



Managing WiFi Networks in the Retail Industry

Overview

The retail industry has been an early adopter of WiFi technology. The reasons for retail's love affair with wireless are obvious: WiFi dramatically reduces cabling and change costs, and makes it possible to deliver affordable high-speed connectivity in hundreds of locations.

As a result, retail giants are actively building some of the largest wireless networks in the world, often fielding 10,000 or more wireless hotspots. Yet, despite millions of dollars spent by retailers on WiFi equipment, the industry largely ignores the unique challenges these large organizations face and continues to develop technology solutions targeted at large-campus environments.

Operating a network with 5,000 access points in a thousand remote locations is radically different than supporting several thousand access points on one campus. When WiFi solutions do not reflect this reality, support costs escalate and wireless LAN performance deteriorates.

To develop a management system to meet retailers' unique needs, AirWave Wireless worked closely with some of the largest retailers in the world. AirWave solutions enable retailers to successfully operate and support a network of wireless LANs by addressing:

- **Remote management:** Because onsite staff in retail stores typically cannot diagnose and resolve network issues on their own, IT must provide efficient remote support.

EXECUTIVE SUMMARY

Managing WiFi networks in the complex operating environment of a large retailer involves challenges a traditional campus-based enterprise doesn't have, even though the underlying WiFi hardware is the same. The network is larger and more distributed, operating environments are more varied, onsite support resources are limited or nonexistent and network security is paramount. For a retailer, a robust management solution not a luxury but a requirement.

The AirWave Wireless Management Suite gives IT the level of control it needs over a large, distributed WiFi network:

- **Manageability** -- Configure and control WiFi infrastructure, regardless of manufacturer or architecture.
- **Security** -- Detect devices and enforce security policies across all WiFi devices.
- **Visibility** -- View real-time information on every user and device, as well as historical trend reports for planning and analysis.
- **Flexibility** -- Fit the WiFi management solution to the existing network infrastructure

With the AirWave Wireless Management Suite, retailers can effectively control the largest wireless LANs in the world, in thousands of remote locations.



- **Planning:** To efficiently manage thousands of sites, IT needs flexible planning tools that adapt as the network expands and changes.
- **Flexible legacy support:** Large retail networks tend to become increasingly diverse over the years and any management system has to handle WiFi hardware from different vendors.
- **Heterogeneity:** WiFi hardware has to remain in place for at least three to four years and a management system must control both new and legacy environments to help retail avoid costly 'forklift' hardware upgrades.
- **Security:** To maintain PCI/CISP compliance, strict wireless network security policies must be enforced to protect corporate and customer data.
- **Role-based management:** No individual can manage a large retail network alone; dozens of employees need quick access to information about the wireless LAN from wherever they are.
- **Scalability:** The WLAN needs to grow without sacrificing centralized control and manageability.
- **Reporting:** When any decision impacts thousands of locations, real-time and historical trending data is critical.
- **Diverse network architectures:** Wireless management solutions have to adapt to the available bandwidth on distributed retail networks, rather than forcing the network architecture to meet the requirements of the management system.

The AirWave Wireless Management Suite™ is specifically designed to manage these large networks with features that meet the specific needs of retailers.

Remote management

Challenge: In the retail environment, especially where each store is relatively small, local IT support does not exist – and store managers or retail salespeople may not be able to provide useful diagnostic assistance. Efficient remote support has to come through a centralized NOC or operating costs will mount with each local service call.

Solution: AirWave Management Platform (AMP) gives remote IT staff the same type of information they'd get if they were standing in the store itself. Through a combination of RF monitoring (via authorized access points) and wired network scans, AMP shows IT exactly who is connected to the network, what signal they are receiving, how much bandwidth they are using and how the network is performing locally.

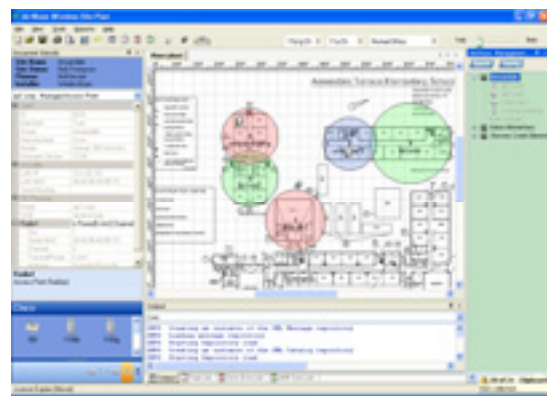
AMP provides a flexible, logical naming system and search feature to allow IT to quickly locate and drill down to view detailed data for an individual location or user. Using AirWave's VisualRF module, IT can see where each user is located and can assess the RF environment for likely sources of interference. With this data, IT can diagnose problems quickly, determining whether the issue is client-based or network-related. When a network problem is detected, the remote IT admin can change the device configuration to implement a corrective action via AMP's web-based UI.

