



DEPLOYMENT GUIDE

Cisco Small Business Pro

**Cisco SBCS 2.0 Voice Over Wireless
Deployment Guide**

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Overview

Release 2.0 of the Cisco Smart Business Communications System (SBCS), with its enhanced wireless capabilities, provides a fully integrated voice-over-wireless (Wi-Fi) solution that is simple to use, combines wired and wireless voice and data, and is delivered through trusted local partners.

This deployment guide discusses:

- SBCS 2.0 voice over Wi-Fi solution components and features
 - **Cisco Unified Communications 500 Series platforms** (all models and SKUs).
 - **Wireless Access Points (APs)**. Cisco UC 520W and UC 540W platforms with integrated wireless capability or Cisco Small Business Pro AP541N Dual-band Single-radio access points.
 - **Wireless IP Phones**. Cisco SPA 525G IP phones operating in Wireless-G mode or Cisco Unified Wireless IP Phone Models 7921G and 7925G.
- Supported reference designs for SBCS voice-over-wireless deployments, including target customers, features and benefits, components, design characteristics, limitations, and caveats.
- Steps required for initial installation and configuration using Cisco Configuration Assistant (CCA) Release 2.2 and later.
- Administrative tasks that may be required after initial installation.

Audience

The audience for this guide includes Cisco SBCS-certified Value Added Resellers (VARs) who are planning an SBCS voice over Wi-Fi deployment. The guide assumes VARs are familiar with configuration of voice, data, and network features for Cisco SBCS platforms using Cisco Configuration Assistant (CCA).

Solution Components

The Cisco SBCS 2.0 Voice over Wi-Fi solution includes these components:

- **Cisco Unified Communications 500 Series Platforms**
- **Cisco AP541N Dual-band Single Radio Access Points**
- **Cisco IP Phone SPA 525G**
- **Cisco Unified Wireless IP Phones (Models 7921G/7925G)**

Cisco Unified Communications 500 Series Platforms

The reference designs for voice over Wi-Fi described in this guide support all Cisco Unified Communications 500 Series Models: Model UC 520, UC 540, and UC 560.

Small offices with up to 8 users can UC 500 SKUs with integrated wireless capabilities, without the need for an external access point:

- Cisco Unified Communications 500 Series Model 540 for Small Business (UC540W-FXO-K and UC540W-BRI-K9)
- Cisco Unified Communications 500 Series Model 520 with integrated wireless (UC520W-8U-4FXO, UC520W-8U-2BRI, UC520W-16U-4FXO, UC520W-16U-2BRI)

The references designs for SBCS 2.0 Voice over Wi-Fi deployments do not support combining the integrated UC 500 access point with external AP541N access points within a customer site.

More information on the UC 500 is available on Cisco.com at the following URL:

www.cisco.com/go/uc500

Cisco AP541N Dual-band Single Radio Access Points

Cisco SBCS 2.0 and later releases support Cisco AP541N Dual-band Single Radio access points.



Features

The Cisco AP541N Wireless Access Point gives partners and their customers a complete and easy-to-install wireless solution to address their network infrastructure needs. With advanced features such as clustering, 802.11n, robust security and quality of service, the AP541N allows a small business wireless network to be as secure and reliable as any wired network. Features include:

- Dual-band .11n works in either 2.4- or 5-GHz bands for flexible coverage options
- Load balancing
- Access point clustering, which provides wireless controller-like capabilities without the need for a separate appliance
- Seamless roaming and QoS for voice and data applications
- Standards-based, business-class encryption and authentication
- MAC address authentication
- Rogue access point detection
- Secure guest access with URL redirection

Cisco IP Phone SPA 525G

Cisco IP Phone SPA 525G. When SPA 525G phones are deployed as part of a Cisco Smart Business Communications system, SPCP (also called SCCP) is used for call control features. In SPCP mode, Cisco Smart Business Applications such as TimeCardView, Live Record, and VoiceView Express are also supported. These applications can be enabled and configured using CCA. Firmware updates and administration of SPA 525G phones in SPCP mode are also performed through CCA.

Cisco SBCS 2.0 Voice over Wi-Fi deployments require version 7.3.5 or later of the Cisco SPA 525G IP phones.



Features

The Cisco IP Phone SPA 525G is a full-featured VoIP (Voice over Internet Protocol) phone that provides voice communication over an IP network. It supports traditional features such as call forwarding, redial, speed dialing, transferring calls, conference calling, and voice mail.

The Cisco SPA 525G IP phone is connected to the network through its wired Ethernet port or the built-in Wireless-G connection. Unlike traditional phones, the Cisco SPA 525G requires a separate power source when not connected to a PoE (Power over Ethernet) source. When the phone is operating in Wireless-G mode, as it does in a Cisco SBCS voice over Wi-Fi deployment, a separate power adapter (Model PA100) is required for connecting the phone to a power source.

IMPORTANT Although the Cisco SPA 525G has an additional Ethernet port that allows a computer to be connected to the network through the IP phone, this option is only available when the phone is connected to the network via the wired Ethernet port.

The SPA 525G has a 320 x 240 color, 3.2" inch LCD screen and provides up to five telephone extensions. It provides the following hardware features:

- Two (2) Ethernet 10/100 Mbps ports
- 802.3af Power over Ethernet support
- USB 2.0 host port for connecting a USB memory device to play MP3 files
- Bluetooth capability for headset support
- 2.5-mm stereo earphone jack for headset
- Wireless-G client
- Kensington security slot
- Phone VPN client (requires SPA 525G firmware version 7.4.2 or later)

Cisco SPA 525G IP phones support headsets from different manufacturers. For the latest supported models, contact your reseller. Additional information can be found at the following manufacturer's websites:

- Plantronics — <http://www.plantronics.com>
- Jabra — <http://www.jabra.com>

More information about the Cisco IP Phone SPA 525G is available on Cisco.com at the following URL:

<http://www.cisco.com/en/US/products/ps1067/index.html>

Documentation for SPA 525G phones is available on Cisco.com at the following URL:

www.cisco.com/en/US/products/ps10499/tsd_products_support_series_home.html

Available guides include:

- *Cisco Small Business Pro IP Phone SPA 525G Quick Start Guide*
- *Cisco Small Business Pro SPA 500 Series and WIP310 IP Phone Administration Guide*
- *Release Notes for Cisco Small Business Pro IP Phone SPA 525G Firmware Version 7.3.5*

Cisco Unified Wireless IP Phones (Models 7921G/7925G)

The Model 7921G and 7925G wireless IP phones are supported for Cisco SBCS voice-over wireless reference designs that include Cisco Small Business Pro AP54 1N Dual-band Single-radio access points.

