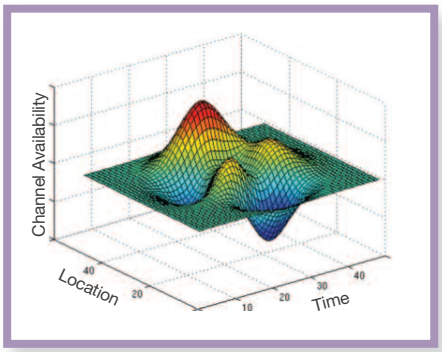
Go Further, Go Wireless
Fast, Secure, Reliable

ARUBA networks

Aruba Networks Adaptive Radio Management

Wireless networking has the potential to deliver unprecedented mobility benefits provided that Radio Frequency (RF) spectrum is properly managed. Aruba's Adaptive Radio Management (ARM) takes the guesswork out of RF management by using automatic, infrastructure based controls to maximize client performance and enhance the stability and predictability of the entire Wi-Fi network.

ARM works with all standard clients, across all operating systems, while remaining in compliance with IEEE 802.11 standards.



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What's the problem with real-world Wi-Fi?

When it comes to RF management, real-world Wi-Fi deployments suffer from three primary shortcomings:

- **Shared Media:** Wi-Fi, like every other RF technology, is a shared medium. Since a fixed amount of channel bandwidth must be shared by all clients on a channel, clients must compete for bandwidth while simultaneously avoiding collisions;
- **Multiple Client Technologies:** In order to maintain interoperability with older clients, protective mechanisms have been incorporated into new, higher speed Wi-Fi technologies that force them to lower their operating speed in the presence of slower clients. The presence of even a single low-speed client can undermine the performance of nearby devices that would otherwise operate at higher speeds;
- **Client-based decision making:** Clients decide to which access point they should associate, when to roam, and at what speed they should send and receive data. Unfortunately clients do not have a system-level view of the network, and as a result often make poor decisions because they lack a broader view of the network.

These shortcomings can reduce overall client and network performance, a situation that ARM is designed specifically to address – without adding client software, without using non-standard system architectures, and without violating IEEE 802.11 standards.

Infrastructure Control

The solution to these shortcomings is infrastructure based control, a technology through which client and network behaviour are purposefully adjusted to optimize performance, mitigate interference, and better utilize available resources. The goals of ARM and infrastructure based control include:

- **Optimize Spectrum Usage:** Depending on the local regulatory requirements, Wi-Fi typically has three channels available in the 2.4GHz band and 23 channels in the 5GHz band. For maximum capacity, these channels should be fully utilized, and clients evenly distributed across all available channels;
- **Maximize Coverage:** In order to achieve pervasive wireless coverage, the Wi-Fi infrastructure must ensure that coverage is uniform and adequate throughout the service area. Simply increasing AP power is insufficient because it creates an unbalanced condition in which more distantly located clients may perform poorly due to their lower transmit output power;
- **Minimize Co-Channel Interference:** Interference results when multiple devices in a given area attempt to simultaneously access the same channel at the same time. Interference reduces overall performance of the channel, and therefore interference mitigation is essential to proper network operation;
- **Ensure Compatibility and Interoperability:** Wi-Fi clients vary widely in terms of the technology they employ, the power and sensitivity of their radios, and the type and gain of their antennas.

  Standards-compliance of both the clients and the infrastructure is critical to ensure interoperability and "good neighbour" behaviour with respect to other nearby WLANs. The use of proprietary infrastructure control or client software is fraught with problems and should always be avoided;
- **Maximum Performance and Fair Access:** The ultimate objective of infrastructure control is to coax the maximum performance from every client. Among other techniques, this requires providing fair access to the network so that no single client or group of clients monopolizes resources at the expense of other clients.

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The Aruba Difference

Aruba has tackled these objectives head-on by incorporating best-in-class infrastructure based control into ARM. ARM allows mixed 802.11a, b, g, and n client types to interoperate at the highest performance levels, RF airtime to be allocated fairly, and co-channel interference to be avoided or mitigated.

ARM does not require any proprietary client software to achieve its performance goals. Client software is problematic because it requires vigilant revision control and may not be available for all operating systems or compatible with all client hardware. In most operating environments the wide variety of client hardware makes proprietary client software virtually impossible to manage.

ARM ensures low-latency roaming, consistently high performance, and maximum client compatibility in a multi-channel environment. Unlike proprietary single-channel architectures, Aruba's architecture is designed to squeeze maximum efficiency and performance out of all available RF spectrum. And it does so without compromising interference resistance, scalability, or interoperability - common problems of single-channel architectures.

Adaptive Radio Management

Infrastructure Control Capability	Aruba	Others
No dependence on client software	✓	✗
Compatible with all client hardware	✓	✗
Works across entire AP family	✓	✗
Fully utilizes available spectrum	✓	✗
Compatible with 802.11n 40MHz channels	✓	✗
Adjusts to changing conditions in real-time	✓	✗

With technologies such as Adaptive Radio Management, high-speed 802.11n, identity-based security, centralized integration of all mobility services, and easy-to-deploy branch office and telecommuter solutions, only Aruba can truly deliver the All-Wireless Workplace - a wireless network suitable for use as the primary access connection.

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ARM Features and Benefits

Adaptive Radio Management (ARM) Feature	Value
Adaptive Power and Channel Assignments: Automatically assigns channel and power settings for all APs in the network. Includes support for 802.11n HT20 and HT40 channels.	Automates many set-up tasks during network installation and during ongoing operation when RF conditions change. HT40 support ensures that new double-wide 802.11n channels function as intended.
Coordinated Access to a Single Channel: Allows nearby APs on the same channel to share spectrum without increasing co-channel interference.	Overcomes the challenges of dense AP deployments in the 2.4GHz band typically seen in lecture halls, airport lounges, and conference centers.
Band Steering: Moves 5GHz-capable clients to the 5GHz band for higher performance.	The 5GHz band offers better noise immunity, fewer sources of interference, and more available channels.
Channel Load Balancing: Ensures the even distribution of clients across available channels in a given area to avoid overloading a single channel or AP.	Prevents a single AP or channel from becoming overloaded, and thereby reducing the performance of associated clients.
Airtime Fairness: Provides equal access to the wireless medium for all clients, regardless of client type, capability, or operating system.	Delivers uniform performance of the WLAN for all clients. Prevents clients from monopolizing resources at the expense of other clients.
Airtime Performance Protection: Delivers uniform performance for all clients by preventing clients, especially slower ones, from monopolizing resources.	Delivers uniform performance of the WLAN for all clients. 802.11n users experience faster network speeds even when older 802.11a/b/g clients are present.
Coverage Hole Detection: Detects and notifies the network manager when clients are unable to associate at acceptable speeds.	Automatically detects potential coverage problems so they can be corrected quickly.

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