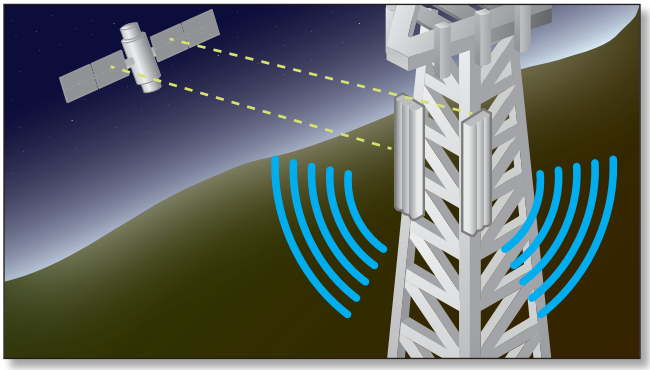
airSync™ Design Guide

UBIQUITI NETWORKS

How airSync™ works

airSync reduces problems when co-locating multiple radios near each other. When airSync is enabled, all APs transmit at the same time, and receive at the same time, reducing co-location interference. airSync synchronizes airMAX APs with a satellite reference timing signal. When enabled, airSync eliminates receive (RX) errors due to co-location transmission interference. To use airSync, all Stations must have Ubiquiti products with GPS functionality running airOS version 5.4.5 or above.



GPS Performance Expectations

- All APs will transmit at the same time, and receive at the same time.
- Reduces co-location interference.
- Latency may be slightly higher (8-16 ms latency), but it should be constant as network scales.
- Throughput is fixed (fixed time slots/directions), so the throughput in one direction may be as much as half of what it is with airSync disabled, but it remains constant as the network scales. Lower timing values will provide better TCP performance (especially single stream) but the throughput will be lower when sending bulk traffic with lots of TCP streams multiplexed. Higher timing values will provide better multi-stream TCP and UDP performance, but at the cost of latency. Overall throughput linearly increases based on the number of APs.

Recommended Guidelines

- Adjacent sectors should use different frequencies.
- Back-to-back sectors can use the same frequency.
- Do not use the same frequency on ALL of your co-located APs. Some of your co-located APs may be able to use the same frequency, depending on the scenario. See the *Design Examples*: *Four APs* and *Two APs*.
- The number of frequencies you should use depends on the number of APs you have on a single tower because a client can get confused if it receives signals on the same frequency from two different APs.
- If using more than one frequency, ensure that you have 20 MHz separation between the frequency band edges. For example: if frequency range A ends at 5815 MHz, then frequency range B should start at 5835 MHz or higher.

Requirements

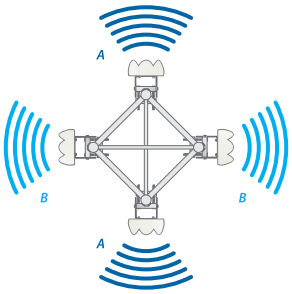
To sync multiple APs, these are the requirements:

- The master AP has IP connectivity (specifically UDP) to the slave APs.
- All APs have an active GPS signal.
- Transmit and receive durations have been configured on the master AP.

Design Examples

Four APs

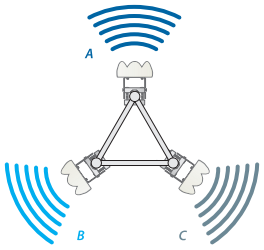
Use two different frequencies. Set the same frequency on each back-to-back pair of APs. For example, a client is located equidistant from two APs (one set to frequency A and one set to frequency B). The client will only receive signals from the AP that shares its frequency. Be sure that A and B have at least a minimum of 20 MHz channel separation.



ABAB Channel Design

Three APs

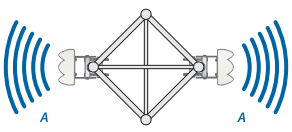
Set a different frequency on each AP. For example, a client is located equidistant from two APs (one set to frequency A and one set to frequency B). The client will only receive signals from the AP that shares its frequency. A different client is located equidistant from a different pair of APs (one set to frequency B and one set to frequency C). This client will only receive signals from the AP that shares its frequency.



ABC Channel Design

Two APs

Set the same frequency on both APs located back to back.