Cisco Unified Wireless IP Phone 7921G



The Model 7921G wireless IP phone includes these features:

- IEEE 802.11a, b, and g standards that allow customers to use the phone in the 2.4-GHz or 5-GHz bands
- 2 in. (5 cm) color display with 176 x 220-pixel resolution
- Built-in speakerphone capabilities
- Longer battery life (200 hours standby time or 15.5 hours talk time)
- Wireless security features including LEAP, PEAP, EAP-FAST, EAP-TLS, WPA, WPA2, CCKM, WEP, TKIP/MIC, AES
- Voice security features including Certificates, Secure Real-Time Protocol (SRTP), and Transport Layer Security (TLS)
- QoS features including WMM, TSPEC, EDCA, and QBSS

More information on the Cisco Unified Wireless IP Phone 7921G is available on Cisco.com at the following URL:

<http://www.cisco.com/en/US/products/ps7071/index.html>

Cisco Unified Wireless IP Phone 7925G



The Cisco Unified Wireless IP Phone 7925G extends the functionality of the existing Cisco Unified Wireless IP Phone 7921G with these features:

- Support for Bluetooth v2.0 headset profiles gives you more freedom
- IP54-rated, hermetically sealed phone/display—protects against dust, liquids, and moist wipes, and is ideal for deployment in more demanding environments.
- Rugged industrial design that complies with military 810F standard and includes a rubber casing to shield the phone from damage caused by drops and shocks.
- Compact form factor

More information on the Cisco Unified Wireless IP Phone 7925G is available on Cisco.com at the following URL:

<http://www.cisco.com/en/US/products/ps9900/index.html>

Planning a Cisco SBCS Voice Over Wi-Fi Deployment

This chapter discusses network planning guidelines for Cisco SBCS 2.0 voice over Wi-Fi deployments using the reference designs described in [Chapter 3, “Reference Designs for Cisco SBCS 2.0 Voice Over Wi-Fi Deployments.”](#)

IMPORTANT Consult the wireless regulatory compliance information to verify that the wireless IP phones and access points deployed for your solution are certified for operation in your country.

NOTE Wireless data network design is outside the scope of this guide.

The following topics are covered:

- [Overview, page 14](#)
- [Wireless Mobility, page 14](#)
- [Quality of Service \(QoS\), page 15](#)
- [Radio Frequency \(RF\) Design Guidelines, page 16](#)
- [Wireless Access Point Placement and Signal Coverage, page 16](#)
- [Wireless Site Survey, page 20](#)
- [Wireless Voice Security, page 22](#)

Overview

The Cisco SBCS 2.0 Voice over Wi-Fi solution is designed for small businesses who want a flexible, affordable, full-featured business communications system that is reliable, easy to deploy or move, requires no new wiring, and helps the business operate more efficiently and effectively. It offers growth and reduced costs, unlike point product offerings from competitors that are potentially incompatible and could require complex integration efforts, resulting in a higher overall cost of ownership.

Traditionally, small businesses wishing to deploy IP telephony had the option of replacing desktop phones with IP phones that use a wired connection to IP resources. As a result, this often required business to upgrade the network infrastructure to support voice features or employ skilled IT staff with technical knowledge to configure the end-to-end solution. SBCS provides small business customers with a way to overcome some of these technical challenges when deploying converged voice and data by using wireless media as the transport mechanism. The only investment required for the small business is the wireless infrastructure and wireless IP phone endpoints.

Wireless voice deployments are well-suited to businesses housed in historic buildings where network cabling is limited or non-existent or mobile business locations such as trailers, kiosks, and oil rigs.

Another advantage is rapid deployment. Cisco Configuration Assistant (CCA), provides an easy-to-use GUI for configuring the solution that enables customers to save time when deploying the reference designs presented in this guide.

Wireless Mobility

Wireless voice mobility is the ability for Wi-Fi phones to roam across different access points, while maintaining call states and voice quality.

The reference designs described in this guide do not require a wireless LAN controller for wireless voice mobility. Cisco Small Business Pro AP54 1N access points support AP clustering, which provides controller-like capabilities that support client-based roaming.

Wireless roaming between AP54 1N access points and the integrated access point on the UC 500 or SA 500, however, is *not* supported. If there is a UC 500W with integrated wireless AP at the customer site and AP 54 1s, the voice SSID should only be configured on AP54 1Ns.

Customers who want to use controller-assisted roaming for wireless mobility can deploy a WLC 526 controller with Cisco Model 7921G wireless IP phones. For more information, refer to the *Guide to Configuring Cisco 7921 Phones in an SBCS Environment*, available on Cisco.com at the following URL:

http://www.cisco.com/en/US/products/ps7320/products_white_paper09186a0080973d69.shtml#design_sbcs

Quality of Service (QoS)

QoS refers to the capability of a network to provide differentiated service to selected network traffic over various transport technologies. QoS provides the following benefits:

- Capability for network resources to be shared more efficiently and expedite the handling of mission-critical applications
- Management of time-sensitive multimedia and voice application traffic to ensure that this traffic receives higher priority, greater bandwidth, and less delay than best-effort data traffic

With QoS, bandwidth can be managed more efficiently across LANs, including WLANs. QoS provides enhanced and reliable network service by:

- Supporting dedicated bandwidth for critical users and applications
- Controlling jitter and latency (required for real-time voice traffic)
- Managing and minimizing network congestion
- Setting network traffic priorities

The Cisco SBCS 2.0 voice over Wi-Fi solution provides QoS by:

- Offering separate VLANs for voice and data
- Giving priority to voice traffic over the shared RF (radio frequency) link

For best performance, WMM/802.11e and the “Optimized for Voice” QoS Presets must be enabled on Cisco AP541N access points using the AP541N Configuration Utility.

