MASERGY

Cisco
IP DECT 6800 Series

Deployment Guide

April 2022

Table of Contents

Masergy recommends reviewing the Masergy Deployment Guide in preparation for the deployment of the Cisco DECT 6800 Wireless Solution into your business environment.

Cisco IP DECT Phone 6800 Series Deployment Guide

DECT (Digital Enhanced Cordless Telecommunications) is a standard for wireless, mobile voice services. Originally, from Europe, DECT has been adopted worldwide.

Intended Audience

The target audience for this document include network administrators and anyone who plans, designs, and installs a Cisco IP DECT 6800 Series network.

Quick Set up and Installation Process

This first section is a quick systematic guide. The details and context are found in the remainder of this document. You must read the entire document before you start your deployment to ensure success.

Note: The Cisco IP DECT 6800 Phone products support single cell and multi-cell deployments. Masergy supports the single cell and multi-cell deployment.

Note: There are many ways to install the base stations. This guide provides the best practices and the recommended deployment models supported by Masergy.

Plan for the Device Installation

These instructions are for the planner:

1. Review the site to install the DECT system.
   a. Plan the location of the base stations.
      i. Each base station covers 50m (164 feet) indoors. The base stations should be installed within 50 meters for good coverage. The location of the base station may be impacted by objects or barriers that create radio obstruction and interference. The handsets provide a free site survey tool to identify the impact of these potential barriers.
      ii. Each base station requires an Ethernet cable.
      iii. A power outlet is required for each base station if the Ethernet switch does not provide Power over Ethernet.
2. Determine the DECT equipment required:
   a. Available base stations and repeater:
      i. Cisco IP DECT DBS-110 Single-Cell Base Station and Dual-Cell

ii.   Cisco IP DECT DBS-210 Multi-Cell Base Station

iii.   Cisco IP DECT RPT-110 Repeater

b.   The base stations vary in their support for SIP registrations and concurrent calls. For more information, see *Match the Base Stations to the Density Requirements the Base Stations to the Density Requirements*.

c.   Each handset supports up to four (4) SIP registrations.

d.   Available handsets:

i.   Cisco IP DECT Phone 6823 Handset

ii.   Cisco IP DECT Phone 6825 Handset

iii.   Cisco IP DECT Phone 6825 Ruggedized Handset

e.   A foot stand is provided to place the base station on a table or shelf.

f.   An optional kit is also available, but sold separately, to mount the base stations on the wall or ceiling.

Note: Masergy is responsible for all firmware upgrades.

Upgrading the Devices

Currently, as of February 2022, Cisco IP DECT 6800 series phones with firmware prior to version 5.0 does not support automated firmware upgrades. The Cisco IP DECT phones do not support the firmware comparison logic as Cisco MPP IP phones do; therefore, the only way to do a firmware upgrade is manual. Below is the recommended firmware upgrade path for DBS 110 / 210 base station.

Note: if your base station came with a higher firmware version than 4.5 then you do not need to downgrade your base station, just upgrade to the next version in the below path.

The recommended path for the **DECT DBS 110** is 4.5 ➜ 4.8SR1 ➜ 5.0(1)

The recommended path for the **DECT DBS 210** is 4.5 ➜4.7➜ 4.8SR1 ➜ 5.0(1)

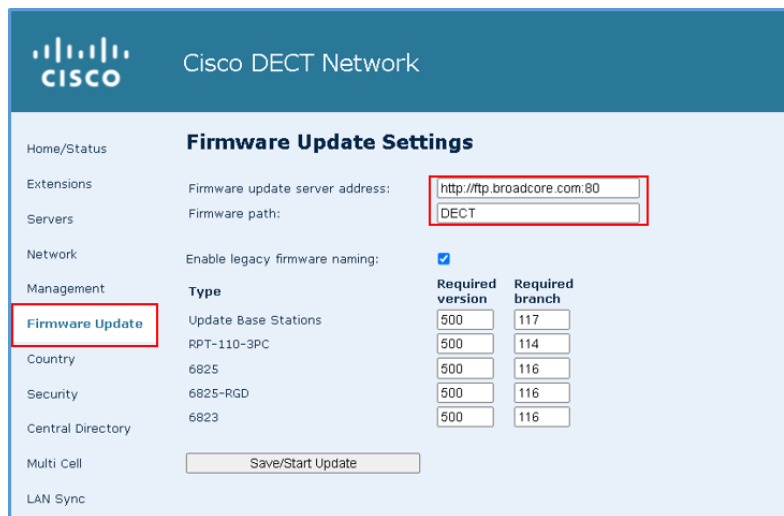**Note:** the upgrade procedure for the DBS-110 is the same as the DBS-210, except you do not need to upgrade to 4.7 version, you can go from 4.5 to 4.8SR1 version. Procedure to do a manual firmware upgrade via base station web GUI on DBS 110 / 210 base stations:

Note: you cannot upgrade the firmware of the 6823 / 6825 handsets until the handset is registered with a DECT base station and the DECT base station cannot allow a handset to be registered to it without having the configuration file downloaded from the Masergy platform. Therefore, the first step is to upgrade the DECT base station to the latest firmware version mentioned above which is 5.0(1). The reason is that the DECT base station must be on the latest firmware version to be able to successfully parse and validate the configuration parameters in its configuration file downloaded from Masergy platform.

Secondly, the next step is to make sure the end-user and DECT devices are provisioned on the Masergy platform. Then the DECT base station needs to be pointed to the Masergy provisioning server by setting the DHCP option 66 to

https://ftp.broadcore.com (or https://config.masergy.com) and confirm that the DECT base station downloads its configuration file successfully. Then you can proceed to register each handset with the DECT base station and perform the manual firmware upgrade of each handset.

