VoWLAN Deployments: Cisco’s Recommendations

Wireless IP Telephony networks require careful RF planning. A thorough voice site survey is usually required to determine the appropriate level of wireless coverage and to identify sources of interference. Access point placement and antenna selection choices can be greatly eased with the help of the results of a valid voice site survey. The most important consideration is the transmit power of the wireless phone. Ideally, the phone detects the transmit power of the access point and adjusts its transmit power to that of the access point.

Although the majority of the wireless networks today are deployed after an extensive RF site survey, they are done with keeping data service in mind as well. VoWLAN phones are likely to have different roaming characteristics and different coverage requirements than those of a typical WLAN adapter for a mobile client such as a laptop. Therefore, an additional site survey for voice is often recommended to prepare for the performance requirements of multiple VoWLAN clients. This additional survey gives the opportunity to tune the access points to ensure that the VoWLAN phones have enough RF coverage and bandwidth to provide proper voice quality.


This chapter includes the following topic:

• Recommendations for Multi-Floor Buildings, Hospitals, and Warehouses, page 1

Recommendations for Multi-Floor Buildings, Hospitals, and Warehouses

Consider the factors listed in this section when you survey multi-floor buildings, hospitals, and warehouses.

Construction Methods and Materials

Many aspects of the building construction are unknown or hidden from the site survey, so you might have to acquire that information from other sources (such as architectural drawings). Some examples of typical construction methods and materials that affect the range and coverage area of access points include metallic film on window glass, leaded glass, steel-studded walls, cement floors and walls with steel reinforcement, foil-backed insulation, stairwells and elevator shafts, plumbing pipes and fixtures, and many others.
Inventory

Various types of inventory can affect RF range, particularly those with high steel or water content. Some items to watch for include cardboard boxes, pet food, paint, petroleum products, engine parts, and so forth.

Levels of Inventory

Make sure you perform a site survey at peak inventory levels or at times of highest activity. A warehouse at a 50% stocking level has a very different RF footprint than the same warehouse at an inventory level of 100%.

Activity Levels

Similarly, an office area after hours (without people) has a different RF footprint than the same area full of people during the day. Although many parts of the site survey can be conducted without full occupation, it is essential to conduct the site survey verification and tweak key values during a time when the location is occupied. The higher the utilization requirements and the density of users, the more important it is to have a well-designed diversified solution. When more users are present, more signals are received on each user's device. Additional signals cause more contention, more null points, and more multipath distortion. Diversity on the access point (antennas) helps minimize these conditions.

Multi-Floor Buildings

Keep in mind these guidelines when you conduct a site survey for a typical office building:

- Elevator shafts block and reflect RF signals.
- Supply rooms with inventory absorb signals.
- Interior offices with hard walls absorb RF signals.
- Break rooms (kitchens) can produce 2.4 GHz interference through the use of microwave ovens.
- Test labs can produce 2.4 GHz or 5 GHz interference, creating multipath distortion and RF shadows.
- Cubicles tend to absorb and block signals.
- Conference rooms require high access point coverage because they are areas of high utilization.

Extra precaution must be administered when you survey multi-floor facilities. Access points on different floors can interfere with each other as easily as access points located on the same floor. Be careful not to overlap channels between access points on different floors or access points on the same floor. In multi-tenant buildings, there might be security concerns that require the use of lower transmission powers and lower gain antennas to keep signals out of neighboring offices.

Hospitals

The survey process for a hospital is much the same as that for an enterprise, but the layout of a hospital facility tends to differ in these ways:

- Hospital buildings tend to go through many reconstruction projects and additions. Each additional construction is likely to have different construction materials with different levels of attenuation.
- Signal penetration through walls and floors in the patient areas is typically minimal, which helps create micro-cells and multipath variations.
- The need for bandwidth increases with the increasing use of WLAN ultrasound equipment and other portable imaging applications. The need for bandwidth increases with the addition of wireless voice as well.
• Healthcare cells are small, and seamless roaming is essential, especially with voice applications.
• Cell overlap can be high, and so can channel reuse.
• Hospitals can have several types of wireless networks installed. This includes 2.4 GHz non-802.11 equipment. This equipment can cause contention with other 2.4 GHz networks.
• Wall-mounted diversity patch antennas and ceiling-mounted diversity omni-directional antennas are popular, but keep in mind that diversity is required.

Warehouses

Warehouses have large open areas that often contain high storage racks. Many times, these racks reach almost to the ceiling, where access points are typically placed. Such storage racks can limit the area that the access point can cover. In these cases, consider placing access points on other locations besides the ceiling, such as side walls and cement pillars. Also consider these factors when you survey a warehouse:

• Inventory levels affect the number of access points needed. Test coverage with two or three access points in estimated placement locations.
• Unexpected cell overlaps are likely because of multipath variations. The quality of the signal varies more than the strength of that signal. Clients might associate and operate better with access points farther away than with nearby access points.
• During a survey, access points and antennas usually do not have an antenna cable connecting them. But in a production environment, the access point and antenna might require antenna cables. All antenna cables introduce signal loss. The most accurate survey includes the type of antenna to be installed and the length of cable to be installed. A good tool to use to simulate the cable and its loss is an attenuator in a survey kit.

Surveying a manufacturing facility is similar to surveying a warehouse, except that there might be many more sources of RF interference in a manufacturing facility. In addition, the applications in a manufacturing facility usually require more bandwidth than those of a warehouse. These applications can include video imaging and wireless voice. Multipath distortion is likely to be the greatest performance problem in a manufacturing facility.