Radio Frequency (RF) Design Guidelines

Cisco SBCS 2.0 Voice over Wi-Fi deployments using the AP541N access points support a mix of wireless-B, G, and N clients. The AP541N also supports a mix of wireless-A and -N clients, depending on how the mode for the radio is configured.

The most important factor to consider in an SBCS Voice over Wi-Fi deployment with wireless IP phones is coverage—that is, how far the signal can reach wireless clients with acceptable quality. To achieve reliable voice service, a Voice over Wireless LAN (VoWLAN) cell boundary of -67 dBm or better is recommended.

Wireless Access Point Placement and Signal Coverage

The physical environment affects performance of any wireless access point, and careful placement of access points is critical in providing reliable coverage throughout the office. It is important to note that every obstacle placed between an access point and wireless client will degrade the signal to some extent. Leaded glass, metal, concrete floors, water, and walls will all inhibit the signal and reduce range. In addition, electrical equipment such as heavy machinery or items such as microwave ovens can generate interference that also degrades signal quality in the immediate vicinity.

Small installations may be implemented relatively easily and using only basic tools such as wireless site survey applications bundled with many wireless client devices. Access points may be initially positioned in a convenient location central to the area requiring coverage, and then adjusted based on the actual coverage as measured using a wireless client device.

Keep the following general rules in mind when placing access points:

- Access points should be placed as high as possible to ensure the best possible coverage.
- Access points should not be placed close to metal cabinets, concrete walls, or other obstacles.
- Access points should not be placed on a metallic surface such as a cabinet or aluminum heat dissipater.
- Access points should not be placed within any type of enclosure.
- Antennas should be vertically oriented for most uses. Adjusting the antenna angle may affect performance.

For the Cisco SBCS 2.0 voice-over-wireless deployment reference designs, these types of access points can be deployed:

- The UC 500 integrated access point
- External Cisco AP54 1N access points

Theoretically, the AP54 1N and UC 500 integrated access points can serve an area of 5,000 square feet (464 m²). However, because of the nature of voice traffic, and the fact that a typical office building has walls, ceiling, RF interference, and other factors that can affect signal strength, the recommended effective coverage area defined for the solution has been reduced to provide a safety margin:

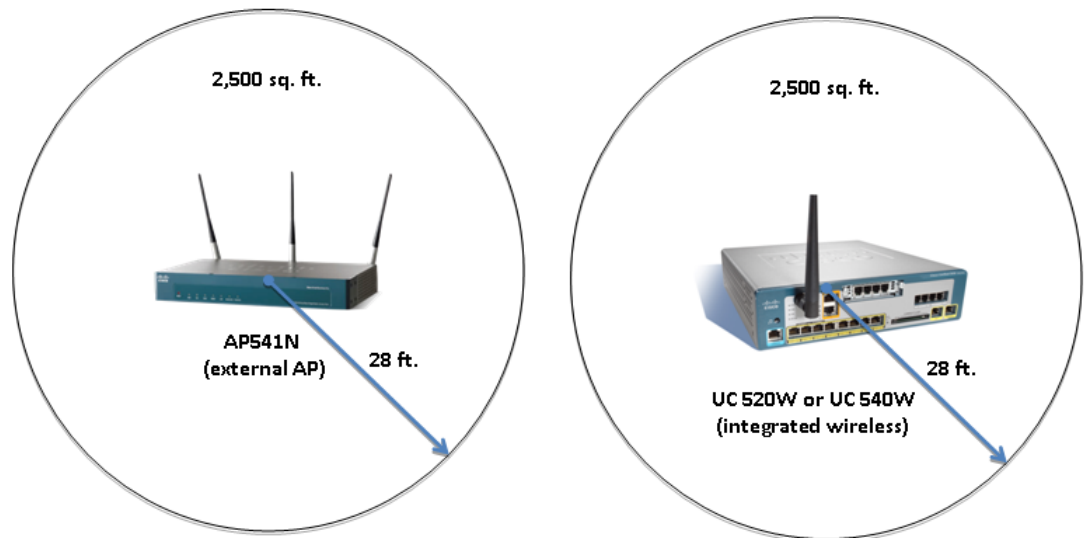
- UC 500 integrated access point recommended coverage area — 2,500 sq ft (232 m²)
- Single external AP54 1N access point coverage area — 2500 sq ft (232 m²)

Cisco AP 54 1N access points support clustering for voice over Wi-Fi client roaming. This means that you can increase the coverage area by adding more APs (for example, with two AP54 1Ns, the coverage area increases to 5000 square feet (minus the recommended 20% coverage area overlap); with three AP54 1Ns it increases to 7500 square feet (minus the recommended 20% coverage area overlap), and so on, up to 10 access points).

IMPORTANT The coverage areas described here are guidelines. Cisco strongly recommends that you conduct a wireless RF site survey at the customer site to account for RF interference.

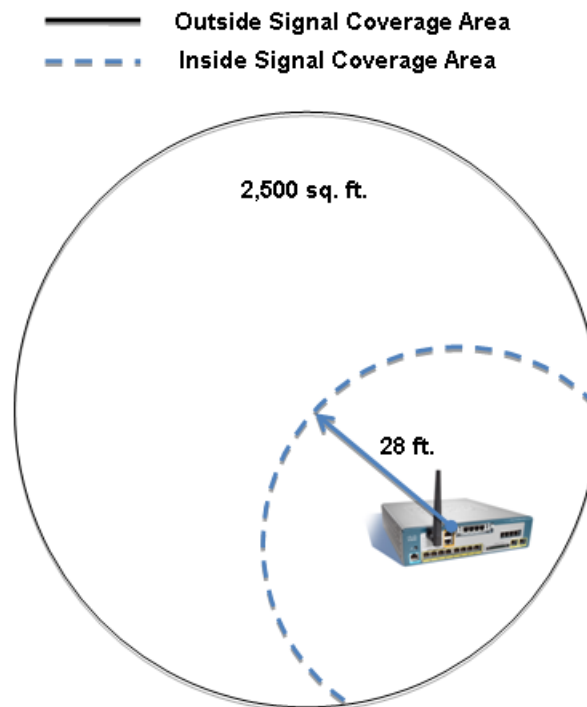
The diagrams in **Figure 1** show optimal placement of a single UC 520W or UC 540W with integrated wireless and a single external AP54 1N access point in an office building without excessive obstructions. Only two-dimensional coverage is considered. For multi-floor deployments, you cannot assume the same distances, as floors and ceilings are significant obstructions that can greatly reduce signal strength.