1. Browse each base station first and then go to "Firmware Update" page by selecting this page from the left panel.

2. Set the "Firmware update server address" to http://ftp.broadcore.com:80 for US deployment and http://config.masergy.com:80 for outside of the US

3. Set the "Firmware patch" to   DECT

4. Make sure the option of "Enable legacy firmware naming" is a checkmark.

5. Set the "Update Base Stations" section for "Required version" subsection to 470 and "Required branch" subsection to 6

6. Click on the "Save/Start Update" button.

7. You will notice the 210 base station will begin downloading its firmware file and its LED will start blinking red.

8. When the firmware installation process is complete the LED will turn to green, try to browse the IP of the base station and confirm on the home page that the current firmware version is 470.

9. When the upgrade of the base station is complete, return to the firmware update settings page and set the base station to the next firmware version level per the above-recommended path.

10. Set the "Update Base Stations" section for "Required version" subsection to 480 and "Required branch" subsection to 17

11. You will notice the 210 base station will begin downloading its firmware file and its LED will start blinking red.

12. Log back to the base station and confirm the firmware version is now 480.

13. When the upgrade of all devices is complete now you can go back to the firmware update settings page and set the base station to the next firmware version level per the above recommended path.

14. Set the "Update Base Stations" section for "Required version" subsection to 500 and "Required branch" subsection to 117

15. Log back to the base station and confirm the firmware version is now 500.

16. Confirm with the Masergy Project Manager that the users and base station devices are provisioned on the Masergy platform.

17. Then browse back to the firmware page of the base station and set the "Firmware update server address" to https://ftp.broadcore.com for US deployment and https://config.masergy.com for outside of the US. Please leave the "Firmware patch" to blank. Other option is to put the base station in a voice network/subnet where the DHCP has option 66 set with the above mentioned FQDN.

    Note: there is an existing bug with LLDP-MED and CDP protocol for the DECT base station with the voice VLAN. In order to put the DECT base station into the voice VLAN, you will set the port on the switch that you would like to connect the DECT base station to be the only member of the voice VLAN untagged. In this way, the DECT base station will fall into the voice subnet.

18. At this point, the base station should be able to download its configuration file. You can confirm this by browsing to "Server" page, you should see the configuration is populated; meaning, the base station downloads it configuration file and successfully parse through it. However, if you browse to the "Extension" page you still will not see any Extension/users data because you have not registered any handset to the base station.

19. Now you can register each handset you have to the base station by entry of the Access Code for each handset that you will need to obtain from the Masergy Project Manager. You can confirm the registration of the handset by checking the Extension page where you should see each handset shows up with its IPEI Number (International Portable Equipment Identity) which is a 10 digit alphanumeric characters. You can find the IPEI on the label of the handset box or under the handset battery.

20. Now, you can go back to the base station firmware page and set each handset models firmware version info as the below steps.

    Note: the firmware upgrade process percentage will show up on the Extension page of the base station.

21. Set the "6825" handset section for "Required version" subsection to 470 and

"Required branch" subsection to 3

22. Set the "6825-RGD" handset section for "Required version" subsection to 470 and "Required branch" subsection to 3

23. Set the "6823" handset section for "Required version" subsection to 480 and "Required branch" subsection to 15

24. If you have a repeater connect to the power and set the "RPT-110-3PC" (DBS 110 Repeater) section for "Required version" subsection to 480 and "Required branch" subsection to 2

25. When you have confirmed that your handset(s) is (are) upgraded, proceed to the next steps.

26. Set the "RPT-110-3PC" (DBS 110 Repeater) section for "Required version" subsection to 500 and "Required branch" subsection to 114

27. Set the "6825" handset section for "Required version" subsection to 480 and "Required branch" subsection to 16

28. Set the "6825-RGD" handset section for "Required version" subsection to 480 and "Required branch" subsection to 16

29. Set the "6823" handset section for "Required version" subsection to 500 and "Required branch" subsection to 116

30. When you have confirmed that your handset(s) is (are) upgraded proceed to the next steps.

31. Leave the "RPT-110-3PC" (DBS 110 Repeater) section as is, since this is the latest firmware version for the repeater device.

32. Set the "6825" handset section for "Required version" subsection to 500 and "Required branch" subsection to 116

33. Set the "6825-RGD" handset section for "Required version" subsection to 500 and "Required branch" subsection to 116

34. Leave the "6823" handset section as is, since this is the latest firmware version for the 6823 handsets.

Note: Please make sure the DECT 6823 / 6825 handset is fully charged before performing any firmware updates.

Installing the Base Station

1. Place the base stations around the site in high locations without securing them to the wall or ceiling. You can use stepladders to test the locations.

2. Use the site survey tool on a few handsets to check the base station location for good coverage. If there is more than one base station to install, you can run the site survey to

check the coverage. For more information, see Site Survey.

3. To use the survey tool in the handset, press **Menu** ▪and dial *47*. The IP Search screen appears.

4. Press the Select softkey when the MAC address of the base station appears.
   a. If you are using more than one base station, repeaters, or a combination of base stations and repeaters, you can select each of them from the same handset and test the radio strength to the handset. Unlike during a call, the handset does not roam between base stations when you are using the site survey tool. However, you can manually switch between base stations and repeaters during the site survey test by returning to the base station and repeater selection page **IP Search**.

5. Make a few test calls from the handsets.

6. Mount the base stations with the included foot stands, or the kits for wall or ceiling mount which are sold separately.

7. Place the handsets with their cradles at each location or in a central location if they are shared.

Introduction

The Cisco IP DECT Phones 6800 Series is the mobility solution within Cisco's Multiplatform IP Phone portfolio. One advantage of Cisco's DECT solution over Wi-Fi is that the DECT solution components, the phones and the base stations have the same architecture and are designed to work exclusively with each other.

