Technical Details

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Overview of the Cisco IP Phone

The Cisco IP Phone 8800 Series Multiplatform Phones comprises a set of full-featured VoIP (Voice-over-Internet Protocol) phones that provide voice communication over an IP network. The phones provide all the features of traditional business phones, such as call forwarding, redialing, speed dialing, transferring calls, and conference calling. The Cisco IP Phone 8800 Series Multiplatform Phones is targeted for solutions that are centered on Third-Party SIP-based IP PBX.

Note In this document, the terms Cisco IP Phone or phone means Cisco IP Phone 8800 Series Multiplatform Phones.

Physical and Operating Environment Specifications

The following table shows the physical and operating environment specifications for the Cisco IP Phone 8800 Series.

Table 1: Physical and Operating Specifications

Specification	Value or range
Operating temperature	32° to 104°F (0° to 40°C)
Operating relative humidity	Operating: 10% to 90% (non-condensing) Non-operating: 10% to 95% (non-condensing)

Specification	Value or range
Storage temperature	14° to 140°F (–10° to 60°C)
Height	9.02 in. (229.1 mm)
Width	10.13 in. (257.34 mm)
Depth	1.57 in. (40 mm)
Weight	2.62 lb (1.19 kg)
Power	100-240 VAC, 50-60 Hz, 0.5 A when using the AC adapter 48 VDC, 0.2 A when using the in-line power over the network cable
Cables	Category 3/5/5e/6 for 10-Mbps cables with 4 pairs Category 5/5e/6 for 100-Mbps cables with 4 pairs Category 5e/6 for 1000-Mbps cables with 4 pairs **Note** Cables have 4 pairs of wires for a total of 8 conductors.
Distance requirements	As supported by the Ethernet Specification, the maximum cable length between each Cisco IP Phone and the switch is assumed to be 330 feet (100 meters).

For more information, see the Cisco IP Phone 8800 Series Data Sheet: https://www.cisco.com/c/en/us/products/collaboration-endpoints/ip-phone-8800-series-multiplatform-firmware/datasheet-listing.html

Cable Specifications

The following information lists the cable specifications:

- RJ-9 jack (4-conductor) for handset and headset connection
- RJ-45 jack for the LAN 10/100/1000BaseT connection (10/100/1000 Network port on the phone)
- RJ-45 jack for a second 10/100/1000BaseT compliant connection (10/100/1000 Computer port on the phone)
- 3.5-mm stereo line in/out jack (for optional external headset, speakers, or headphones), for Cisco IP Phone 8861 only
- 48-volt power connector
- USB ports/connectors:
  - One USB port for the Cisco IP Phone 8851
  - Two USB ports for the Cisco IP Phone 8861

- Three key expansion module (KEM) connectors which are considered as a USB connector for the Cisco IP Phone 8851 and 8861

Network and Computer Port Pinouts

Although both the network and computer (access) ports are used for network connectivity, they serve different purposes and have different port pinouts.

- The network port is the 10/100/1000 SW port on the Cisco IP Phone.
- The computer (access) port is the 10/100/1000 PC port on the Cisco IP Phone.

Network Port Connector

The following table describes the network port connector pinouts.

Table 2: Network Port Connector Pinouts

Pin Number	Function
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-
Note BI stands for bidirectional, while DA, DB, DC, and DD stand for Data A, Data B, Data C, and Data D respectively.	

Computer Port Connector

The following table describes the computer port connector pinouts.

Table 3: Computer (Access) Port Connector Pinouts

Pin Number	Function
1	BI_DB+
2	BI_DB-
3	BI_DA+

Pin Number	Function
4	BI_DD+
5	BI_DD-
6	BI_DA-
7	BI_DC+
8	BI_DC-
Note BI stands for bidirectional, while DA, DB, DC, and DD stand for Data A, Data B, Data C, and Data D respectively.	

Phone Power Requirements

The Cisco IP Phone can be powered with external power or with Power over Ethernet (PoE). A separate power supply provides external power. The switch can provide PoE through the phone Ethernet cable.

Cisco IP Phones 8861 and 8865 are PoE Class 4 devices and require a switch or line card with Class 4 capabilities to support extra features.