Figure 1 Coverage Area for Single UC 520W, UC 540W, or External AP541N



The diagram in [Figure 2](#) shows a worst-case scenario in which the UC 500 with an integrated access point is positioned at the furthest point possible (for example, when the office telecommunications equipment is located in one corner of the office). When the access point is placed in the corner of an office, the effective signal reach is greatly reduced because a large part of the coverage area is outside the office.

Figure 2 Worst-Case Placement of UC 500 with Integrated Access Point

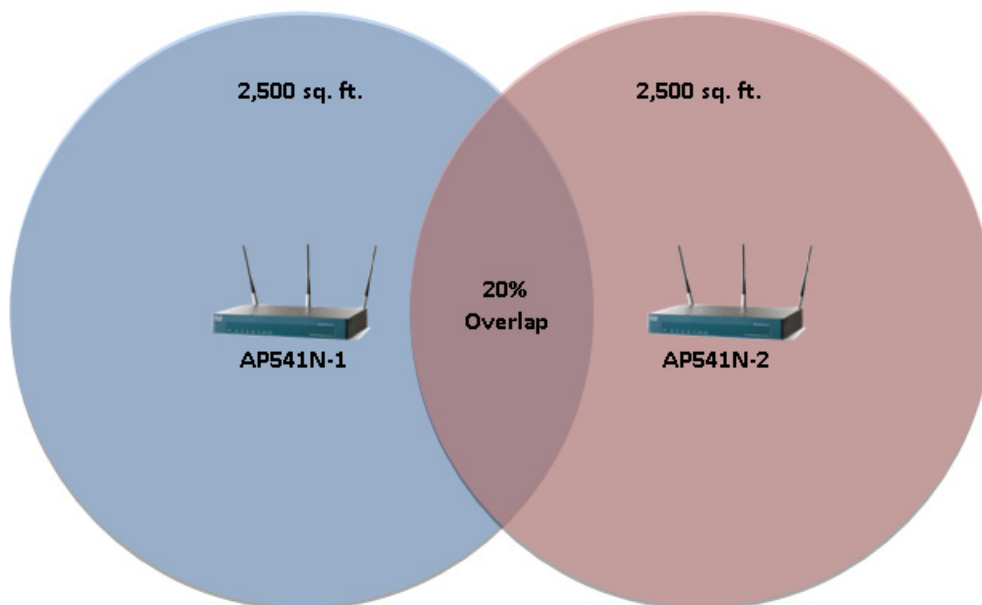


**UC 500 with Integrated AP — Worst-case scenario
(placement of UC 500 in corner of office space)**

Note that a worst-case scenario for the external AP541N is not shown. This is because it is a standalone device, and there is greater flexibility for placement.

When deploying multiple external access points, a signal coverage area overlap of 20% is recommended, as shown in **Figure 3**.

Figure 3 Placement of Multiple Access Points for Coverage Area Overlap



Wireless Site Survey

A wireless site survey must be performed for Cisco SPA 525G wireless deployments to check for sources of wireless interference and guarantee that coverage meets recommended guidelines.

A number of tools exist for performing a wireless site survey. Using these tools, businesses can detect, classify, locate, and mitigate sources of wireless interference to optimize network performance for voice applications.

A full-featured solution is Cisco Wireless Spectrum. For more information, see the following URL on Cisco.com:

<http://www.cisco.com/en/US/products/ps9393/index.html>

After the equipment is installed, the installer should verify coverage and signal strength is within acceptable thresholds and adjust placement of phones and access points to optimize performance. Cisco recommends Voice over Wireless LAN (VoWLAN) cell boundary value of -67 dBm or better for optimal voice quality.

Cisco 7921G/7925G Wireless IP Phone Site Survey Utility

Cisco 7921G/7925G phones have a Site Survey utility that can be used to actively and passively scan the wireless medium across all channels and locate APs that belong to the Basic Service Set (BSS). The results of the scans can be used to help identify areas of low coverage, if any, and to determine whether the APs are configured consistently. When you start the Site Survey utility, the phone disassociates from the current AP and remains disassociated for the duration of the operation.

- To access the Site Survey utility on the Cisco 7921G wireless IP phone, choose **Settings > Status > Site Survey**.

The phone displays a list of access points within range that have the same SSID and security settings as the phone. To see more information about an AP, scroll to the desired line and press **Details**.

- To verify the ability to roam between APs, walk through all areas where phones are used and take readings. Approach areas from different directions to assure successful roaming conditions.
- Adjust AP and antenna placement and AP power settings to provide approximately 20 percent coverage overlap.

For more information, see the *Cisco Unified Wireless IP Phone 7921G Administration Guide for Release 7.0* or the *Cisco Unified Wireless IP Phone 7925G Administration Guide, Release 7.0*, available on Cisco.com.

Viewing Signal Strength on SPA 525G IP Phones

The Cisco IP Phone SPA 525G displays the received signal strength from its associated access point. To check the signal level during installation, press the **Setup** button on the phone and navigate to **Network Configuration > Wireless > Wireless Status**.

Wireless Voice Security

The SSID (service set identifier) is a unique identifier that wireless endpoints must use to be able to communicate with each other or to an access point. The SSID can be any alphanumeric entry up to a maximum of 32 characters.

The following guidelines and limitations apply to configuring wireless voice security for the supported reference designs:

- Wireless security for data and voice can be configured independently by using separate VLANs for voice and data.
- The solution supports WPA Personal security mode only.

WPA Personal security mode (also known as WPA-PSK) is designed for SOHO and small office networks. Each wireless data user must use the SSID and password configured for the wireless access points to access the network.

When setting up the SSID and password for the network, use a strong password for security. You can also disable network broadcast of the SSID.

- The security profile for Wi-Fi data clients such as PCs must be configured separately for each client.
- For the current release SSID and profile synchronization is not provided for Wi-Fi voice clients.

SSID and security profile configuration is performed manually through each phone handset.

The section “[Configuring Settings Using CCA, page 32](#)” includes instructions for configuring wireless SSID and security settings for access points.