Unlike Wi-Fi, a customer cannot use a third party DECT base station to support their Cisco handset. Third party base stations, repeaters, and handsets are not supported with the Cisco DECT Phone solution. The product design ensures that the DECT base station and the handset run on compatible frequencies.

You do not need to be an expert in DECT or wireless products to successfully install a working system. You must read the entire document to ensure successful deployment.

This document:

- Describes the elements in planning and designing a Cisco IP DECT 6800 Series Phone system.
- Provides a simplified design procedure.
- Includes the network planning and deployment processes used in North America and Europe.

The Cisco IP DECT 6800 Series contains:

- Cisco IP DECT Phone DBS-110 Single-Cell / Dual Cell Base Station
- Cisco IP DECT Phone DBS-210 Multi-Cell Base Station
- Cisco IP DECT Phone RPT-110 Repeater
- Cisco IP DECT Phone 6823 Handset
- Cisco IP DECT Phone 6825 Handset
- Cisco IP DECT Phone 6825 Ruggedized Handset

Note: The 6825 Ruggedized Handset operates identically to the 6825 handset, but the Ruggedized Handset is IP65 rated for dusty and damp environments.

Regulatory Areas Covered with Cisco DECT Solutions

This information is only for reference. Cisco's ordering process allows you to receive only the units, which are set up correctly for your region. These are the current areas covered with Cisco DECT solutions:

- 1880-1900 MHz (Australia and New Zealand - power <= 158 mW)
- 1880-1900 MHz (E.U. and APAC)
- 1920-1930 MHz (U.S. and Canada)

Note: For Mexico, Cisco offers the NA (North America) version with NOM compliance.

Signal and Bandwidth

The Cisco IP DECT Phone 6800 Series is built on Digital Enhanced Cordless Telecommunications (DECT) technology. The technology was developed for many users working in close proximity. DECT uses a low bit rate that provides good voice quality at 32kbps per channel, and effective for mobile phone users at home and small to medium sized industrial sites.

This series uses the Session Initiation Protocol (SIP) to provide a Voice over IP (VoIP) solution over Ethernet. The DECT base station connects to the call server and provisioning servers over Ethernet, and then uses DECT technology to connect, register, and provision the handsets.

DECT works close to the 1.9 GHz frequency band to avoid interference with Bluetooth, Wi-Fi, and microwave frequencies. The frequencies used by DECT are in the unlicensed residential spectrum and DECT devices may exhibit interference when they are in a close range of commonly used residential and commercial appliances. The actual DECT frequency used in your region is regulated by your country and may be different in other regions of the world.

Like other radio technologies, DECT uses a combination of Frequency Division Multiplexing (channels) and Time Division Multiplexing (time slots) techniques. DECT devices share available channels on the radio spectrum and limit the active number of devices within a close range.

For more information about device density, see *Match the Base Stations to the Density Requirements*.

Deployment

You can collect the network requirements for capacity, coverage, and quality to start the network deployment. Consider the location of the base stations where the handsets are used. Ensure that there are not signal blocking obstacles near the base station.

The handsets have a simple site survey tool that you can use to determine the best base station locations for maximum coverage. For more information, see *Site Survey*. Mount the base stations in a high location with a clear line of sight to the area where the handsets are used. If you mount the base stations behind closed doors or between steel beams, it creates signal interference, which leads to reduced range and a reduced coverage area. Use the site survey tool to ensure good coverage where the handsets are used.

If the service area has many rooms and obstacles for good DECT signaling, you may need a multi-cell deployment. If the building is wood framed with drywall, you may not experience

poor signal strength.

Signal Area Characteristics

The signal area produced by the base station is omnidirectional and resembles a sphere. If you mount the base station very close to the ground or in a corner, the location can reduce the optimal signal strength. The best mounting area is a location high up on the wall, on the wall, or ceiling away from any corners. There are scenarios in buildings made of less obstructive materials such as wood and drywall, where the corner mounted base station serves more than one room. If the floors are like that of a house rather than a heavy, industrial building, a ceiling mounted base station can provide service to the floor above. Use the site survey to ensure that you have good coverage.

Plan Your DECT System

Good system planning is essential to achieve the expectations of the customer. Typically, the network requirements include (but not limited to):

- The area to be covered.
- The type or architecture of the building and/or topology, and so on. This includes the material and thickness of the walls.
    - You do not require precise knowledge about the makeup and thickness of the walls. You should be aware of the "interior grade" and "exterior grade" walls. The site survey tool helps to determine if the walls are compromising good signal strength between different areas of your installation.
- The estimated traffic in each coverage area.
- Any signaling obstacles located in each coverage area.
- Any new Ethernet cables or power outlets required to support the base station mounting locations.

Plan the Capacity

Capacity for each installation includes the number of simultaneous users and projected number of simultaneous calls. Each handset uses DECT channels on the base station. If you have more handset line registrations on a base station than its concurrent call capacity, not every line can support calls at the same time. You must plan your capacity.

Capacity planning requires the following knowledge for each site:
- Intended number of handsets simultaneously registered
- Intended traffic load
- Intended coverage area

The DBS-110, DBS-210 base stations, and RPT-110 repeater signal strength:
- Indoor: 20-50 meters (60-164 feet) radius
    - The range of this radius depends on the nature and quantity of any radio signal impeding items or material in the installation site. Some of these may include items made of metal: shelving, doors, and supporting beams.
    - One base station will be sufficient for a single retail store's area if there are no thick walls or other sources of interference.
    - Adding base stations and repeaters help you to work around signal barriers.
- Outdoor: 300 meters (984 feet) radius
    - Note: The base stations and repeaters are not weather-guarded for extreme heat, damp, or cold conditions. If they should be used outdoors, they must be installed

inside a weatherproof enclosure that does not severely affect their signal strength.

