AIRMATCH RF OPTIMIZATION TECHNOLOGY

Automate your Wi-Fi network tuning to enable the highest performance

Enterprise work environments are shifting to digital workplaces, where soaring device densities and growing data needs are driven by BYOD, IoT, mobile applications, and unified communications. To enable an always-on network with the desired performance and user experience, enterprises must deliver a WLAN with advanced radio management technologies that can optimize its behavior in the radio frequency (RF) environment to improve network efficiency and performance.

Aruba Adaptive Radio Management (ARM), built into ArubaOS, dynamically adjusts the RF environment to ensure the best radio connection and QoS, while mitigating co-channel and adjacent channel interference. Starting with AubaOS 8.0 in the Mobility Master — the next generation of master controller — static channel assignments in high density environments are now a thing of the past. Via machine learning, optimal channel, channel-width and power assignments are performed automatically to maximize capacity across the entire Wi-Fi network.

AirMatch brings together new optimized channel and power assignment features and adds automatic channel width adjustment function to provide automated and dynamic RF optimization for enterprise WLANs. AirMatch is designed for noisy and high density environments with a scarcity of clean and unused RF spectrum. With the optimal assignments of channel, channel widths and transmit power, AirMatch enables:

- Even distribution of radios across available channels, interference mitigation and maximized system capacity
- Dynamic bandwidth adjustments between 20MHz, 40MHz and 80MHz to match the density of your environment
- Best coverage and even EIRP distributions for seamless roaming

With AirMatch, enterprises can now provide better support for demanding and quality sensitive applications, such as video streaming and Microsoft Skype for Business, while roaming throughout the enterprise.

WHAT DOES AIRMATCH DO DIFFERENTLY?

The existing channel and power assignment functions in ARM support channel scanning, channel assignment and power adjustments, locally. Decisions are made locally at the AP without looking at the entire network. Thanks to the dynamic machine learning techniques, AirMatch centralizes this function in the Mobility Master while dynamically learning the network and adapting the RF planning for the entire network. It not only looks at a single AP, but at all APs' RF-specific information, such as interference, noise, and radar detections in the network, before any decision is made. The optimized RF plan is derived from a single compute phase and the configuration is pushed to the APs. AirMatch's optimized RF plan results in long term network stability with fewer required channel and transmit power changes during normal operating conditions.

With the new channel bandwidth adjustment feature, AirMatch automatically tunes the channel bandwidth based on the device density of the environment, maximizing the capacity and improving network efficiency.

Channel assignment

The Aruba Mobility Master controller collects RF statistics from the entire network. Based on the data from the past 24 hours, AirMatch proactively optimizes the channel allocation plan for the network to ensure the highest performance. Additionally, APs react to local RF events, such as high noise floor and radar detection by changing channels appropriately. Overall, AirMatch ensures more evenly distributed channels in the network with reduced channel interference and improved channel reuse. Figure 1 shows the channel assignment with ARM. Figure 2 shows a more even channel distribution with AirMatch based on data from the entire network.

In Figure 1, both AP 225-3 and AP 225-9 support channel 1 in 2.4GHz and channel 149 in 5GHz, resulting in a channel coupling; while in Figure 2, with AirMatch, channels in both 2.4GHz and 5GHz radios are more evenly distributed.

Transmit power adjustment

AirMatch examines the entire WLAN coverage and automatically adjusts the transmit power of APs to ensure the best coverage and user experience. For example, when an AP is down, it creates a coverage hole in the network. AirMatch will increase the transmit power of neighboring APs to extend the coverage. As shown in Figure 1 and Figure 2, in order to extend coverage for the gap in the center of the rectangular area, AirMatch adjusted the EIRP values for all of the APs around the hole to 9dbm for 2.4GHz and 16dbm for 5GHz symmetrically; while ARM adjusted the APs' EIRP values asymmetrically due to its local view of the network.

Additionally, when network interference is high, AirMatch will increase the transmit power of APs to mitigate the co-channel interference and improve the WLAN performance. AirMatch also ensures a minimum of wild EIRP swings across neighboring APs, leading to a better roaming experience.

Channel bandwidth adjustment

In addition to the optimized channel and power assignment features, AirMatch is designed with another unique function – channel bandwidth adjustment. AirMatch looks at the density of devices in the network and automatically adjusts the channel width of the radio. When the number of connected devices increases, the channel width is automatically adjusted to a narrower channel like 40MHz or 20MHz, and vice versa. For very high density areas such as lecture halls and stadiums, 20MHz is recommended for better performance. However, if 20MHz was not originally planned for the network, AirMatch will automatically switch the bandwidth from 80MHz or 40MHz to 20MHz, based on real-time data from the network. AirMatch reviews the overall network statistics for the past 24-hour period, and makes ongoing adjustments. Figure 3 shows channel width adjustment based on the number of devices in a high density environment.