Reference Designs for Cisco SBCS 2.0 Voice Over Wi-Fi Deployments

This chapter covers components, design characteristics, target customers, deployment limitations, and caveats for supported reference designs.

- **Overview**
- **Reference Design #1 — Small Office, Up to 8 Wi-Fi Voice and Data Users, Integrated UC 500 Wireless**
- **Reference Design #2 — Larger Offices, 16 to 48 Wi-Fi Voice Users, AP541N Access Points, 50+ Wi-Fi Data Clients**
- **Guidelines, Limitations, and Caveats**

Overview

Table 1 summarizes components and design characteristics each of the voice over Wi-Fi reference designs that are supported in SBCS 2.0.

Although it is possible to deploy a system outside these limits, Cisco strongly recommends that customers deploy one of these designs as specified.

These reference designs can be combined with existing wired-line devices such as Cisco Small Business Pro ESW 500 Series switches, Cisco Catalyst Express CE 520 switches, Cisco SR 500 Series secure routers, and wired IP phones (for example, Cisco Model 7960 IP phones).

NOTE Phone capacity recommendations for these reference designs address wireless phone capacity only. The maximum phone capacity for deployments with a combination of wired and wireless phones is determined by the license capacity of the UC 500 platform being deployed.

Table 1 Summary of Supported Voice Over Wi-Fi Reference Designs for SBCS 2.0

Reference Design	Access Points	Number of APs	Maximum Wi-Fi Voice Clients	Maximum Wi-Fi Data Clients	Voice over Wi-Fi Roaming?	Wireless Coverage Area in sq ft (m ²)
#1	UC 520W or UC 540W with integrated wireless	1	8	8	N/A	Up to 2,500 sq ft (232 m ²)
#2	AP541N	Up to 10	16 per AP; 48 total	50 per AP	Yes (with 2 or more APs)	2500 sq ft (232 m ²) per AP deployed, minus 20% signal coverage area overlap

The following notes apply to the above summary:

- Reference design #1 supports all UC 520 and UC 540 wireless SKUs.
- Reference design #2 supports all UC 500 SKUs.

Reference Design #1 — Small Office, Up to 8 Wi-Fi Voice and Data Users, Integrated UC 500 Wireless

Reference design #1 is a perfect fit for a small business with up to 8 users who are housed in a single workspace of up to 2,500 square feet. One of the benefits of this design is that the small business can take advantage of the full license capacity of the UC 520W and UC 540W 8-user SKUs to deploy an all-wireless solution. In this design, a single Cisco UC 520W or UC 540W with an integrated wireless AP is used for both voice and data traffic.

QoS settings allow for the co-existence of voice and data on the wireless network, while maintaining voice quality. When no calls are present on the system and all phones are in an idle state, computers can take advantage of the full throughput offered by the Wireless-G radio on the integrated UC 500 access point. IP phone-to-IP phone communication within a site over the wireless LAN uses toll-quality voice compression (G.711 codec).

You do not need to deploy all 8 phones in wireless mode—you can combine wired and wireless phones (the SPA 525G also offers an uplink for wired connections). Bandwidth saved by deploying fewer phones in wireless mode can be used by data applications.

Figure 1 Reference Design #1 — Small Office, Up to 8 Users, 1 Integrated AP



Reference Design #2 — Larger Offices, 16 to 48 Wi-Fi Voice Users, AP541N Access Points, 50+ Wi-Fi Data Clients

Reference design #2 is a scalable design that can be used to deploy voice over Wi-Fi for businesses who require support for 16 to 48 Wi-Fi voice users, 50 or more wireless data clients, wireless voice mobility, or a larger coverage area.

To increase capacity, add AP541N access points and phones and, if needed, purchase and install additional UC 500 user licenses.

The QoS settings required to guarantee voice quality in the presence of data traffic must be manually configured on the AP541N for this design.

In this design:

- All UC 500 models and SKUs are supported. The number of user licenses on the UC 500 must be equal to or greater than the number of phones deployed.

You cannot combine external APs with the integrated access point on the UC 500. When external APs are used with a UC 500W with integrated wireless, remove the SSID configuration on the UC 500W.

- From 1 to 10 external AP541N access points can be deployed. Each AP provides an additional 16 Wi-Fi voice clients (up to a maximum of 48), 50 Wi-Fi data clients, and 2500 square feet of coverage area (232 square meters).
- Clustering can be enabled on AP541N access points to support wireless mobility using client-based roaming
- Separate SSIDs are configured on the AP541N for voice and data.
- A mix of wireless-B, G, and N wireless clients are supported.

You do not need to deploy all phones in wireless mode—you can combine wired and wireless phones (the SPA 525G also offers an uplink for wired connections). Bandwidth saved by deploying fewer phones in wireless mode can be used by data applications.

Figure 2 Reference Design #2, Single AP541N Access Point Option



Guidelines, Limitations, and Caveats

The following limitations and caveats apply to voice over Wi-Fi deployments with Cisco SPA 525G IP phones for SBCS 2.0:

- The reference designs do not support a combination of UC 500 integrated APs and external AP54 1N APs.
- WPA-PSK security must be used.
- Cisco SPA 525G phones are not supported for use with any 3rd-party wireless AP.
- These reference designs supports SCCP phone registrations with UC5xx only; they do not support SIP endpoint registrations with a SIP provider.
- The Cisco IP Phone SPA 525G is a desktop phone with a built-in Wireless-G client that is served by a single access point. It is not a wireless mobile phone. When the Cisco IP Phone SPA 525G is operating in Wireless-G mode, it still requires a connection to power.
- The CCA Wireless Setup Wizard cannot be used to automate configuration of AP54 1N access points or SPA 525G, 792 1G, and 7925G wireless IP phones profiles. The APs must be manually configured using CCA in expert mode, and the wireless profiles must be manually configured on the phones.
- The Cisco IP Phone SPA 525G is supported for teleworkers in wired mode only.
- Unicast paging groups are required with Cisco SPA 525G wireless phones. A maximum of ten (10) phones can be in a unicast paging group.
- Multicast Music on Hold (MoH) for internal calls (IP phone-to-IP phone) is not supported for this solution and must be disabled using CCA.

The procedures under [Configuring Settings Using CCA, page 32](#) include instructions for disabling MoH for internal calls.