Density Guidelines

In high-density areas that require maximum channels, the base stations located very closely can cause interference. To minimize base station interference and good audio experience, follow these recommendations:

- Install base stations at least 2 meters (6.5 feet) away from each other.
- In the 20 MHz frequency spectrum (EU spectrum), the density should be 7 or fewer base stations in 100 square meters (1,076 square feet).
- In the 10 MHz frequency spectrum (Americas spectrum), the density should be 4 or fewer base stations in 100 square meters (1,076 square feet).

Use these conditions with the density and possible interference:

- **Low Density, Low Interference:** A Cisco IP DECT Base Station provides a coverage of 50 meters (164 feet) radius in a straight line without radio interference. This means, if the density is less than 5 simultaneous calls and not more than 30 simultaneous registrations, you only need one Cisco IP DECT Base Station.
- **Low Density, High Interference:** A Cisco IP DECT Base Station can support up to 20 or 30 line registrations, depending on the model, with up to 10 narrowband calls or 5 wideband calls. For more information, see Single Cell Deployments.

  For the DBS-210, if you add another base station, you can register 60 handsets, and support 16 narrowband or 8 wideband calls at one time. If high interference is expected because of RF attenuation or RF interferences, you can add more base stations or repeaters.

  For the DBS-110, you can add up to 6 repeaters to extend the area covered.
- **High Density, Less Interference:** A Cisco IP DECT Base Station provides coverage of 20-50 meters (60-164 feet) radius indoors depending on the interference and attenuation. It provides 300 meters (984 feet) radius coverage in plain outdoors. The 300 meters (984 foot) radius coverage area is also good for a room that is 300 meters (984 feet) in radius without any interference and attenuations.
- **High Density, High Interference:** You need the DBS-210 Multi-Cell Base Stations with many base stations deployed in the same system to achieve the required capacity. In high density areas where you need maximum channels, base stations located close together can cause interference. To minimize base station interference, work with these audio codec considerations for a good audio experience.

Audio Codec Considerations

You should consider the audio codecs to use when you plan the capacity.

- The Cisco IP DECT 6823 and 6825 handsets support G722 for wideband and G726 for narrow band.
- The Cisco IP DECT DBS-110 and DBS-210 Base Stations support G.711 a-law & μ-law, G.722.2, G.726, and G.729a/ab
- The DECT protocol supports only two codecs. The administrator must choose the two supported protocols to use. Choose one wideband and one narrowband codec.

- The base station does the required transcoding based on the negotiated codec for each call.
- The wideband codec occupies two (2) channels and the narrowband codec occupies 1 channel.
- If you expect more simultaneous calls, use the narrowband codec to increase the available number of channels. If you configure the wideband codec, you may add more base stations to increase the channel capacity.

Match the Base Stations to the Density Requirements

When you know how big your system will be in terms of the number of users who require handsets, the area to be covered and the concurrent calls the system must support, you can check the capacity of the base stations for each type of deployment.

Single Cell Deployments

The following table provides the handsets supported and concurrent calls for a single cell DECT system for a DBS-210 base station.

User Requirements	DBS-110	DBS-210
Number of SIP Registrations	20	30
Concurrent Narrowband Calls	10	10
Concurrent Secure Narrowband Calls	8	8
Concurrent Secure Wideband Calls	5	5
Maximum Repeaters that may be connected to the system	6	3

The single cell system is mostly used in small businesses and home offices. The DBS-110 is the most cost-effective choice for a single cell system that is not expected to grow in either number of handsets or call capacity. The DBS-210 is an ideal choice for a single cell system if you want to add more base stations to the system in the future. If you are starting with the DBS-110 and you need to expand your handset quantity or call capacity, you must replace the DBS-110 with a DBS- 210 and add more DBS-21Os to the system. If you are starting with a DBS-210, you may continue using the original DBS-210 and add more DBS-21Os to increase your handset quantity and call capacity.

If you want to add more base stations and there are radio signal blockers, such as steel doors, there must be a clear line of sight between the base stations.

Multi-Cell Deployments

Multi-cell systems can have 3 to 1000 base stations where the radio signals overlap for seamless handover. For a Multi-cell system, Cisco recommends LAN synchronization, while Air synchronization is possible but not recommended.

The following table explains the support for handsets and concurrent calls for a system built only on DBS-210 base stations.

| User Requirements	DBS-210
Number of SIP Registrations with 250 base stations deployed	1000
Concurrent Narrowband Calls: 250 base stations	2032
Concurrent Secure Narrowband Calls: 250 base stations	2032
Concurrent Secure Wideband Calls: 250 base stations	1016
DECT Synchronization	LAN (recommended) or Air

The Multi-cell system is mostly used in medium business that have large coverage areas with many users. The DBS-210 is the only option for the multi-cell system.

Installation

Capacity planning helps to identify if a single cell or multi-cell system is required. Cisco recommends a single cell set up for small area with low density. Otherwise, you can set up a multi-cell system.

Typically, a small retail store can have a single cell system. You must confirm this with a site survey. If the store is an open area without real radio signal barriers, one base station can cover the entire store.