For the 5GHz band in North America, there are a total of 6 channels in 80MHz while there are 12 in 40MHz, and 25 in 20MHz. Figure 4 shows the FCC channel allocation in North America. With more channels in 20MHz, it is easier for channel planning, especially in very high density environments.
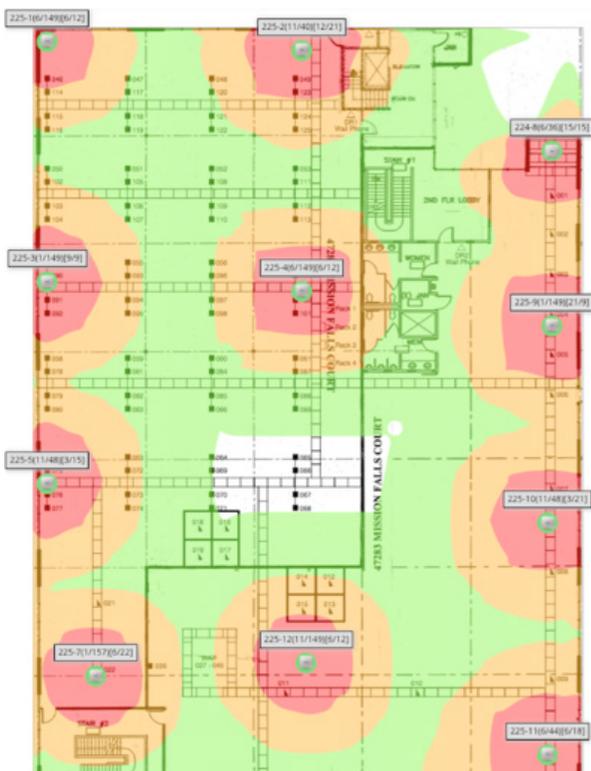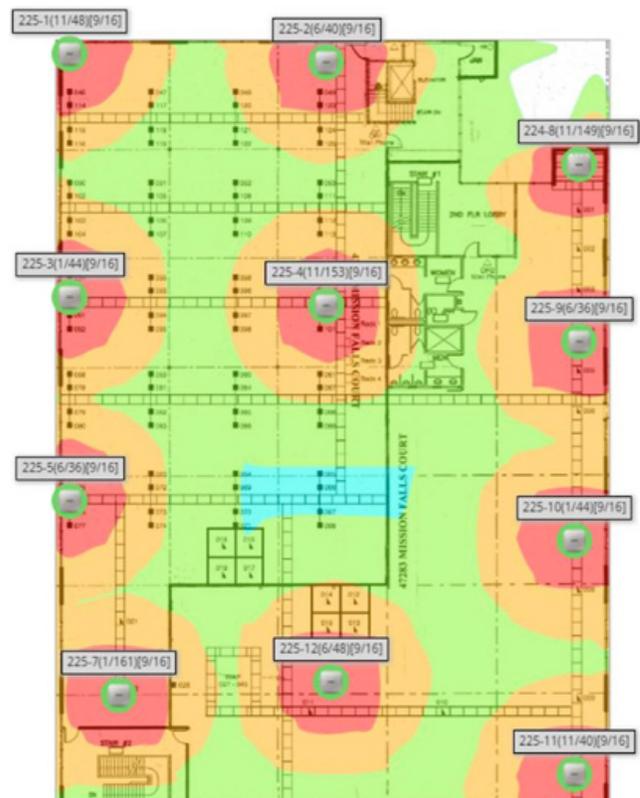

Figure 1*: Channel assignment with ARM

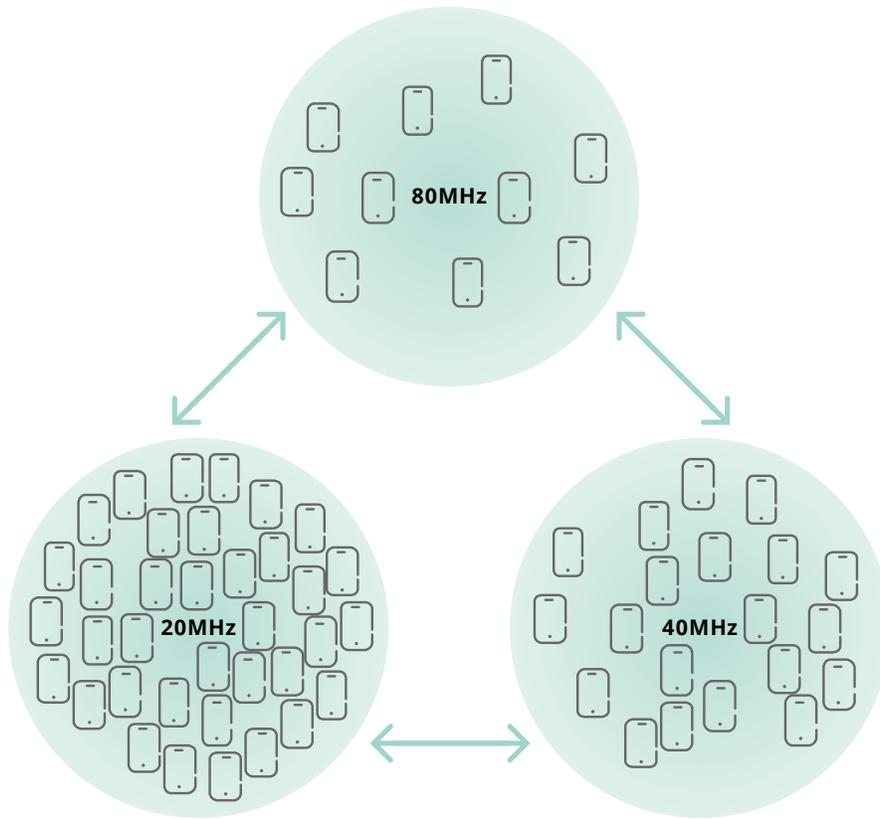Figure 2: Channel assignment with AirMatch