Installing, Configuring, and Administering SBCS 2.0 Voice over Wi-Fi Deployments

This chapter covers the following topics:

- [Initial Installation and Configuration Steps, page 29](#)
- [Administration Tasks After Initial Installation, page 40](#)

Initial Installation and Configuration Steps

This section contains the following procedures for first-time installation and configuration of a Cisco SBCS voice over Wi-Fi deployment:

- [Before You Begin, page 30](#)
- [Creating a CCA Customer Site, page 31](#)
- [Configuring Settings Using CCA, page 32](#)
- [Configuring Settings Using the AP541N Configuration Utility, page 35](#)
- [Configuring Wireless Profile Settings on the IP Phones, page 36](#)
- [Verifying the Installation, page 40](#)

Before You Begin

Before installing a Cisco SBCS voice over Wi-Fi deployment for the first time, make sure that the following requirements are met:

- Each of the SPA 525G phones that will be connected wirelessly must have a Model PA100 external power supply. The power supply does not ship with the phone and must be ordered separately.
- Verify that you have the correct number and type of access points for the deployment.
- Verify that the UC 500 has software licensing for the number of phones being deployed.
- Download and install Cisco Configuration Assistant, Version 2.2 or later to a local PC to be used for the installation. The CCA software is free and available from Cisco.com at the following location:

www.cisco.com/go/configassist

You must be a registered Cisco.com user to download the software; no other access privileges are required.

- Create a customer site that includes the AP541N access point, UC 500, IP phones, and other SBCS components as described in **Creating a CCA Customer Site, page 31**.
- Verify that the UC 500 has been upgraded to Cisco SBCS Software Package Version 8.0.0 or later, which includes the most current SPA 525G phone firmware, voice mail software, and other files.

To view the version of Cisco IOS currently installed on the UC 500 using CCA, open the Dashboard (**Home > Dashboard**) and check the IOS Version displayed on the System Status item.

To perform software upgrades using CCA, navigate to **Maintenance**, choose **Software Upgrade**, and follow the instructions in the CCA online help.

- If this is a new installation, the procedures in this guide assume that you have already configured the rest of the system using CCA in expert mode or by running the Telephony Setup Wizard.

Creating a CCA Customer Site

If you have not already done so, create a CCA customer site that includes the UC 500, AP54 1N access points, IP phones, and other SBCS components. Upgrade software on these devices if needed.

NOTE Before launching CCA, disable any third-party FTP or TFTP server running on the PC and make sure that firewall software running on the PC does not block access to the UC 500 or the CUE module on the UC 500. If the PC has a dual network interface card (NIC), make sure that only one network interface is enabled.

For more detailed instructions on creating a customer site, see the *Cisco Configuration Assistant Smart Business Communications System Administrator Guide* or the CCA online help. The CCA administration guide is available on Cisco.com at the following URL:

http://www.cisco.com/en/US/products/ps7287/prod_maintenance_guides_list.html

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- STEP 1** Connect each external AP54 1N access point to a PoE port on the UC 500 platform or ESW 500 Series or CE 520 switch in the customer site and allow the access points to boot up.
- STEP 2** Connect a PC to one of the PoE ports on the UC 500 platform or connected switch and launch CCA.
- STEP 3** Create a customer site using the LAN IP address (for example, 192.168.10.1) of the UC 500 platform as the starting IP address for discovering devices. The AP54 1N should be listed as one of the devices discovered.
- STEP 4** Connect to the customer site.
- STEP 5** When prompted for authentication, enter the username and password for any managed devices that are discovered.
- The default username and password for the UC 500 and the AP54 1N are both cisco/cisco.
- STEP 6** Verify that the UC 500 and any external access points are discovered and displayed in the network Topology View in CCA.
- STEP 7** In the Topology View, right-click on the icon for each AP54 1N and choose **Add to Site** if the device is not already shown as a member of the customer site.
- STEP 8** If you have not upgraded the UC 500 software package to version 8.0.0 or later, back up the configuration (**Maintenance > Configuration Archive**), then go to

Maintenance > Software Upgrade and follow the instructions in the online help for upgrading the UC 500.

- STEP 9** In the Software Upgrade window, select each AP54 1N AP and verify that it is running the latest software. Firmware version 1.8.0 or later is required. Upgrade devices as needed.

When upgrading AP54 1N access points, choose **Standard** in the Upgrade Settings window. The upgrade file for the AP54 1N will have a .tar extension, for example, AP54 1N-K9.1.8.0.tar. The access points are restarted after the upgrade is applied.

- STEP 10** Verify that ESW 500 Series switches are running the latest firmware. Upgrade these devices if needed.

Configuring Settings Using CCA

Next, you will use CCA to configure device properties and wireless settings on access points and the UC 500:

- Configure device properties, such as hostname, administrative username, and admin password.
- Disable Music on Hold on the UC 500.
- Configure wireless SSID settings for each access point.

-
- STEP 1** Choose **Configure > Device Properties > Hostname** from the feature bar.

- STEP 2** In the Hostname window, select each external AP and edit the default Hostname of **AP54 1N-A-K9**.

The hostname you enter will help you to identify the AP and its location in the network topology.

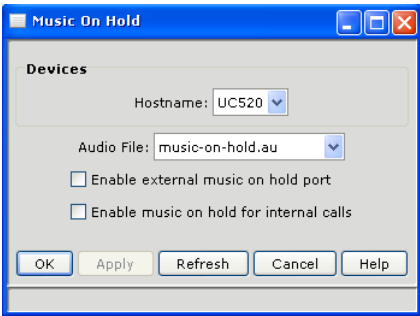
- STEP 3** For security reasons, change the default password on each AP54 1N. To do this, perform these steps on each of the APs:
- a. Choose **Configure > Device Properties > Users and Passwords** from the feature bar.
 - b. In the Hostname field, select the AP54 1N whose password you want to change.
 - c. Enter the new password, then re-enter it for confirmation.
 - d. Click **OK**.

STEP 4 Disable Music on Hold on the UC 500.

Multicast Music on Hold (MoH) for internal calls (IP phone-to-IP phone) is not supported for this solution and must be disabled using CCA. When you disable MoH for internal calls, Music on Hold for the external MoH port on the UC 500 is also disabled.