The range of a base station is 50 meters (164 feet) radius indoors in a building made of standard brick and mortar construction with basic inference from low-level shelving and other items found in a retail store or workplace. When you move away from the base station, the signal degrades from good, weak, poor, and to no signal.
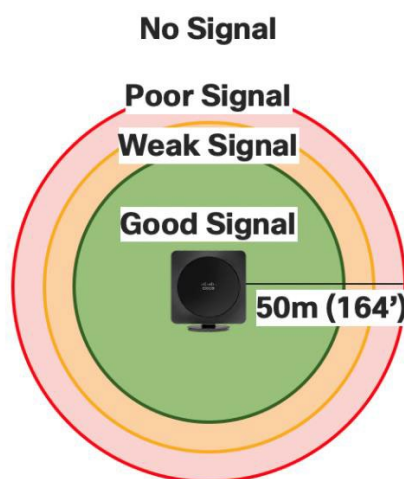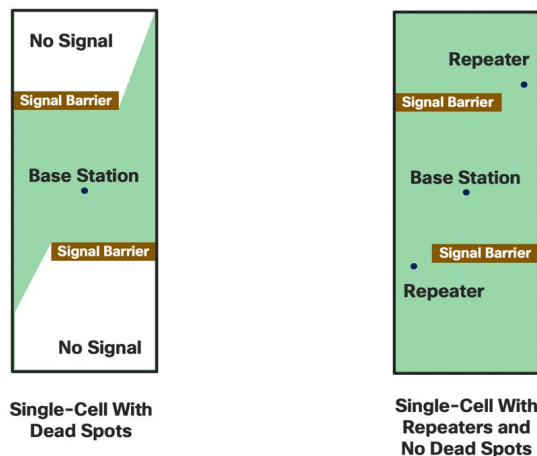

Base Station Signal Range

A 50-meter (164 feet) radius covers 7,854 square meters or 84,540 square feet. A typical small store in a mall or town center is 6 meters (20 feet) by 16.7 meters (50 feet) which is 93 square meters or 1000 square feet. That is a small fraction of the base station's range if there are no serious signal barriers near the base station.

This image shows both the range of a single base station compared to the size of a small retail store. In addition, a Base Station Range with Few Signal Barriers Compared to the Size of a Small Store
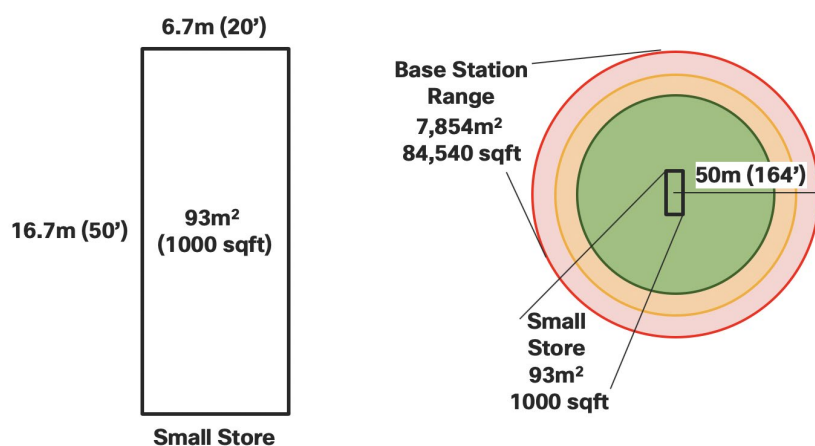

If there are signal barriers in the store, such as a steel wall, shelving unit, or other radio emitting devices, you need one or more base stations to cover the entire site as shown in a *Small Store Installation with Signal Barriers* image.

Small Store Installation with Signal Barriers

If there are dead spots that require a good signal, you may need to add another base station. Identify the number of base stations you need, place the base stations in temporary locations, such as, on top of stepladders, and run the site survey tool on a handset as shown in *Check the Signal with the Site Survey Tool* image. For more information on instructions to use the tool, see *Site Survey Tool*.
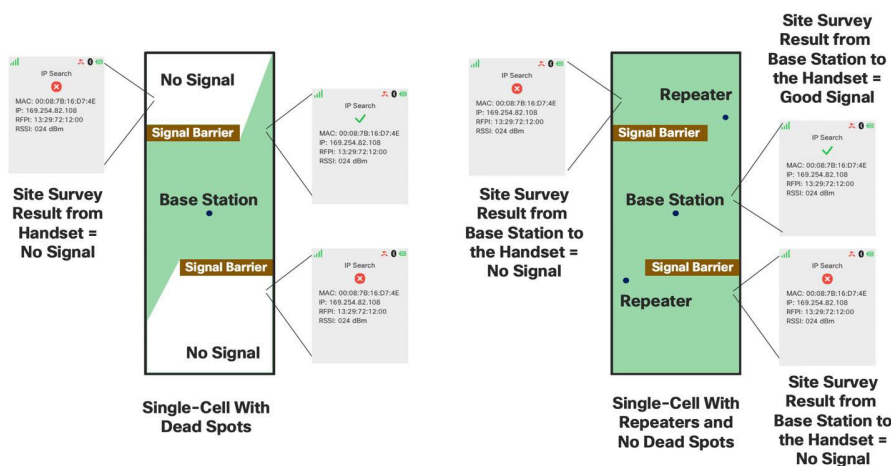
Check the Signal with the Site Survey Tool

Single Cell Installation

This section guides you with the physical placement of the base station in a single cell system.

Determine the Install Location for a Base Station

To optimize the time in the installation process, mount the base station using these recommendations:

- Small to medium size area: For a store in a shopping mall, the base station must be installed in the middle of the space below the false ceiling.
- Two-floor building: Mount the base station at the center of the first floor false ceiling. You can verify coverage with the site survey tool, as a few buildings may have ceilings out of materials that do not allow the radio signal to the upper floor.
- Large hall: These are typically large retail stores with more than 4,500 square meters (50,000 square feet). The base station should be installed in the middle of the space below the false ceiling. If the signal strength is poor in some areas, you may need to install more base stations.

Follow these steps to improve the install location:

1. Place the base station in the center with a line of sight to the coverage area.

2. Run the site survey tool.

3. Move around the entire coverage area and locate any dead spots. If there are dead spots, move the base station towards the dead spot and repeat the site survey until you get the coverage you need. If not all the dead spots can be covered by repositioning the base station, add a second base station in multi-cell mode or add another base station. For more information, see *Multi-cell Installation*.

