The Essentials of Wireless LAN Lifecycle Management

Wireless LANs are Not Install-and-Forget Systems; they require ongoing attention.

Enterprise Wireless LAN (WLAN) deployments often start as "trial" systems. Over time, these deployments grow into large systems with users becoming dependant upon the wireless services. Consequently, these wireless applications become mission-critical. This requires detailed assessments and ongoing support—a critical necessity often overlooked during the planning phase. In fact, many industry experts warn that the initial cost of deployment is only the beginning—ongoing lifecycle support and maintenance will often exceed the cost of the equipment by a factor of more than five. The reality: being prepared for ongoing support is not only prudent, but essential in large wireless deployments.

The best way to be prepared for a WLAN and the ongoing support details is to understand the full scope of the challenge and the available options. Once you understand these issues, you can make educated choices in preparing for them. As an enterprise prepares and executes its plan, the best weapon in its arsenal will be the ability to rapidly document and modify its strategy, graphically and in layman's terms, so that the entire team stays focused. This saves the enterprise thousands, or potentially millions of dollars throughout years of seemingly hidden maintenance and expensive survey costs.

You must also consider the dynamics of where the wireless network is deployed—building construction, additions, and users will change with time. Given this fact, there must be a baseline from where to start. You should also plan for future wireless expansion and evolving technology, while reducing the need for costly, duplicate efforts.

The best documentation possible in this case is "soft" records. During the planning and design phases of deployment, you can convert these into "hard" records for implementers to ensure proper hardware placement. Then, use these records in soft form for ongoing operation and management phases. Later, you can capitalize upon their accuracy for future expansion and technology upgrades.

The Planning Process

The initial phase of any lifecycle process begins with solid planning. In the case of WLAN planning, the process involves the collection of the following types of data:

User Information: How many users do you anticipate? Where are their locations? What are their wireless service needs and at what usage levels (throughput /bandwidth), etc.?

Applications: What types of applications will users require? What are the application performance requirements such as throughput, latency, availability, and burst data rates?

Facilities: What are the physical and logistical characteristics of the facilities where you plan to deploy the system? What special restrictions apply? Is power available to drive the Access Points and antennas? Are there any specific radio frequency (RF wireless) concerns? Are there notes on material types used throughout the facility, such as wood, brick, sheet rock, glass, and especially, the locations of metallic obstacles?

Equipment & Configuration Options: What types of wireless equipment are currently installed? Will these technologies multiply interference or throughput issues? What new types of equipment are you considering, and what configuration options are possible such as antenna types, power, bands, channels, etc.?

These are all typical planning questions—resolving them now will save countless dollars.

You can easily find most enterprise user, application, and facility information. In other settings, these can be reasonably estimated. You can then use these data points to assess the needs of the user and the enterprise, and begin to design the WLAN utilizing a variety of hardware types. The use of a physically annotated map of the facility to show the locations of all existing RF-related equipment and potential equipment substantially reduces the time and effort involved both in the short- and long-term.

To provide optimal coverage, you can use predictive design software to analyze and decide upon various equipment options. The assessment process should include accurate predictive analysis of coverage, signal level, data rates, noise margins, and other RF parameters required by the applications. After completing the analysis, you can generate a final network design map that includes accurate details of equipment placement, wireless coverage characteristics, and the design history.

This use of predictive design software is instrumental in reducing maintenance costs over the years. As a result, your planning documentation will become the foundation of the WLAN lifecycle management process. Ideally, the network design "map" will be highly detailed, easily viewable, manageable, and exportable.

The Deployment Process

The deployment process starts with a complete design and bill of materials (BOM) to assist wireless equipment installers, and those responsible for the assets. Along with the BOM, you can use the network design "map" to generate detailed documentation for the installation team. This map should include details about the placement and orientation of the equipment, approximate power connection points, and any special marking or required nomenclature.

After installation, the verification and tuning process begins. This step involves a site-survey type of process in which you take measurements at various points throughout the facility to verify the predicted coverage and performance. You can expect minor deviations due to unexpected obstacles that may require adjustments. After making the adjustments, you should update the network design map to accurately reflect true partition attenuation values, the new hardware locations, optimal wireless equipment power settings, and relative RF coverage levels.

