



# CHAPTER 14

## Pre-Deployment Radio Frequency Site Survey

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This part of the CVD discusses the pre-deployment RF site survey. A good Cisco WLAN deployment is dependent on a good RF design, which includes doing a thorough site survey of the location, determining the best location for access points, making the right channel plans, planning for AP capacity, and lastly performing a regular post deployment RF site survey. The chapter discusses pre-deployment site survey topics.

### Pre-deployment RF Site Survey

A pre-deployment site survey is one of the most important tasks that should be conducted before deploying a Cisco Wireless LAN. Pre-deployment RF site surveys involve physically inspecting the location where the WLAN needs to be deployed, studying building properties to plan for multipath, signal attenuation, etc., and verifying that Access Points can be installed in a location that provides maximum coverage with good signal strength to users. A typical pre-deployment RF site survey should involve discussion and planning around the topics discussed in the following sections.

### Physical Site Survey

The purpose of a physical site survey is to establish a firm view on planning for a WLAN RF site. Typical items to consider in a physical site survey include gathering knowledge not just about existing WLANs at the site, but also considering building types, coverage requirements, and restrictions. The sections below describe the typical data that should be collected.

### Location Assessment

- Assess building type and materials used—As previously mentioned, building type and material play a big part in attenuating signal, which in turn means planning for coverage.
- Anticipate difficult zones—Coverage in stair cases or atrium like environments.
- Areas where full coverage and full performance are needed—Key locations where full wireless coverage and performance are required should be noted in advance.
- Areas where location is important and needed—Certain areas can be marked as a no Wi-Fi zone or exclusion zone in which a customer may not be interested. These should be marked on map.

- Areas where RF free zones exist—Unexpected roaming paths that a user may take in the building? This information is very useful in later parts when analyzing analytics data as well as planning for better mobility.
- Obtain location maps for RF surveys later—It is important to obtain updated maps for locations where CMX services should be deployed. The maps should be accurate as these maps are for AP placement and capacity planning. The maps also help in determining predictive RF site survey.
- Outdoor readiness—While the Cisco CMX solution guide does not cover outdoor deployments, in the interest of completeness it is important to consider the following for an outdoor environment. Most of the guidelines that apply to indoor deployment also effectively apply to outdoor deployments. Other guidelines to consider may include outdoor casing for APs, power requirements, aesthetic constraint on outdoor requirement, and mesh network requirements if any. Outdoor networks are more susceptible to RF bleed from other networks than indoor networks. A survey of existing 802.11 coverage should be done to analyze how much RF bleed occurs and what can be done. Safety of installation of Access Points with other RF equipment in area should also be considered.

**Note**


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Presence Analytics can be used for outdoor environments where a single AP in a store or few APs can be used for a presence site. However this guide does not cover this scenario in this release.

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- Location where Access Points can be deployed—Network drops and Access Point instability should also be considered. A general rule of thumb is that Access Points should be installed less than 70ft from each other to ensure good location coverage. Is the location capable of providing AP drops where needed? Potential sources of interferences should be noted, such as static analog video cameras and microwave ovens.
- High Density—Is this location going to be a high density location. High density is defined as a location that has a large number of clients or a network that aims to provide high level of bandwidth to all its clients. [Chapter 18, “Capacity Planning and High Density”](#) goes into more detail about high density deployment recommendations.

## Business Needs of WLAN

- Critical Services—What services does this business want to provide to its users? For a typical Cisco Connected Mobile Experience it is important that CMX can detect, connect, and engage its users effectively.
- Long term Network View—Planning for future needs is always better than planning for the present. With the explosion of smartphones and mobile devices in markets, more and more devices are constantly on the Wi-Fi network. The Internet of Everything (IoE) is enabling machine-to-machine and machine-to-network communication via Wi-Fi too. It is not enough to plan for smartphones and laptops alone, but also for other potential IoE devices that may use Wi-Fi.
- Guarding against potential RF explosion—As machine-to-machine and various devices proliferate on the network, RF spectrum will be at a premium. Innovations like CleanAir enable networks to heal themselves and operate better.
- Scale of the planning—One building versus multiple buildings, malls, hospital size, etc. dictates the scale of the installation. Is this a mission critical network or a guest network (like malls, etc).