To disable Music on Hold for internal calls using CCA:

- a. Launch CCA and navigate to **Configure > Telephony > Voice Features > Music on Hold**.
- b. In the Music On Hold window, uncheck both **Enable external music on hold port** and **Enable music on hold for internal calls**.



- c. Click **OK** or **Apply**.

STEP 5 Choose **Configure > Wireless > WLANs (SSIDs)** to open the WLANs (SSIDs) window.

STEP 6 Configure separate SSIDs for voice and data. You can modify the existing default SSIDs (cisco-data and cisco-voice), or create two new SSIDs.

If you are using reference design # 1, configure these SSID settings on the integrated UC 500 wireless AP, then click **OK**.

Setting	Value
SSID Name	Enter names for each of the two new SSIDs or use the default SSID names, which are <code>cisco-data</code> for Wi-Fi data clients and <code>cisco-voice</code> for Wi-Fi voice clients.
VLANs	Use VLAN 1 for the data SSID and VLAN 100 for the voice SSID. These are the default VLANs for voice and data on the UC 500.
Security	You must choose WPA Personal .

Setting	Value
Pre-shared Key	Enter from 8 to 32 characters for the pre-shared key.
Broadcast in Beacon	Recommend disabling this setting for security reasons.

If you are using reference design #2, configure these settings on each AP541N for the voice and data SSIDs, then click **OK**.

Setting	Value
SSID Name	Enter names for each of the two new SSIDs or use the default SSID names, which are <code>cisco-data</code> for Wi-Fi data clients and <code>cisco-voice</code> for Wi-Fi voice clients.
VLANs	Use VLAN 1 for the data SSID and VLAN 100 for the voice SSID. These are the default VLANs for voice and data on the UC 500.
Security	You must choose WPA Personal .
Pre-shared Key	Enter from 8 to 32 characters for the pre-shared key.
Broadcast Key Refresh Rate	Leave the default value of 300 seconds.
MAC Authentication Type	Set to Disabled .

STEP 7 If you are using reference design 2 and you have a UC 500 with an integrated access point, select the UC 500 hostname in the WLANs (SSIDs) window and delete the default voice and data SSIDs. This effectively disables the wireless on the UC 500.

STEP 8 Exit CCA. When prompted, save the configuration for All Devices.

If your deployment includes AP541N access points, perform the steps described in [Configuring Settings Using the AP541N Configuration Utility, page 35](#). If not, perform the steps described in [Configuring Wireless Profile Settings on the IP Phones, page 36](#).

Configuring Settings Using the AP541N Configuration Utility

If your voice over Wi-Fi deployment uses AP541N access points, you must configure these settings manually on the each AP541 using the web-based AP541 Configuration Utility.

- Verify that the wireless radio is on and the mode is set correctly
- Enable Wi-Fi Multi Media (WMM) for QoS and verify QoS settings on the AP
- Enable clustering for client-based roaming.

The AP541 Configuration Utility can be accessed from within CCA.

STEP 1 To access the Configuration Utility on the AP541N:

- a. Go to the Topology view in CCA.
- b. In the Topology view, right click on the icon for the AP541N you want to configure.
- c. Choose **Configuration Utility** from the pop-up menu.
- d. Log in to the AP541N. Use the new password you configured earlier.

STEP 2 To verify wireless radio settings and check the mode:

- a. Click the **Wireless** tab and choose **Radio Settings**.
- b. Choose the appropriate **Region** (country).
- c. Verify that the **Wireless Radio Interface** is set to **On**.
- d. Verify that the **Mode** is set to **802.11 b/g/n**. This is required for maximum performance.
- e. Click **Apply**.

STEP 3 To enable Wi-Fi Multi Media and verify QoS settings:

- a. In the AP541N Configuration Utility, choose **Wireless > QoS Parameters**.
- a. Under **QoS Presets**, verify that **Optimized for Voice** is selected.
- a. Verify that **Wi-Fi Multi Media (WMM)** is enabled (required). If not, enable it.
- a. Click **Apply**.

STEP 4 Enable clustering on the AP.

- a. In the AP541N Configuration Utility, choose **Cluster > Access Points**
- b. Under **Clustering Options**, enter the location for the AP and the name of the cluster.

IMPORTANT Once you configure the first AP, you **MUST** enter the same cluster name that you used on the first AP (the cluster name on all APs must match exactly; the name is case-sensitive).

- c. Click **Enable Clustering**.
- d. Click **Apply**.

To continue with the configuration, perform the steps described in [Configuring Wireless Profile Settings on the IP Phones, page 36](#).

Configuring Wireless Profile Settings on the IP Phones

Wireless profile settings must be configured manually on each phone. The SSID and pre-shared key you use when configuring the wireless phone profile on the phones must exactly match those configured on the UC 500 or AP541N.

The exact steps vary, depending on the type of phone you are configuring. For step-by-step instructions, see these sections:

- [Enabling Wi-Fi Mode and Configuring Wireless Profile Settings on SPA 525G Phones, page 37](#)
- [Configuring Wireless Profile Settings on Cisco 7921G/7925G Phones, page 39](#)

Enabling Wi-Fi Mode and Configuring Wireless Profile Settings on SPA 525G Phones

To enable Wi-Fi mode and manually configure the wireless profile on a Cisco SPA 525G IP phone, follow these steps.

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- STEP 1** Unpack and set up the Cisco SPA 525G IP phone.
- STEP 2** Connect the phone to power using a PA100 power supply.
- STEP 3** Enable Wi-Fi mode on the phone:
- Press the **settings** button on the phone.
 - Use the down arrow key on the Navigation button to scroll to the **Network Configuration** option, then press the **Select** softkey.
 - Press the right arrow key on the Navigation button to enable Wi-Fi mode (Wi-Fi setting will change from OFF to ON).
 - Click **Save**.
 - Click **Exit**.
- STEP 4** Configure the wireless profile for the phone:
- On the Cisco SPA 525G phone, press the **Setup** button.
 - Navigate to **Network Configuration > Wi-Fi Configuration > Wireless Profile**.
The current profile is shown.
 - To delete the current profile, press the **Option** softkey, scroll to the **Delete** option, then press the **Select** softkey.
 - Choose **OK** when asked to confirm the profile deletion.
 - Press the **Option** softkey again.
 - Choose **Add New**, then press the **Select** softkey.