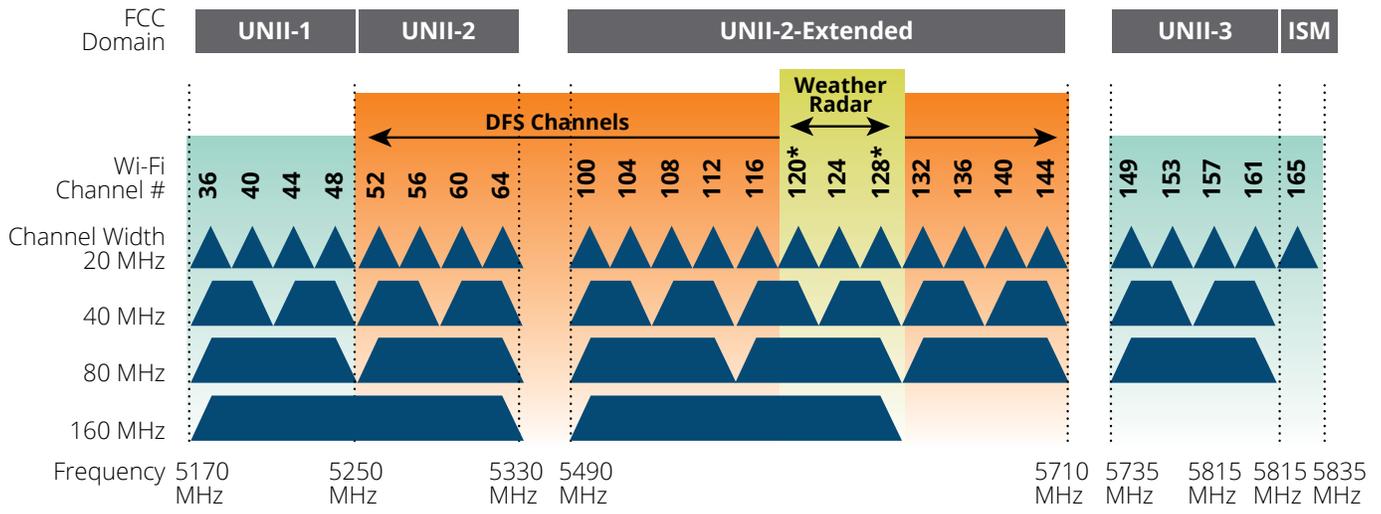**Figure 3: Channel width adjustment with AirMatch in high density environments**

Figure 4: 5GHz channel allocation in North America

BENEFITS OF AIRMATCH

WLAN Requirements in High Density Environments	AirMatch Benefits
Smarter WLAN	With the ArubaOS 8.0 release, AirMatch is being introduced as part of the ARM solution for the Mobility Master controller to automatically adjust the channel, transmit power and channel bandwidth, based on overall WLAN data for the past 24 hours. With AirMatch, the WLAN is now smarter and can easily adapt to changing environments to deliver the highest network performance. AirMatch provides simple configurations for most IT staff and is fully customizable for advanced users.
Superb user experience	The unique features in AirMatch enable a best-in-class WLAN and superior user experience. With the co-channel interference mitigation, optimized coverages and maximized capacities, users can roam seamlessly while on voice calls with BYOD devices.
Maximum System Capacity	AirMatch algorithmically derives the RF plan by solving for the least link conflicts, maximizing system capacity. It supports more clients in high density areas by appropriately allocating lower channel widths.
Best coverage	With an overall view of the entire WLAN, the power adjustment feature in AirMatch automatically adjusts the transmit power of APs to extend the coverage to ensure there are no coverage holes. This provides the best coverage and the best roaming experience in enterprise environments.

* The data labels for each AP in Figure 1 and Figure 2 should be interpreted as noted in this example – 225-1(6/149)(6/12). AP name: 225-1; 2.4GHz channel allocation: 6; 5GHz channel allocation: 149; EIRP for 2.4GHz: 6dbm; EIRP for 5GHz: 12dbm