4. When you have found the optimum location for the base station, mount it permanently.
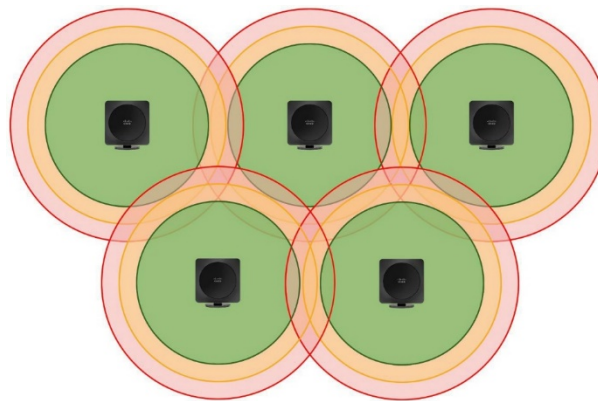
Multi-Cell Installation

Coverage for a multi-cell system should provide an overlap of at least 20% to ensure that a handset could roam freely from one base station to another without any loss of coverage.
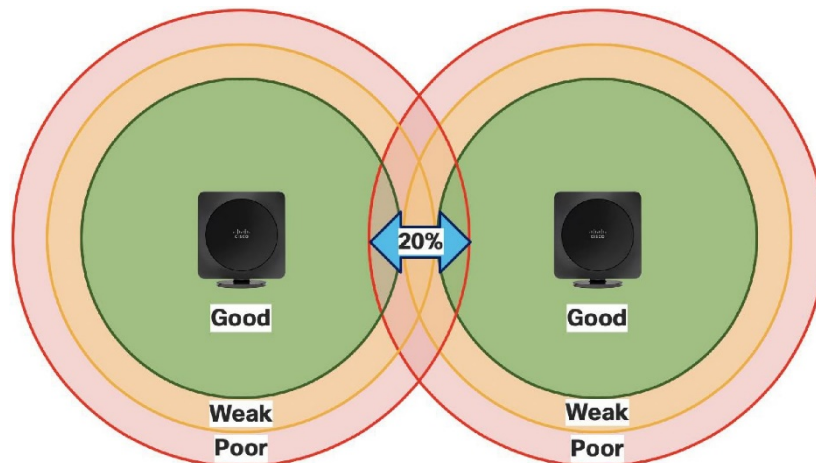

Multi-cell Overlap

Cisco recommends that you place the base stations as shown in multi-cell Installation image to maximize the coverage. The overlap does not have to be exact. The placement depends on the RF attenuation in the deployment site. Based on the environment, you may have to place the base stations close to each other. In this image, it is assumed that there is no RF loss due to the environment.

Multi-cell Installation

Scenario 1: Conference Room

➢ You have a conference room that can have 50 people. Each person has a handset and you expect to have a maximum of 20 simultaneous calls. You will need:
  o 5 base stations if the calls use wideband
  o 3 base stations if the calls use narrowband
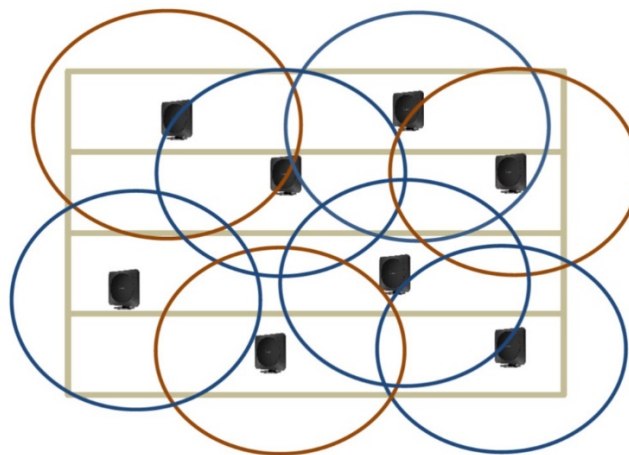➢ Install the base station in the ceiling.
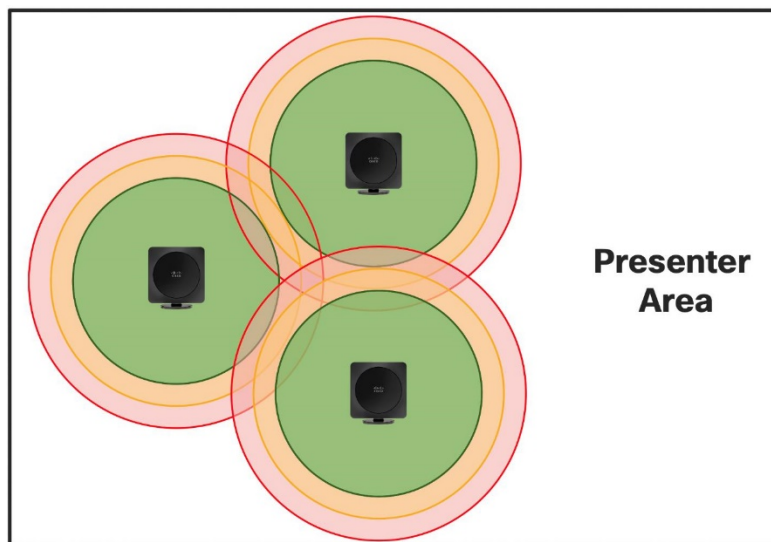
Conference Room Setup

Scenario 2: Multistory Shops

For a medium-sized, two-floor shop with 10 employees and about 5 simultaneous calls, the capacity table suggests only one base station. However, for a two-floor building, one base station is not enough because of RF attenuation. Cisco recommends at least one base station for each floor. If there is an elevator to move between the floors and the handset should have coverage while riding the elevator, you may need one or more base stations near the elevator to provide better coverage.
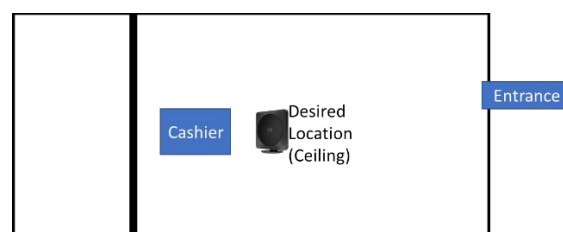
Install the base station in the ceiling or false ceiling on each floor.