- Expected audience of the network—Are your users going to be mostly smartphone/tablet users (such as in retail establishments and malls) or users with voice applications running on laptops. While there is no way to predict exactly how many user devices will be on a network, a good ball park estimate should be used while designing the network for capacity.
- 802.11n/ac readiness and expectations—It is important to study the physical aspects of location and determine 802.11n/ac readiness of the deployment. While 802.11n/ac provides higher speeds, they also come with the price of lost range. A good multipath environment is good for an 802.11n/ac deployment, while a hallway deployment may need more Access Points because of lesser multipath. It is recommended to keep the deployment consistent by using Access Points of the same type throughout the location.



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**Note** Note: 802.11ac does not have any impact on location accuracy or calculation of clients.

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## Constraints on Deployment

- RF Free Zones—Is there a need for RF free zones in building where no coverage is desired?
- DFS and radar avoidance requirement—Know in advance the DFS and Radar requirements for deployment. Different countries have different regulatory domains, so have a list ready of available channels and power levels that can be deployed ready in advance.
- Aesthetic design requirements—Aesthetics should be considered and planned for. For example, a hospital may not want any external antenna to be visible or a mall may want to hide all Access Points.



**Note**

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[Chapter 11, “Antenna Fundamentals”](#) discusses various antenna options when deploying a WLAN solution. Antennas that are a best match for the venue and aesthetics should be chosen.

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## Budgeting

- Predictive surveys for simple budgeting—Based on the above information, a simple budgeting estimate should be done to avoid any potential surprises in deployment costs later.
- Plan for cabling, power drops, and power requirements—Plan for obtaining cabling and power drops. You may discover later that an ideal location for AP does not have power drops. Can they be added later?
- Thorough versus sample area survey—Sometimes it may not be necessary to evaluate the entire location. A sample area might be enough to extrapolate information. This is usually sufficient in a location where it is determined that there are very few external factors that might hinder deployment. Another example is a huge mall deployment where it might be a more cost effective use of time to survey the edges of the mall for existing RF rather than center of mall.

## Existing 802.11 Surveys

- It is a good idea to capture existing 802.11 networks and their properties at the location where CMX needs to be deployed. Because Wi-Fi and other technologies are hugely prevalent today, it is a good investment of time to have a pre-study of existing RF done. Use tools like Metageek site survey to record existing RF at the location. In a big location it is advisable to move through the entire location and take a RF base reading.
- Plan for persistent non-movable interferers—Plan for existing RF deployments that can potentially interfere with your CMX deployment. (analog security cameras, microwave ovens, etc.). Existing outdoor bridges like Motorola Canopy wireless systems may operate on the same spectrum as other 5Ghz systems. Since these antennas usually cannot be moved, care should be taken to take note of where these systems are and plan APs around them.
- Capture current state of Wi-Fi network—How many SSIDs exist already? What is their signal strength? Are there potential Wi-Fi networks around the location that are strong enough to interfere with a CMX deployment? What can be done to mitigate such potential sources of interference?
- Antenna Evaluation—Evaluate using external antennas instead of internal antennas to ensure good coverage based on above parameters? Will use of external antennas be an aesthetic constraint? Can directional antennas be used in corner of the building to direct more coverage into the building rather than outside of it? In a large environment this may be useful.

## Use Case Example

As an example to illustrate these considerations, consider a deployment using a floor space similar to that discussed for location analytics in [Chapter 7, “CMX Use Case Stories.”](#) Using the maps and doing a physical site survey of the location, we can determine in advance many details that can be used before doing an actual RF site survey and planning.

[Figure 14-1](#) illustrates an example of how a physical site survey results in information gathered for a RF site survey and RF planning.

Figure 14-1 Use Case Example Layout



