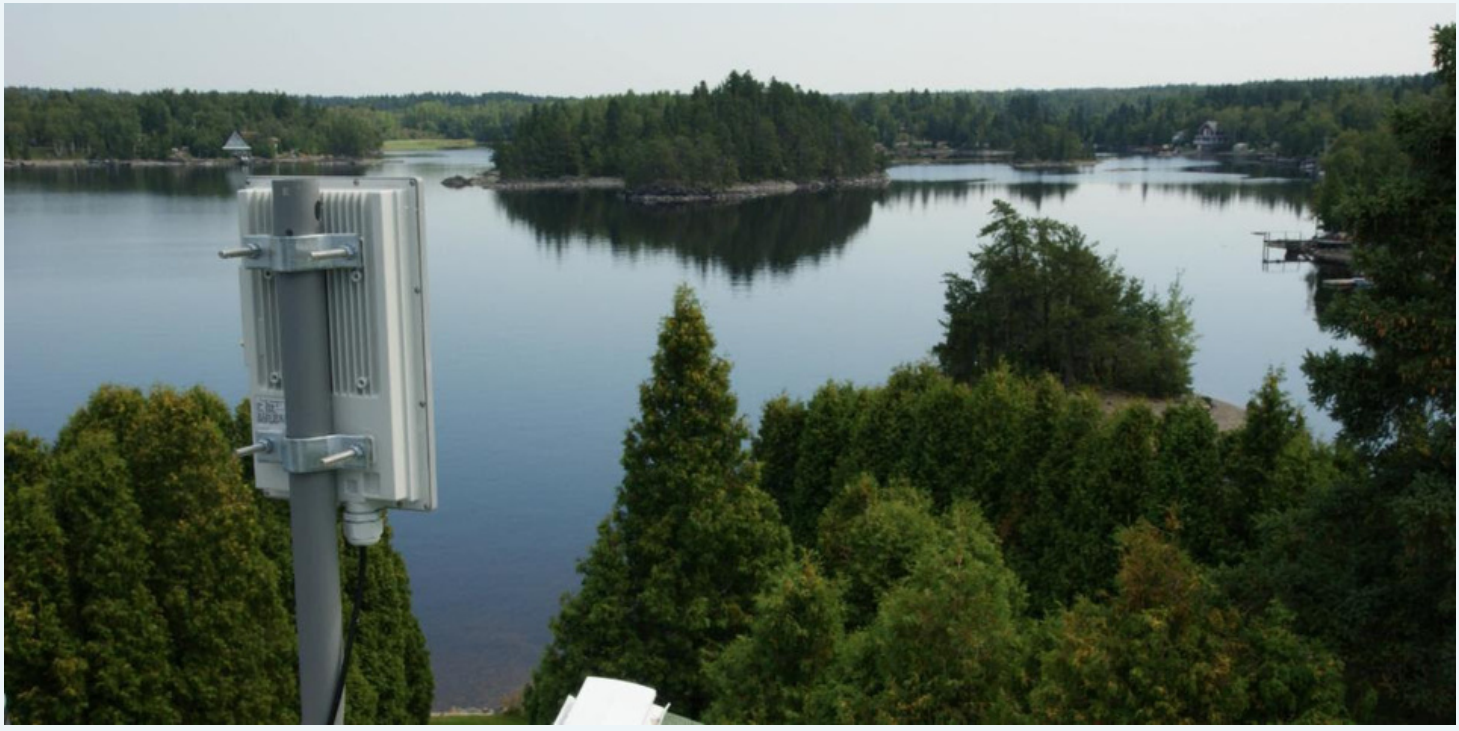
Intelligence in the Air | VOL. 100

EION ByTES

Understanding FDD vs. TDD in Wireless Systems

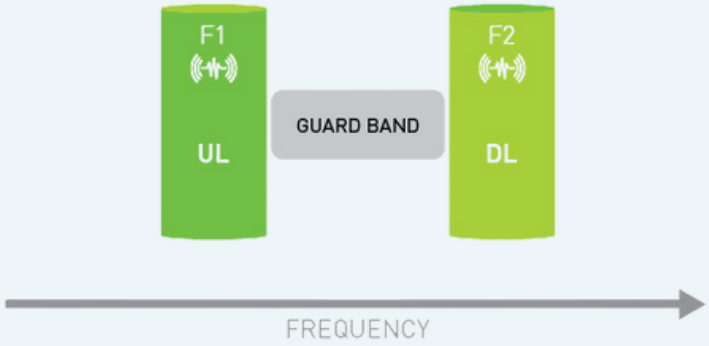


The Definition

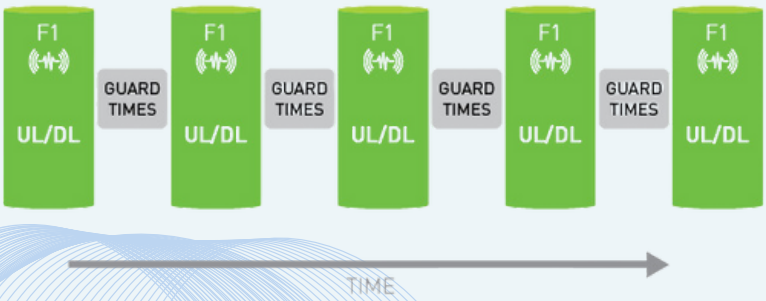
FDD stands for Frequency Division Duplex, and TDD stands for Time Division Duplex. FDD and TDD are two spectrum usage techniques, both duplex forms, used in mobile or fixed wireless broadband links. It is essential to these links that transmission can occur simultaneously in both directions so that data can flow downlink (DL) and uplink (UL) simultaneously without any noticeable interruptions.

The FDD Systems

FDD systems need two separate frequency bands or channels. A sufficient guard band needs to separate the transmitting and receiving channels so they do not interfere with one another and guarantee clear and uninterrupted transmission. A large guard band does not impact capacity. The frequency allocation for the UL /DL capacity is predetermined based on the system needs so that it is the same in either direction. It is not possible to dynamically change capacity. Continuous transmission and high performance are guaranteed with FDD.



The pictures featured in this article are from a recent Saab deployment of their Advanced Surface Movement Guidance and Control (A-SMGCS) at Los Angeles (LAX) International Airport. They utilize 51 EION Remote Radio systems across all terminals to communicate with the Air Traffic Control Tower throughout the airport and within a 5-square-kilometre area. The deployment of the wireless network infrastructure was completed in four months, making the airport fully ready for the A-SMGCS system to integrate with the airport operation system.



What does this mean for actual capacity?

TDD radios claim capacity numbers in half-duplex, meaning the quoted numbers are half in one direction and half in the other. So 1Gbps capacity is 500Mbps transmit, and 500Mbps receive since the bandwidth is shared in a TDD system.

FDD radios claim capacity numbers in full-duplex, meaning the quoted numbers are available in both directions. Therefore, 1Gbps of capacity is 1Gbps transmit, and 1Gbps receive since the bandwidth has separated allocated frequencies for each direction in an FDD system.

What does this mean for Latency?

Because TDD radios share the same spectrum for send and receive communications, latencies can be high and variable. Latencies will depend on the time allocation of the spectrum for send/receive and may also be dependent on the size of the packets. FDD systems, on the other hand, which have dedicated, unshared spectrum, have much lower and more predictable latencies.

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