Multi-story Set up

Scenario 3: Mall Store or Small Shop

For a typical mall store or small shop, one base station is enough. The base station should be installed in the center of the store for good coverage.

Small Shop

If the store has a metal door between the service side and the main area, select one of these options for good coverage:

> ➢ Add one or more base stations
> ➢ Install the base station close to the metal door.

Install the base station at least 2 meters (6.5 feet) above the floor, in the center of the building.

The scenarios are only for illustrative purposes. Cisco recommends that you use the site survey tool to identify any dead spots in the coverage.

Network Considerations

- Switch ports must be opened for the base station to connect and get an IP address.
- If you plan to use a Voice VLAN, ensure that the Voice VLAN is configured for the correct switch ports.
- If you plan to use PoE for the base station, ensure that the switch is configured and there is enough power to allocate IEEE Class 2 PoE for the base station.
- The IP address allocation for the base station can be done with DHCP or a Static IP address. After the IP address is assigned, it appears on the site survey tool.
- The switch must open (S)NTP, DNS, HTTP(S), SIP(S) and (S)RTP ports for the device to work properly. Contact your service provider for the exact port numbers to open for each of the protocol.
- If LDAP is used for directories, ensure to open the LDAP ports.

If DHCP options are used to point to the provisioning server, they must be configured.

You must open the HTTP(S) port for connections initiated by the base station. This is required for Firmware upgrades, provisioning, and to push the logs.

## Work with the Site Layout and Signal Barriers

DECT is resilient to interference from wireless frequencies commonly used for cell phones, Wi-Fi radios, and Bluetooth headsets. If there is an interference, the DECT protocol adapts the channel to minimize the impact. To ensure optimum use of the handsets and good coverage, perform a site survey and mount the base station in a strategic location. Consider the effects of coverage by RF attenuation and RF interference during planning to have a good coverage for the handset.

Radio Considerations

Before planning the installation, the site survey should identify possible radio frequency attenuation objects in the coverage area. This section provides a few common attenuation and interference objects in a typical installation site.

Building Penetration:

When a signal strikes a wall, it is diffracted or absorbed. This may reduce or distort the signal. The amount of absorption is dependent on the building type and its environment, and the amount of solid structure, which includes concrete, metal, frames, metallic doors, thickness, and so on. This is an important consideration when you plan the coverage.
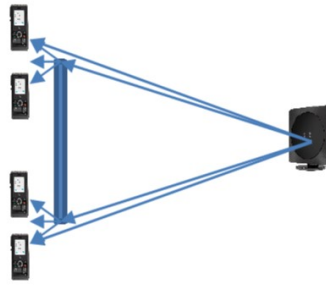
RF Diffraction and Multiple Path

Interference Sources:

The interference from other signals or the same network can make receiving signals weak. DECT can handle some network interference and it uses different channels, if available. For interference from other signals, identify, and plan the location of the base station. These are the sources of interference in a typical site:

- Other DECT systems
- Some strong cellular base stations

Note: Bluetooth, Wi-Fi, and most wireless cellular networks, does not affect DECT. The DECT frequencies are different from the frequencies used in these technologies.

Radio/Cell Range:

The ideal situation is to always have the base station and handset in the line of sight. Line of sight means the straight physical path between the base station and the handset. Any interference or RF attenuation materials in the line of sight reduces the coverage distance. Each RF attenuation material has unique attenuation characteristic. The following figure explains the effect of RF attenuation material on the coverage area.
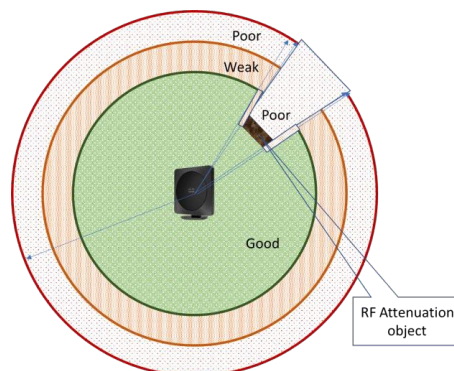
RF Attenuation Effect on Coverage

Attenuation

The table in this section provides the attenuation levels for each material. The thickness of the material also plays a significant role in the attenuation. If the material is thicker, the attenuation is higher.

- If the wood material is thick, the attenuation level may change from low to high.
- If the glass door is very thick, the attenuation level make change from medium to high.
- If the tiles on both sides of the walls, the attenuation is almost doubled through the wall.

Material	Level of Attenuation	Comments
Wood	Low	Doors, floors, and so on
Plastics	Low	Room partitions
Tinted Glass	Medium	Wall hangings, glass door, and window
Living Objects	Medium	Crowds, and Plants
Bricks	Medium	Walls
Ceramic	High	Tiles
Concrete	High	Walls, pillars, floors, and stairs
Metal	Very High	Elevator, and cabinet

Cisco recommends that you identify the medium and high attenuation materials in your coverage plan.

Provisioning Approaches

The method for configuring the DECT 6800 system:

When you are connecting the base stations to Masergy UC platform, the configuration parameters are provided by the Masergy calling service and sent to the base station.

Site Survey

DECT (Digital Enhanced Cordless Telecommunications) is a standard for wireless, mobile voice services. Originally, from Europe, DECT has been adopted worldwide. In deploying, any type of digital enhanced cordless telecommunications (DECT) system will require a review of the area of coverage and the environment. Each installation site is different even if it is one of a group of retail or restaurant locations built with the same plan. Create a site map to identify the best location to mount the base station.