Planning

Challenge: A retail organization with hundreds or thousands of stores needs up-to-date RF site maps for each location to optimize network performance and efficiently diagnose problems. Such information is especially critical when providing location services -- accurate site maps will help IT to accurately triangulate client devices and users. Developing RF site maps manually or with complex RF tools is a daunting task and keeping each site map accurate as the network evolves and the RF environment changes can be almost impossible.

Solution: The AirWave Wireless Site Plan™ software is an easy-to-use Visio™-based application that can import nearly any existing file to serve as the basis for a plan: CAD, Visio, JPEG or GIF. A site plan can be generated within minutes with the Visio template, and the results exported automatically to the AirWave Management Platform™ (AMP) software.

AMP then configures the wireless network infrastructure to match the plan and continuously updates the plan with real-time data from the network. With AirWave's VisualRF™ module, these site plans provide the foundation for location-





based services, helping to determine and display the physical location of users and devices.

Flexible grouping and legacy support

Challenge: No matter how inexpensive the WiFi hardware, the real cost of installing or replacing a wireless access point (AP) for a large retailer can be thousands of dollars -- changing APs in retail is not as easy as changing a light bulb, as some hardware vendors have maintained. Equipment must be staged, local contractors hired and the work performed so it does not disrupt store operations. Even a small mistake can cost hundreds of thousands of dollars if it is replicated in every store location, so retail operators prefer to update a test segment of the network to work out the kinks with the upgrade. When it's successful, it is gradually migrated to the rest of the network, segment by segment -- upgrading the entire network may take several years.

A retail network-management platform must maintain extensive support for legacy devices and architectures, as well as new products. It must also allow the wireless network to function in logical segments, to enable new products and changes to be rolled out gradually.

Solution: The AirWave Wireless Management Suite supports a broad library of the most popular WiFi devices, including legacy hardware from the early days of WiFi. The organization can extend the life of its existing investment and determine when to upgrade its network infrastructure.

Within AMP, users can define as many device groups as needed, allowing retailers to set up test groups for new devices and configurations. When a network change is made, AMP can implement it globally or segment by segment. Changes can be scheduled to occur late at night, to minimize the impact on local network performance.

Heterogeneity

Challenge: Compared to general Fortune 1000 corporations, large retailers' wireless LANs are more likely to have WiFi hardware from multiple vendors. To avoid using multiple proprietary management solutions to control a diverse WiFi infrastructure, IT needs a solution capable of managing diversity.

Solution: The AirWave Wireless Management Suite is a vendor- and architecture-agnostic software solution that

allows the IT staff to discover, monitor, configure and control multiple vendors' WiFi networking infrastructure from one integrated web console. Whether the organization uses a combination of Cisco Aironet™ and Airespace™ devices or a

The Changeable World of Retail WiFi

A large retail organization's wireless LAN is significantly more likely to have WiFi hardware from multiple vendors than a standard Fortune 500 organization. Several key factors contribute to this diversity:

Mergers and acquisitions – Retail-industry consolidation means stores and entire chains are frequently bought and sold. With a new chain or subsidiary comes infrastructure -- often different than that of its new parent company. Retaining the existing infrastructure is usually most cost-effective, but even standardizing and replacing the existing equipment can take years.

Aggressive vendor management – Cost-conscious large retailers are skilled at extracting the most aggressive pricing possible from their networking vendors. Some retailers have primary and secondary WiFi equipment vendors to maintain competitive pricing pressure.

Diverse operating environments – No one-size-fits-all hardware solution works well in all environments. For example, a small store location can be covered with one or a few wireless access points, so a standalone access point or even an integrated firewall/VPN/AP may be the most economical. In contrast, a distribution facility or corporate headquarters campus may be best served by a thin AP and controller architecture.

Large deployments and lengthy rollouts – For a large retailer with hundreds or thousands of locations, even an aggressive WiFi rollout may take years. Hardware vendor discontinue old product lines, develop new technologies and introduce new architectures before the deployment is complete.

In this environment, IT needs a WiFi management solution that is flexible and vendor-agnostic, able to integrate smoothly with existing equipment configured differently in various locations.



mixture of Symbol and Intermec, the AirWave software manages it all.

Security

Challenge: Retail IT must guarantee the security of the network and corporate data. In order to comply with Payment Card Industry (PCI) standards and Visa's Cardholder Information Security Plan (CISP) requirements, security policies must be properly defined and enforced. Non-compliance can result in substantial financial penalties and sanctions, including the prohibition to process Visa transactions.