If you use advanced predictive software, you can modify the RF propagation model so that future predictions will be more accurate. Finally, you will want to annotate the network design map to reflect any special notes about the installation. This step allows you to locate the equipment in the future and to reduce costs associated with "gophering"—putting your head in the ceiling to try to identify wireless assets.

The Management Process

The management process for wireless networks is similar in many ways to managing standard network equipment. However, there are several unique challenges:

Real-Time Monitoring traditionally involves polling the equipment for status. Unlike traditional wired networks, wireless networks suffer from many different forms of degraded operation. This can be from simple things like loose or misaligned antennas, stacks of boxes or moved cabinets, interference from neighbors, rogues, or simply too many users in one area. The preferred monitoring solution should allow you to visualize the real-time RF coverage in an understandable way by adding contour overlays to the map created during the design phase.

Since buildings are three dimensional, accurate deployment and management of a wireless network requires a cubical perspective of the world to ensure proper equipment placement and effective, timely management. Similarly, effective management of a wireless network requires an elevated view of reality. Any system that can provide greater vision into the RF perspective is of great value to the enterprise.

Problem Detection and Isolation is more of a challenge in a wireless system. With traditional network systems, problems usually manifest themselves as simple failures and a Network Management System (NMS) alarm will go off or an angry user will call. Wireless problems come in many levels of gray. Weak and degraded signals may only slow and reduce the quality of a connection. Similarly, rogues, interference from neighbors, and noise cause different degrees of performance reduction. Detecting, isolating, and correcting these type of problems is extremely difficult using traditional NMS tables and charts. Again, the preferred approach is to visualize the RF performance in terms of designed coverage using various contour plots from the RF map, and comparing them to actual readings generated from real-time data. With the proper tools, you can quickly identify "interferers", determine their locations, and rapidly resolve problems.

Problem Correction can also be a challenge. Unlike wired networks that contain switches in specific closets, and cables routing to users, you may find wireless equipment installed in less than obvious locations, such as above ceiling tiles and behind air handling ducts. With a small installation this may not be a problem, however, with large installations involving dozens or hundred of access points in single or multiple facilities, locating the source of a problem can be very difficult. Many companies specializing in on-site wireless maintenance will tell you that they often spend more time "gophering" (climbing ladders, popping ceiling tiles, and looking around like a gopher) for installed equipment than actually correcting the problem. The result: **Lost time = lost productivity and money**. With an annotated network design map, you can eliminate this ugly problem.

The Expansion Process

Much like the planning and deployment phase, expansion presents many of the same challenges. New users, applications, facilities, and equipment all come into play. Again, accurate documentation is crucial.

When planning for expansion, it is important to consider and anticipate the interaction with existing equipment—you must evaluate channel and power settings, possible interference, and facility characteristics. Using map-based predictive modeling tools is the most expedient way to understand and anticipate what needs to be done. Very likely, you may need to adjust the AP channels, power settings, and even locations of the existing deployment to ensure that the expansion fits in smoothly. Designing, installing, tuning and verifying are best accommodated and documented with an annotated network design map.

The Upgrade Process

Are you prepared for emerging advanced wireless applications? Are you prepared to offer wireless VoIP? How about ultra-mobile tablet computing? Have you considered location-based applications? All of these advanced technologies require more than a casual wireless deployment. They require a well- planned, documented, monitored and controlled wireless environment, and a strong set of lifecycle tools to get the job done correctly.

New wireless technologies continue to be deployed that solve enterprise business problems. As your organization evolves, these wireless solutions become increasingly more mission-critical. Will you be prepared as new technologies come along? You will be, if you anticipate and plan with the proper tools. In the near-term, there are revolutionary wireless technologies such as high speed 802.11N and UWB, which will enable new applications. Similarly, RFID will be more prevalent within many industries and will become an integral component of the organization's wireless infrastructure. Zigbee/802.15.4 applications also promise hundreds of new applications. Are you prepared?

Summary

Don't be caught without a plan—a wireless network and its applications are crucial to your business. Instead, develop a structured lifecycle plan that generates documentation consistent with your professional and organizational goals. Lay the foundation of your plan by leveraging advanced predictive modeling tools throughout the wireless network lifecycle to ensure reliable performance, minimal down time, and expansion planning.