For more information on your phone's power requirements, consult your phone's data sheet.

When you install a phone that is powered with external power, connect the power supply before you connect the Ethernet cable to the phone. When you remove a phone that is powered with external power, disconnect the Ethernet cable from the phone before you disconnect the power supply.

Table 4: Guidelines for Cisco IP Phone Power

Power type	Guidelines
External power: Provided through the CP-PWR-CUBE-4= external power supply	The Cisco IP Phone uses the CP-PWR-CUBE-4 power supply.
PoE power—Provided by a switch through the Ethernet cable attached to the phone.	Cisco IP Phones 8851, 8861, and 8865 support 802.3at PoE for accessory use. For more information, consult your phone's data sheet. The switch requires a backup power supply for uninterruptible operation of the phone Make sure that the CatOS or IOS version that runs on your switch supports your intended phone deployment. See the documentation for your switch for operating system version information.
Universal Power over Ethernet (UPoE)	Cisco IP Phones 8865 supports UPoE.

For information about Cisco IP Phone 8800 Key Expansion Module power requirements, see Key Expansion Module Power Information.

The documents in the following table provide more information on the following topics:

- Cisco switches that work with Cisco IP Phones
- Cisco IOS releases that support bidirectional power negotiation
- Other requirements and restrictions about power

Table 5: Additional Information

Document topics	URL
PoE Solutions	http://www.cisco.com/c/en/us/solutions/enterprise-networks/power-over-ethernet-solutions/index.html
UPoE	http://www.cisco.com/c/en/us/solutions/enterprise-networks/upoe/index.html
Cisco Catalyst Switches	http://www.cisco.com/c/en/us/products/switches/index.html
Integrated Service Routers	http://www.cisco.com/c/en/us/products/routers/index.html
Cisco IOS Software	http://www.cisco.com/c/en/us/products/ios-nx-os-software/index.html

Power Outage

Your access to emergency service through the phone requires that the phone receive power. If a power interruption occurs, service or emergency calling service dialing does not function until power is restored. If a power failure or disruption occurs, you may need to reset or reconfigure the equipment before you can use service or emergency calling service dialing.

Power Reduction

You can reduce the amount of energy that the Cisco IP Phone consumes by using Power Save mode.

Power Save

In Power Save mode, the backlight on the screen is not lit when the phone is not in use. The phone remains in Power Save mode until the user lifts the handset or presses any button. Set up each phone to enable or disable Power Save settings.

Power Negotiation Over LLDP

The phone and the switch negotiate the power that the phone consumes. Cisco IP Phone operates at multiple power settings, which lowers power consumption when less power is available.

After a phone reboots, the switch locks to one protocol (CDP or LLDP) for power negotiation. The switch locks to the first protocol (containing a power Threshold Limit Value [TLV]) that the phone transmits. If the system administrator disables that protocol on the phone, the phone cannot power up any accessories because the switch does not respond to power requests in the other protocol.

Cisco recommends that Power Negotiation always be enabled (default) when connecting to a switch that supports power negotiation.

If Power Negotiation is disabled, the switch may disconnect power to the phone. If the switch does not support power negotiation, disable the Power Negotiation feature before you power up accessories over PoE. When the Power Negotiation feature is disabled, the phone can power the accessories up to the maximum that the IEEE 802.3af-2003 standard allows.

Note When CDP and Power Negotiation are disabled, the phone can power the accessories up to 15.4W.

Network Protocols

Cisco IP Phone 8800 Series support several industry-standard and Cisco network protocols required for voice communication. The following table provides an overview of the network protocols that the phones support.