Solution: AirWave's Management Platform helps retail organizations meet strict PCI/CISP standards that protect cardholder data with the following wireless network provisions.

PCI/CISP: Change factory default passwords and settings (such as WEP keys, SSID, SNMP community strings, etc.)

- The AirWave Management Platform allows IT to specify configuration policies for all wireless devices on the network and automatically configures the devices to comply with those policies.

PCI/CISP: Establish and maintain clear configuration policies

- AMP's web UI provides a central location where wireless configuration policies are defined and enforced. AMP audits all WiFi devices regularly to detect any policy violations and automatically restores the correct settings. An automated daily report lists all detected violations.

PCI/CISP: Use WPA whenever possible; if WEP is used, rotate shared keys quarterly and when personnel changes occur

- AMP allows IT to specify that WPA must be used on all WiFi access points and to indicate which authentication servers will control access on that segment of the network. If WEP is used, AMP makes it easy to update keys on all access points as needed.

PCI/CISP: Maintain accurate network inventories

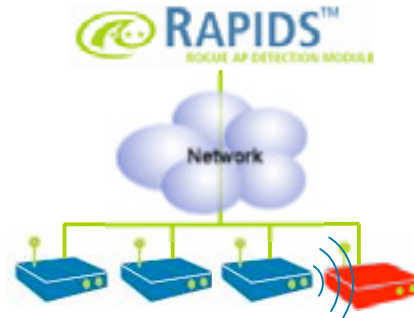
- AMP provides daily reports listing every device on the network, and generates alerts if any new devices are discovered or when it loses contact with existing devices.

PCI/CISP: Detect and locate rogue access points

AirWave's RAPIDS™ module uses both RF and wired network-scanning techniques to discover any unauthorized wireless access points connected to the retailers' network.

RAPIDS' wireline network scans are a reliable way to check for rogue devices in store locations that do not have wireless access points or RF sensors.

CISP: Maintain full, accurate audit trails - AMP logs all actions by administrative users, and allows IT to restrict

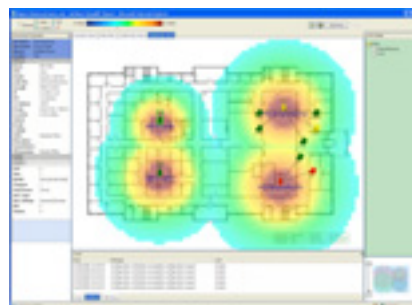


administrative access to a subset of users for additional security. AMP also maintains at least a year of user-session data so the retailer can perform forensic analysis in case a network breach is detected.

Role-based management

Challenge: In a large retail organization, dozens, or even hundreds, of IT employees need access to information about the wireless LAN. A management solution designed only for network engineers cannot meet the diverse needs of all IT staff members.

Helpdesk staff typically fields calls from retail-store employees reporting network problems. Helpdesk needs to locate the remote user quickly (preferably by username), determine which store he is in, view real-time performance and usage data, and access historical information for diagnostic purposes. One helpdesk group may be responsible for all stores or the responsibility may be assigned to multiple smaller helpdesks. This team usually has no administrative privileges for changing network settings or security policies.





Network engineers need to manage device configurations on their segment of the network. Individual network engineers may be responsible for a geographic region or a specific set of stores and should not have administrative access to other network segments for security reasons.

Corporate network administrators need to define network and security policies across the entire network, as well as see detailed trend reports and exception reports.

Network planners need detailed trend reporting by store and other logical groupings, in order to plan wireless network expansion to ensure performance and security.

Installers (often contractors) need detailed installation reports and forms to fill in site-specific information, but typically should not be able to configure or monitor WiFi devices on an ongoing basis.

IT security and audit teams must be alerted when device configurations violate policies or when rogue devices are discovered, and need to view audit trails and log files as needed.

Solution: The AirWave Management Platform software allows the IT organization to tailor permissions and views to match the responsibilities of the various IT users:

- Password-protected user permissions can be set to 'view-only' levels for users who only need to monitor data while 'read-write' administrative access is granted to network engineers and administrators. All changes are logged, with username and time.
- Users can be given permission to view data across the entire WLAN infrastructure or restricted to those groups or devices for which they are responsible.
- All AirWave reports are automatically delivered to specified email distribution lists to ensure staff members receive job-appropriate information. The audit group can receive configuration-compliance reports and rogue-device reports, without administrative access to the system. Network planners can receive usage reports and trend data without accessing the AMP system.
- The AirWave Wireless Site Plan generates Excel-based reports and forms for installers to submit, without giving them access to any configuration data, ensuring security of the network and data.