The site map must identify the radio frequency (RF) attenuation materials and RF interference sources as described in the previous sections. The Site Survey tool helps to identify the actual coverage received as Radio Signal Strength Indication (RSSI).

One base station can provide an indoor coverage radius of less than 50 meters (164 feet) depending on the site map and the attenuation characteristics of the materials in the line of sight. The DECT base station must be placed in the center of the active work area in the building with a line of sight to all the coverage area.

Site Survey Tool

Preparing for the survey:

1. Power on the DBS 110 or DBS-210 base station and wait until the LED on the top of the base station lights green.

2. Power on the 6823 / 6825 handsets. Ensure that the battery is fully charged before entering the site survey.

3. Put the handset into Site Survey mode.

The Cisco DECT Phone 6825 Handset

1. Indicator light (LED)

2. Emergency Button

3. Headset port

4. Softkeys, phone control buttons (**Speaker, Menu**), Navigation cluster (Navigation ring and **Select** button, call control buttons (**Answer/Send**, **Power/End**)

5. Keypad

6. **Volume** and **Mute** buttons

Preparing for the survey with the handset:

1. Press **Menu**.

2. Press (dial) ***47***.

3. Press the **Select** button to select the base station

   If more than one base station is listed, find the desired station with its MAC address. The handset displays the signal strength from the base station.

IP Search Screen

4. Move around the building to confirm the coverage area of this base station. The handset automatically updates the signal strength to the base station. The strength is shown as a green check mark, orange triangle, or red circle. The update may take a few seconds to synchronize with the base station. If there is no connection, the base station will not appear in the list.
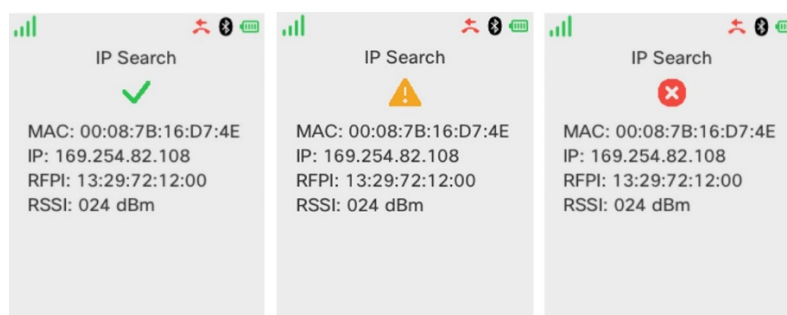
IP Search screen with Good, Weak, and Poor

The following describes the items listed in the IP Search screen.

ID	Description	Purpose
MAC	MAC of the base station	If multiple base stations are available, this identifies the base station.
IP	IP address of the base station	
RFPI	Radio Fixed Part Identity	Identifies the RFPI of the base station.
RSSI	Received Signal Strength Indicator	Indicates the received signal strength in decibel-milliwatt.

The following describes the Received Signal Strength Indicator (RSSI) Value:

RSSI Value	Indication of Quality
Greater than -50 dBm	Excellent
-50 dBm up to -70 dBm	Very Good
-70 dBm up to -80 dBm	Minimum required for a good call
Less than -80 dBm	Poor

In the area of Minimum quality RSSI, Cisco recommends that you add more base station or move the existing base station to improve the coverage in the desired area.

Install the Base Stations

For the Single cell and Multi-cell installation, this section provides the best practices for the direction and placement of the base station in the selected location.

The antennas are omnidirectional. Follow these recommendations for optimal signal coverage:

- Place the base station in the center of the desired coverage area for optimal coverage.
- Place the base station at least 2 meters (6.5') above the floor, so that the line of sight is maximized for all of the desired coverage area.

Installation Caveats

- Do not install the base station on a metal rack. The metal reduces the coverage.
- Do not install the base station at the end of the room unless the desired coverage area is only at that end.
- Do not install a base station in the basement floor or on a table in the basement and expect coverage to the first floor.
- Do not install a base station behind a metal door (including an elevator) if the coverage area is on the other side of the door.
- Do not place the base station near high attenuation materials, such as metal and concrete, as this reduces the RSSI value as displayed on the handset.
- Do not place the base station inside electrical boxes or closets. The base station must be clearly visible in the working area. Use the ceiling mounting kits if the space is limited on the walls or flat surfaces

Troubleshooting

For information about troubleshooting, see the Troubleshooting section in the Cisco IP DECT 6800 Series Administration Guide available on Cisco.com.

Rerun the Site Survey

After installing the base stations, rerun the site survey to ensure that you have good coverage throughout the entire working area of your site.

Completion

Install the handsets at each user's work location or in a common area if they are shared. Your Cisco IP DECT 6800 Series system is now ready for your users.

Abbreviations

For the purpose of this document, the following abbreviations are used:

DHCP	Dynamic Host Configuration Protocol
TFTP	Trivial File Transfer Protocol
IOS	Internetworking Operating System
NAT	Network Address Translator
PCMA	A-law Pulse Code Modulation
PCMU	mu-law Pulse Code Modulation
RSSI	Received signal strength indication
RTP	Real-time Transport Protocol
RPORT	Response Port (RFC3581)
SIP	Session Initiation Protocol
SMB	Small and Medium Business
STUN	Session Traversal Utilities for NAT
VLAN	Virtual Local Access Network
TOS	Type of Service (policy-based routing)
URL	Uniform Resource Locator
UA	User Agent
UTC	Coordinated Universal Time (similar to GMT format)

References

Cisco IP DECT 6800 Series with Multiplatform Firmware Documentation

- Use this page to find the End User Guides, Maintain and Operate Guides, and other useful documentation.