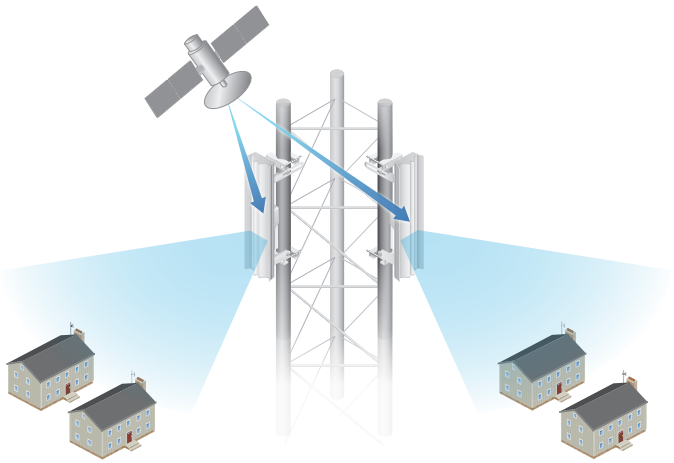
GPS Sync™

Design Guide

How GPS Sync Works

GPS Sync™ eliminates problems that occur with multiple access points (APs) that are co-located. When GPS Sync is enabled, all synchronized APs will transmit at the same time and receive at the same time. The result is a drastic reduction in co-location interference.

Each AP has a GPS receiver and synchronizes its transmissions to the GPS timing signal – no connection between APs is required. To use GPS Sync, all APs must have GPS receivers and all radios must be running airOS® version 8.3 or above.



Performance Expectations

- Co-location interference will be drastically reduced.
- Frequency reuse will be possible in properly designed networks.
- Latency will be 2-3x the frame duration (for example, latency for a 5 ms frame = 10-15 ms) and remain consistent.
- TCP throughput will be 20% higher than competing products with the same radio configuration.
- A 5-ms frame provides lower latency, while an 8-ms frame provides higher throughput.
- In flexible mode, the capacity of the AP is the average of downlink and uplink capacity. When using fixed framing, it is the sum of downlink and uplink capacity.
- Retries and scheduling may affect the instantaneously observed latency.

Recommended Guidelines

- Synchronize all APs that can hear each other or each other's CPEs.
- Only the AP requires a GPS receiver; CPEs do not need GPS.
- Do not operate unsynchronized APs where they can be heard by a synchronized AP on the same channel.
- Different channel bandwidths can be synchronized together if required.
- Use ATPC on all CPEs to eliminate interference from them.
- GPS Sync uses fixed frame mode but fixed frame mode can also be used on APs which do not have GPS receivers. If used, it will not be synchronized to other APs.
- Up to 60 CPEs can be connected in fixed-frame mode as of airOS v8.3.
- Use a downlink/uplink ratio that best fits your traffic patterns (for example, 75/25 for Internet access).
- Follow the examples in the *Design Examples* section when designing your frequency plan.

Requirements

- An airMAX® AC AP with a GPS receiver:
  - PrismStation™
  - Rocket® 5AC Prism
  - Rocket 2AC*
- All APs must have a GPS signal
- The same downlink/uplink ratio and frame duration are configured on all APs
- 10 MHz of separation between channels

* Requires airOS v8.3.1 or above

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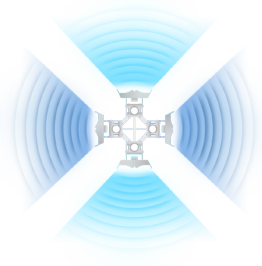
Design Examples

Four APs

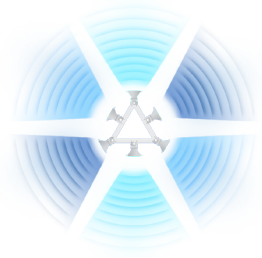
An unsynchronized network requires four channels to operate in this configuration. With GPS Sync, only two are required via frequency reuse. Set the same frequency on each pair of back-to-back APs. This also works if only two APs are being deployed. Clients in the coverage area for each AP will only receive signals from that AP.



ABAB Channel Design

Six APs

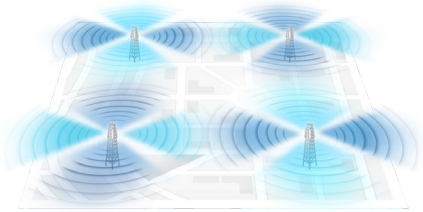
For antennas with narrower beamwidths such as PrismStation isolation antennas, denser configurations can be used. By using GPS Sync, six APs can operate using only three channels via frequency reuse.



ABCABC Channel Design

Multi-Tower Deployments

For multi-tower deployments, arrange the channels on adjacent towers to prevent APs that use the same frequency from hearing each other. For example, an AP using channel A should not face any other APs using channel A. In this scenario, the network is still using only two channels.