- g. Enter the following setting to create the wireless voice profile.

Setting	Value
Security Mode	Choose WPA2PSK .
Profile	Enter a descriptive name for the profile, for example, "voice."
SSID	Enter the wireless voice SSID exactly as you configured it for the AP541N or UC 500 integrated AP (for example, cisco-voice).
Cipher Type	Leave the default setting of TKIP .
WPA Shared Key	Enter the pre-shared key exactly as you configured it for the AP541N or UC 500 integrated AP. The key must have at least 8 characters and can contain up to 32 characters.

- h. Click **Save**.
- i. Click **Connect**.

The phone should register with the UC 500 and display an extension.

STEP 5 Check the signal strength on the SPA 525G IP phone:

- Verify that the wireless icon that displays signal strength appears at the top of the phone display.
- Press the **settings** button on the phone and navigate to **Network Configuration > Wireless > Wireless Status** to check the signal strength level at the location of the phone.

STEP 6 If needed, use CCA to configure additional user extension settings for the phone. See the CCA online help for more information.

Configuring Wireless Profile Settings on Cisco 7921G/7925G Phones

To configure wireless profile settings on Cisco 7921G and 7925G Wireless IP phones, follow these steps.

- STEP 1** Make sure the phone is **On**.
- STEP 2** From the top-level phone menu screen, click **Settings** (toolbox icon).
- STEP 3** Scroll down to **Network Profiles** and press the center select button.
- STEP 4** Choose **Profile 1**.
- STEP 5** Press ******* to unlock configuration options for Profile 1.
- STEP 6** With **Profile 1** selected, choose **View**.
- STEP 7** Scroll to **WLAN Configuration** and press the center select button.
- STEP 8** Configure these parameters.

Setting	Value
SSID	Click Change and enter the SSID for wireless voice EXACTLY as you configured it on the AP541N or UC500 integrated AP. The SSID is case-sensitive.
Security Mode	Choose Auto (AKM)
UserName	Leave blank
Password	Leave blank
Key Style	Leave this value set to ASCII.
Preshared Key	Click Change and enter the pre-shared key EXACTLY as you configured it on the AP541N or UC 500 integrated AP.

- STEP 9** Click **Options > Save** when you are finished configuring settings on the phone.

The phone will restart, register with the UC500, receive and display an extension number, and associate with the AP. At this point, you should be able to make calls.

- STEP 10** If needed, use CCA to configure additional user extension settings for the phone. See the CCA online help for more information.

Verifying the Installation

After you have finished configuring access points and wireless IP phones, you should be able to make calls.

Save and back up your device configuration using CCA. To access these options in CCA:

- Choose **Configure > Save Configuration** to save the running configuration to the startup configuration. This ensures that the configuration is retained if the UC 500 or AP541Ns lose power or restart unexpectedly. Save the configuration for All Devices.
- Choose **Maintenance > Configuration Archive** to access back-up and restore options. Back up the configuration for all devices.

For more information, see the Cisco Configuration Assistant online help.

Administration Tasks After Initial Installation

The procedures in this section apply to administering a Cisco SBCS voice over Wi-Fi deployment after the initial installation:

- [Adding Cisco AP541N Access Points, page 40](#)
- [Adding Phones, page 41](#)
- [Changing the Wireless Voice or Data Password \(WPA Pre-Shared Key\)](#)

Adding Cisco AP541N Access Points

You can add up to 10 AP541N access points. To add access points follow the procedures in [Configuring Settings Using CCA, page 32](#) and [Configuring Settings Using the AP541N Configuration Utility, page 35](#).

When adding access points, make sure that the SSID name, pre-shared key, and cluster name *exactly* match those configured on the existing APs.

Adding Phones

Each additional access point can support up to 16 Wi-Fi voice clients. The process for adding phones and configuring settings is the same as for the initial installation. See [Configuring Wireless Profile Settings on the IP Phones, page 36](#).

Remember to save and back up your device configuration through CCA.

Changing the Wireless Voice or Data Password (WPA Pre-Shared Key)

Perform the following steps to change the password (pre-shared key) for the voice or data SSID.

NOTE Notify users immediately if the pre-shared key for the data network has been modified. Wireless settings for PCs connected wirelessly must be configured separately for each client.

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- STEP 1** Launch CCA and connect to the customer site.
- STEP 2** From the feature bar in CCA, choose **Configure > Wireless**, then click **WLANS (SSIDs)**. CCA reads in the configuration.
- STEP 3** For each access point in the customer site:
- In the WLANS (SSIDs) window, select the hostname that applies to the device that has the SSID information that you want to modify (that is, the hostname for the UC 500 with the integrated AP or the hostname for the AP54 1N access point).
 - Locate the SSID to modify (either cisco-voice or cisco-data, for example) and click on it to select it.
 - Modify the pre-shared key and apply the change.
 - Click **OK**.
- STEP 4** Save and back up the configuration for all devices through CCA.
- STEP 5** Manually edit the pre-shared key in the profile settings for all Wi-Fi data clients and wireless IP phones to exactly match the new key.
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Where to Go From Here

Cisco provides a wide range of resources to help you and your customer obtain the full benefits of the Cisco Smart Business Communications System (SBCS) and its components.

Support	
Cisco Small Business Support Community	www.cisco.com/go/smallbizsupport
Online Technical Support and Documentation (Login Required)	www.cisco.com/support
Support Contacts (Phone)	www.cisco.com/en/US/support/tsd_cisco_small_business_support_center_contacts.html
Software Downloads (Login Required)	Go to tools.cisco.com/support/downloads , and enter the model number in the Software Search box.
Product Resources and Documentation	
Cisco Configuration Assistant (CCA)	www.cisco.com/en/US/products/go/configassist
Cisco AP541N Dual-band Single-radio access points	www.cisco.com/go/ap500
Cisco Smart Business Communications System (SBCS)	www.cisco.com/go/sbcs
Cisco Small Business	
Cisco Partner Central for Small Business (Partner Login Required)	www.cisco.com/web/partners/sell/smb
Cisco Small Business Home	www.cisco.com/smb
Marketplace	www.cisco.com/go/marketplace