Table 6: Supported Network Protocols on the Cisco IP Phone 8800 Series

Network protocol	Purpose	Usage notes
Bluetooth	Bluetooth is a wireless personal area network (WPAN) protocol that specifies how devices communicate over short distances.	Cisco IP Phones 8845, 8865, and 8851 support Bluetooth 4.1. Cisco IP Phone 8861 support Bluetooth 4.0. Cisco IP Phone 8811 and 8841 do not support Bluetooth.
Bootstrap Protocol (BootP)	BootP enables a network device, such as the Cisco IP Phone, to discover certain startup information, such as the IP address.	—
Cisco Discovery Protocol (CDP)	CDP is a device-discovery protocol that runs on all Cisco-manufactured equipment. Using CDP, a device can advertise its existence to other devices and receive information about other devices in the network.	The Cisco IP Phones use CDP to communicate information such as auxiliary VLAN ID, per port power management details, and Quality of Service (QoS) configuration information with the Cisco Catalyst switch.
Dynamic Host Configuration Protocol (DHCP)	DHCP dynamically allocates and assigns an IP address to network devices. DHCP enables you to connect an IP phone into the network and the phone to become operational without the need to manually assign an IP address or to configure additional network parameters.	DHCP is enabled by default. If disabled, you must manually configure the IP address, subnet mask, and gateway on each phone locally. **Note** The **DHCP Option To Use** parameter has 66,160,159,150,60,43,125 as its default value. This value indicates the order in which the phone uses the IP address provided by the DHCP server.

Network protocol	Purpose	Usage notes
Hypertext Transfer Protocol (HTTP)	HTTP is the standard way of transferring information and moving documents across the Internet and the web.	Cisco IP Phones use the HTTP protocol for XML services, provisioning the phone, upgrading the phone, and for troubleshooting purposes.
Hypertext Transfer Protocol Secure (HTTPS)	Hypertext Transfer Protocol Secure (HTTPS) is a combination of the Hypertext Transfer Protocol with the SSL/TLS protocol to provide encryption and secure identification of servers.	Some Web applications support both HTTP and HTTPS protocols. Cisco IP Phones that support HTTPS use the HTTPS URL.
IEEE 802.1X	The IEEE 802.1X standard defines a client-server-based access control and authentication protocol that restricts unauthorized clients from connecting to a LAN through publicly accessible ports. Until the client is authenticated, 802.1X access control allows only Extensible Authentication Protocol over LAN (EAPOL) traffic through the port to which the client is connected. After authentication is successful, normal traffic can pass through the port.	The Cisco IP Phone implements the IEEE 802.1X standard by providing support for the following authentication methods: EAP-FAST, and EAP-TLS. When 802.1X authentication is enabled on the phone, you should disable the PC port and voice VLAN.
IEEE 802.11n/802.11ac	The IEEE 802.11 standard specifies how devices communication over a wireless local area network (WLAN). 802.11n operates at the 2.4 GHz and 5 GHz band and 802.11ac operates at the 5 GHz band.	The 802.11 interface is a deployment option for cases when Ethernet cabling is unavailable or undesirable. Only Cisco IP Phone 8861 and 8865 support WLAN.
Internet Protocol (IP)	IP is a messaging protocol that addresses and sends packets across the network.	To communicate using IP, network devices must have an assigned IP address, subnet, and gateway. IP addresses, subnets, and gateway identifications are automatically assigned if you are using the Cisco IP Phone with Dynamic Host Configuration Protocol (DHCP). If you are not using DHCP, you must manually assign these properties to each phone locally.
Link Layer Discovery Protocol (LLDP)	LLDP is a standardized network discovery protocol (similar to CDP) that is supported on some Cisco and third-party devices.	The Cisco IP Phone supports LLDP on the PC port.