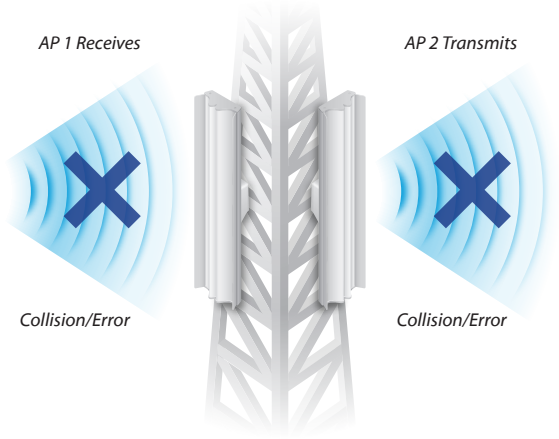
Multi-Tower ABAB Channel Design

Application Examples

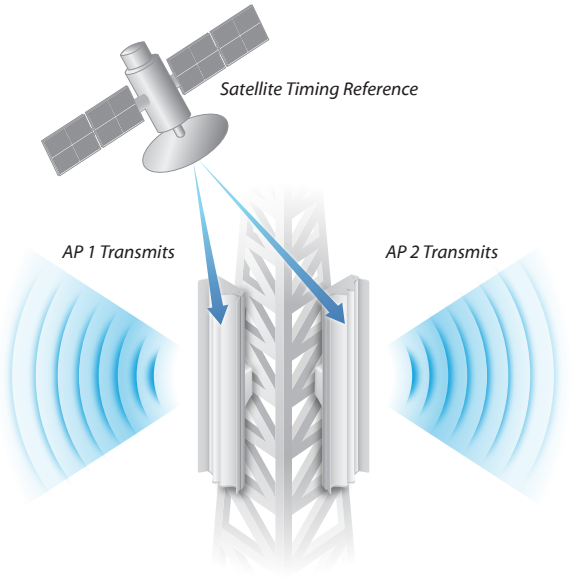
When to Use GPS Sync

Co-Location Interference

Co-located, non-synced APs interfere with each other when one transmits while another is receiving on the same channel. This occurs with dense deployments and areas with limited spectrum.



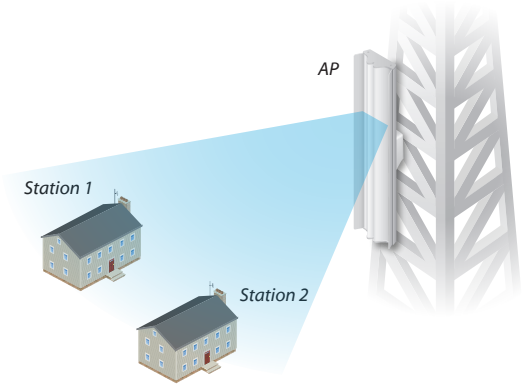
With GPS Sync, the APs transmit at the same time and receive at the same time, eliminating co-location interference.



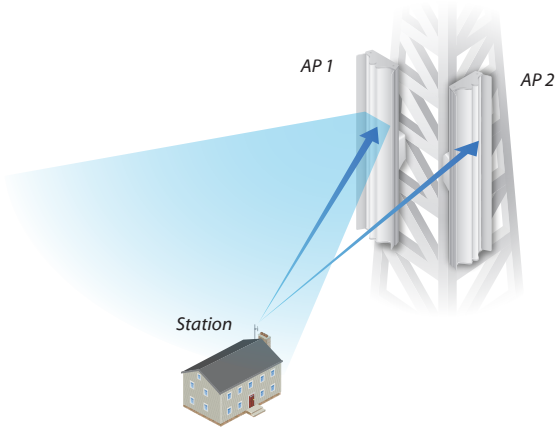
GPS Sync™

When Not to Use GPS Sync

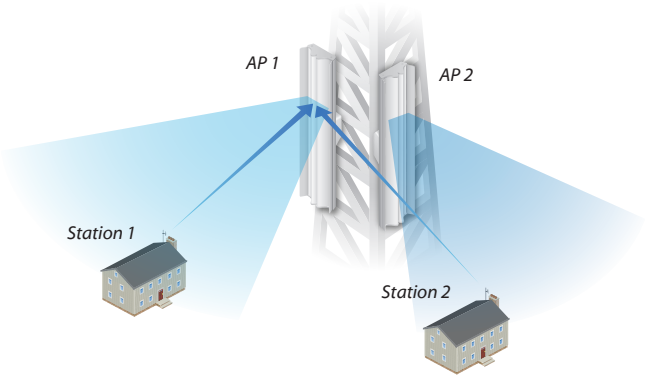
- Sparse deployment with little to no interference and large available spectrum



- CPE can hear other APs with similar signal strength



- AP can hear other AP's CPEs



- Highly dynamic traffic on network (unpredictable downlink/uplink ratio)