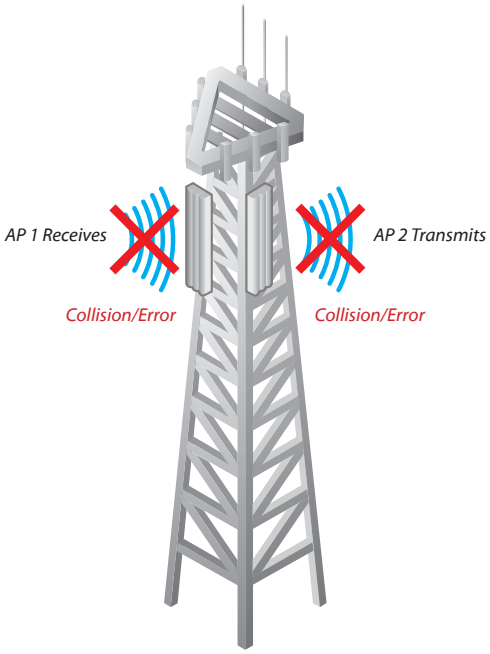
AA Channel Design

Application Examples

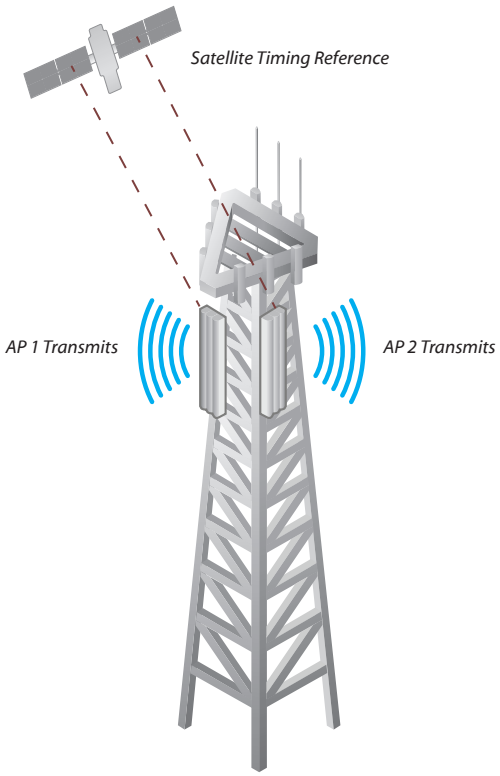
When to use airSync

Co-Location Interference

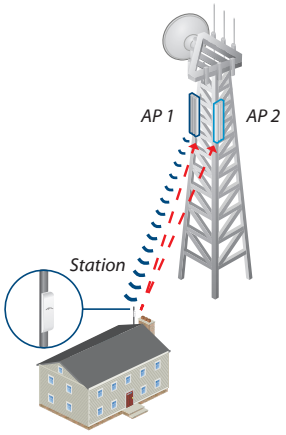
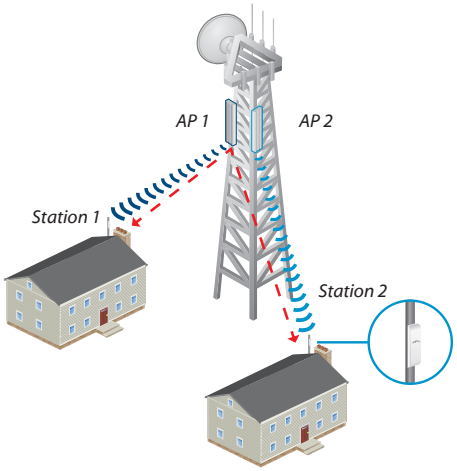
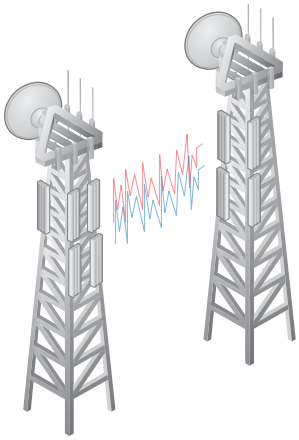
Two co-located APs without airSync are transmitting and receiving at the same time, causing a collision error.



With airSync enabled, the APs transmit at the same time.



When airSync shouldn't be used

Station sees AP other than its own with similar signal strength	AP sees Station from another AP	Excessive in-band noise from sources outside the network
		

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