TECHNOLOGY
DATASHEET

UBIQUITI NETWORKS

HDD (HYBRID DIVISION DUPLEXING)

- Innovative Proprietary Modem Technology
- Send Packets in Precise Synchronization
- Increase Throughput and Reduce Latency

Innovative Proprietary Modem Technology

Ubiquiti Networks™ airFiber® modem technology was purpose-built to address the specific challenges of outdoor, PtP (Point-to-Point) bridging and high-performance network backhauls. airFiber supports FDD (Frequency Division Duplexing), TDD (Time Division Duplexing), and HDD (Hybrid Division Duplexing).

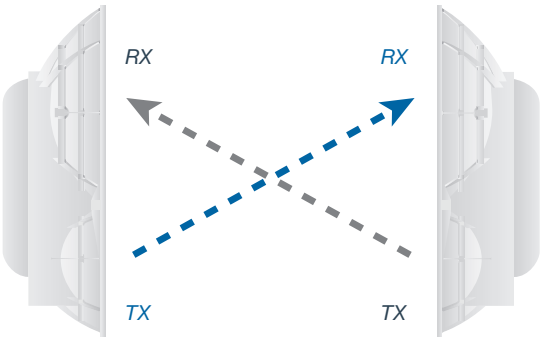
FDD operates in full-duplex mode. Typically airFiber achieves the best speed and lowest latency when it is configured as a full-duplex system using FDD. For airFiber in FDD mode, there are two wireless streams: one wireless stream (on one frequency) for TX (Transmit), and one wireless stream (on a different frequency) for RX (Receive). The transmitter and receiver are running concurrently in time. Because of the trade-off between bandwidth resources and propagation conditions, this approach is typically reserved for links in installation sites that have a clear line of sight and are free of reflected energy.

TDD operates in half-duplex mode, and TDD links are typically installed in environments that are highly reflective or subject to scattering due to heavy rain or foliage loss. One problem with TDD is propagation delay (amount of time it takes for one transmitted frame to reach the receiving radio). With larger propagation delays, when one radio transmits, the receiving radio is waiting for the transmission to arrive, and there can be times when both radios are in a receiving state. This can cause efficiency issues, reducing throughput and increasing latency.

airFiber uses TDD with patent-pending HDD technology to virtually eliminate packet transmission latency. airFiber can transmit data synchronously without any wait time during half-duplex mode, so airFiber's TDD with HDD technology performs significantly better than conventional TDD using less efficient protocols.

Send Packets in Precise Synchronization

TX and RX frames are completely concurrent and therefore do not consume excessive amounts of overhead, which typically happens in conventional TDD systems. Based on the ranging algorithm built into the air protocol, the airFiber radios use breakthrough HDD technology to calculate the propagation delay and know when each radio can transmit and receive, so they send packets in precise synchronization. The transmissions remain clear even though the packets cross paths half-way. GPS is used to trigger the airFiber radios to transmit at the same time; however, the primary benefit of GPS is that it enables the concurrency of TX and RX frames for co-location of master nodes (airFiber radios).



Increase Throughput and Reduce Latency

HDD combines the latency performance of FDD with the spectral efficiency of TDD. The airFiber radios virtually eliminates wait time (dead airtime) when neither radio is transmitting; instead the transmissions are synchronous. This results in greater efficiency: higher throughput and lower latency.

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