Tutorials

Wireless LAN Installation Steps

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In a previous tutorial, we discussed the steps for deploying a wireless LAN, which includes requirements gathering, design, installation, testing, and planning for operational support. What we'll do now is focus on the important steps of installing the distribution system and access points.

Careful Planning

As with any other project, the planning of a WLAN installation involves establishing a schedule and assigning resources. For example, you may need two

installers working over a period of six weeks to install 150 access points and only one installer for a couple days for a smaller network with five access points.

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You'll also need to accomplish some up front coordination to ensure that the installation is completed on schedule. The access points will tie back to switches via Ethernet; therefore, you need to communicate with the people responsible for supporting the existing Ethernet systems if they already exist. Each access point requires a 10Mbps or 100Mbps Ethernet connection, depending on the design of the WLAN. In addition, it will likely be safer and optimum in terms of performance to separate the access points from the rest of the corporate network via a router or virtual LAN(VLAN) (define) . Just be sure to discuss all of this with the support staff for effective integration into the existing system.

When considering the installation schedule, think about the time of installation. The best approach is to install access points and the distribution system during operational downtimes. For example, don't attempt going full speed ahead with an installation in retail stores in November or December because of the holiday-related activities. Also avoid installations in office complexes during the daytime when there are lots of people milling around.

In larger facilities, you'll likely come across locked doors leading to locations where you need to install access points or cabling. As a result, coordinate access to these locked rooms before getting too far along. It's best to actually have a phone number (preferably a cell phone) of someone who can get you into rooms at the last minute if necessary.

Identify Locations for Access Points

The installation locations of access points have significant impact on performance. So, you want to be sure to do this right by performing a radio frequency (RF) site survey before installing the access points. The site survey will spot potential sources of RF interference and provide a basis for determining the most effective installation locations for access points. You can refer to a previous tutorial and related case studies discussing site surveys I performed for the Miami International Airport and Naval Post Graduate School for details on performing RF site surveys for WLANs.

When deciding where to place an access point, bear in mind coverage and performance requirements. You shouldn't over do it when meeting these requirements because of possibly of running out of access point channels. Also take into account the maximum cable length limitations (100 meters) for the cable running from the Ethernet switch to the access point. If a 100 meter cable won't reach your preferred access point location, then think about moving the access point or possibly using a WLAN bridge (define) or optical fiber to make the connection.

For best signal propagation results, mount the access points as high as possible. Keep in mind, though, that you might need to service the access point from time-to-time by using an ordinary

ladder.

Electricity is something else you should consider when identifying a location for the access point. Focus on using power-over-Ethernet (PoE) (define) to supply electrical power to the access point over the Category 5 (define) Ethernet cabling. If that's not possible, you'll probably need an electrician to hard wire the access point to a source of electricity.

This is an obvious step that many would consider trivial; however, keep in mind that the installation of WLANs is somewhat different than wired counterparts. For example, you'll need radio-based test equipment that is able to receive and analyze RF signals. You could use devices such as AirMagnet or Yellow Jacket, which are able to analyze WLAN signals when performing the RF site survey and testing the final installation. Of course other more common tools such as a ladder, mounting brackets, wire crimpers and a hammer are also necessary as well.

Install the distribution system

The distribution system includes Ethernet switches and possibly routers along with Category 5 twisted pair cabling that runs to each access point. Be sure to label all cables according to company specifications or methods that you define. The main idea is to identify each end of the cable by some number scheme that lets you know which access point you're dealing with when connecting the wire to a patch panel and rewiring or troubleshooting the system in the future.

Some companies require that the Ethernet cabling be installed within a metal conduit, which provides some additional fire safety. As a result, determine whether the conduit is required in order to properly install (and quote) the system. You certainly don't want to discover the need for a conduit during the final testing -- they you might have to start from scratch.

Configure and Install Access Points

In most cases, especially when you have multiple access points, you won't be able to meet requirements and the design using the default access point settings. For example, you'll need to set the access points within close proximity to each other to different radio channels in order to minimize inter-access point interference. In addition, set transmit power, encryption, authentication, request-to-send / clear-to-send and fragmentation to proper values.

Besides the 802.11 settings, you need to configure the Internet protocol (IP) address to comply with an effective IP address plan. Be sure to do this before mounting the access point to avoid difficulties in finalizing the installation.

I know of several companies who learned this the hard way by installing a large number of access points only later to find that all access points are set to the same, default IP address. This causes conflicts when trying to configure the access point over the Port 80 Web interface from a convenient, centralized location from the wired-side of the network. There only resolution was to go to each access point and set the IP address via a laptop and serial cable attached to the access point's console port, a rather time consuming task.

In office facilities, install the access points above the drop down ceilings. You can simply remove the ceiling tile and place a wooden shelf over the top of the ceiling struts to act as a platform for the access point to reside. The antenna can remain above the ceiling tile for most situations. In fact, it's often best to conceal the access point as much as possible to improve security.

In some facilities, you may need to mount the access point on a shelf or post. Just keep the access point beyond easy reach of people to minimize the possibility of tampering.

Antennas certainly impact the propagation of radio waves, and improper orientation can change signal coverage to something different than what was determined during the RF site survey. In most cases, you need to point the antenna vertical to the ground to maximize range (assuming the more common omni-directional antennas).

Test the Installation

Don't take it for granted that your coverage and wiring is okay. Test it using tools such as AirMagnet or Yellow Jacket by ensuring that signal strength is high enough in all areas where users will roam. In addition, make certain that performance meets requirements while utilizing client devices that actual users will operate. If coverage is not up to par, then you may need to move some access points or install additional ones.

Accomplish the tests during times when there are typical users in the facility. I've seen significant impacts on propagation from groups of people getting in between the client device and the access point. For example, hospitals get much less coverage within patient rooms when full of doctors and nurses. As a result, run these tests under the worst situations.

Document the final installation

After completing the installation, don't forget to carefully document what was done. Documentation should include a diagram depicting the location of installed access points and applicable configuration settings. You'll certainly need this documentation in order to physically find the access points in the future, assuming you were really good at concealing them. In addition, the configuration information will be necessary in order to monitor, troubleshoot and upgrade the WLAN.

Jim Geier provides independent consulting services to companies developing and deploying wireless network solutions. He is the author of the book, Wireless LANs*.*

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