Scalability

Challenge: For a retail organization with hundreds or thousands of store locations, installing two or three access points per store means the IT organization must manage a WLAN with thousands of APs. When corporate headquarters, distribution facilities and local offices are included, it is not unusual for a retailer to have 5,000 or more access points (and tens of thousands of wireless devices) on its network. Most management solutions are designed for smaller wireless networks, with limits on the number of access points or controllers that can be managed. This forces IT to manage their wireless LAN as multiple separate stand-alone networks. To operate a large, mission-critical wireless network, retail IT needs enterprise-grade features such as many-to-one automated failover, TACACS integration and more.

Solution: The AirWave Wireless Management Suite is designed for maximum scalability, and can routinely manage networks with 10,000-plus wireless APs. The AirWave Management Platform is a software-only solution that allows the user to select a hardware platform that meets its needs rather than using a one-size-fits-all appliance with limited scalability.

AMP also employs a distributed architecture that allows IT to install the software on multiple servers, and manage and monitor it from a unified, web-based Master Console. These servers can be co-located in a single NOC or distributed in multiple locations, as appropriate. As a result, AMP has nearly unlimited scalability: More servers can be added as the WLAN grows without sacrificing centralized control and manageability.

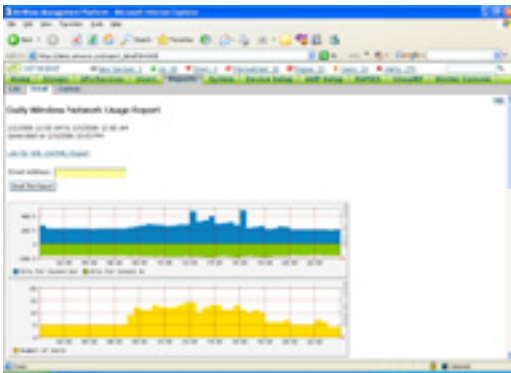
Trend reporting

Challenge: When a retailer decides to add another wireless access point to a standard store configuration, the decision impacts not one store but thousands; the cost is not a few hundred dollars, but several hundred thousand dollars. With so many remote locations, retailers tend to standardize their network environments to keep operational costs low. As a result, the successful retail IT organization needs to know not just real-time information on network utilization and performance in each store, but detailed trending data on individual users and devices.



- Which access points are most heavily used – the APs on the shop floor or on the shipping docks?
- How variable are usage patterns – are there peak usage times at certain points in the day or year, or is usage fairly steady?
- Which users are causing the network traffic to increase – was there a significant utilization increase in the 10 stores where wireless voice over IP is being tested?
- Are there seasonal patterns to network usage – was there a spike in usage during the holiday season last year that would indicate that IT should plan for a comparable spike this year?

Only with reliable historical trending data added to real-time information can IT make informed, intelligent decisions about when, where and how to grow their wireless networks.



Solution: The AirWave Management Platform provides both the real-time and historical information that retailers need. AMP retains historical user and performance data for a year or more, enabling the IT staff to run detailed trending reports for specific groups of stores or globally across the entire network. AMP also uses a flexible folder UI design that allows IT to examine retail shop-floor APs separately from back-office APs to get more granular trend and performance data.

Diverse network environments

Challenge: On a campus network, a reliable broadband connection is nearly always available, so bandwidth and latency are not significant concerns. In a highly distributed retail environment, some stores may be connected by T1 and others may rely on a DSL connection or even an intermittent satellite. Even if the primary connection is a broadband line, the emergency backup link typically is not. Retailers need management solutions that can adapt to the available bandwidth rather than forcing IT to re-architect

their entire network infrastructure simply to support wireless.

Solution: The AirWave Management Platform provides maximum flexibility to support nearly any network environment, whether stand-alone or lightweight access points are deployed. Using Group-based parameters, IT can configure AMP to poll network locations with a broadband connection frequently to provide near real-time monitoring data. In other locations, where bandwidth is more of a concern, the polling interval can be longer to minimize network traffic.

Similarly, AMP's triggers and alert thresholds can be configured to reflect network design and support high-latency networks. On a high-latency network, for example, AMP can be configured to wait longer for a response to a polling query. Instead of treating all network locations the same, AMP provides IT maximum flexibility, fine-tuning management settings for each type of location.

Conclusion

When you compare the operating environments of a retailer to those of a traditional campus-based enterprise, the differences are more striking than the similarities. Specialized solutions like the AirWave Wireless Management Suite give IT the level of control it needs over a large, distributed Wi-Fi network, in thousands of remote locations.

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