Network protocol	Purpose	Usage notes
Link Layer Discovery Protocol-Media Endpoint Devices (LLDP-MED)	LLDP-MED is an extension of the LLDP standard for voice products.	The Cisco IP Phone supports LLDP-MED on the SW port to communicate information such as: • Voice VLAN configuration • Device discovery • Power management • Inventory management For more information about LLDP-MED support, see the LLDP-MED and Cisco Discovery Protocol white paper: http://www.cisco.com/en/US/tech/tk652/tk701/technologies_white_paper0900aecd804cdd1.shtml
Real-Time Transport Protocol (RTP)	RTP is a standard protocol for transporting real-time data, such as interactive voice, over data networks.	Cisco IP Phones use the RTP protocol to send and receive real-time voice traffic from other phones and gateways.
Real-Time Control Protocol (RTCP)	RTCP works in conjunction with RTP to provide QoS data (such as jitter, latency, and round-trip delay) on RTP streams.	RTCP is disabled by default.
Session Description Protocol (SDP)	SDP is the portion of the SIP protocol that determines which parameters are available during a connection between two endpoints. Conferences are established by using only the SDP capabilities that all endpoints in the conference support.	SDP capabilities, such as codec types, DTMF detection, and comfort noise, are normally configured on a global basis by Third-Party Call Control System or Media Gateway in operation. Some SIP endpoints may allow configuration of these parameters on the endpoint itself.
Session Initiation Protocol (SIP)	SIP is the Internet Engineering Task Force (IETF) standard for multimedia conferencing over IP. SIP is an ASCII-based application-layer control protocol (defined in RFC 3261) that can be used to establish, maintain, and terminate calls between two or more endpoints.	Like other VoIP protocols, SIP addresses the functions of signaling and session management within a packet telephony network. Signaling allows transportation of call information across network boundaries. Session management provides the ability to control the attributes of an end-to-end call. Cisco IP Phones support the SIP protocol when the phones are operating in IPv6-only, IPv4-only, or in both IPv4 and IPv6.
Transmission Control Protocol (TCP)	TCP is a connection-oriented transport protocol.	Cisco IP Phones use TCP to connect to Third-Party Call Control system and to access XML services.
Transport Layer Security (TLS)	TLS is a standard protocol for securing and authenticating communications.	Upon security implementation, Cisco IP Phones use the TLS protocol when securely registering with Third-Party Call Control system.

Network protocol	Purpose	Usage notes
Trivial File Transfer Protocol (TFTP)	TFTP allows you to transfer files over the network. On the Cisco IP Phone, TFTP enables you to obtain a configuration file specific to the phone type.	TFTP requires a TFTP server in your network that the DHCP server can automatically identify.
User Datagram Protocol (UDP)	UDP is a connectionless messaging protocol for delivery of data packets.	UDP is used only for RTP streams. SIP signaling on the phones do not support UDP.

VLAN Interaction

The Cisco IP Phone contains an internal Ethernet switch, enabling forwarding of packets to the phone, and to the computer (access) port and the network port on the back of the phone.

If a computer is connected to the computer (access) port, the computer and the phone share the same physical link to the switch and share the same port on the switch. This shared physical link has the following implications for the VLAN configuration on the network:

- The current VLANs might be configured on an IP subnet basis. However, additional IP addresses might not be available to assign the phone to the same subnet as other devices that connect to the same port.
- Data traffic present on the VLAN supporting phones might reduce the quality of VoIP traffic.
- Network security may indicate a need to isolate the VLAN voice traffic from the VLAN data traffic.

You can resolve these issues by isolating the voice traffic onto a separate VLAN. The switch port to which the phone connects would be configured for separate VLANs for carrying:

- Voice traffic to and from the IP phone (auxiliary VLAN on the Cisco Catalyst 6000 series, for example)
- Data traffic to and from the PC that connects to the switch through the computer (access) port of the IP phone (native VLAN)

Isolating the phones on a separate, auxiliary VLAN increases the quality of the voice traffic and allows a large number of phones to be added to an existing network that does not have enough IP addresses for each phone.

For more information, see the documentation that is included with a Cisco switch. You can also access switch information at this URL:

http://cisco.com/en/US/products/hw/switches/index.html

External Devices

We recommend that you use good-quality external devices that are shielded against unwanted radio frequency (RF) and audio frequency (AF) signals. External devices include headsets, cables, and connectors.

Depending on the quality of these devices and their proximity to other devices, such as mobile phones or two-way radios, some audio noise may still occur. In these cases, we recommend that you take one or more of these actions:

- Move the external device away from the source of the RF or AF signals.
- Route the external device cables away from the source of the RF or AF signals.
- Use shielded cables for the external device, or use cables with a better shield and connector.
- Shorten the length of the external device cable.
- Apply ferrites or other such devices on the cables for the external device.

Cisco cannot guarantee the performance of external devices, cables, and connectors.

Caution In European Union countries, use only external speakers, microphones, and headsets that are fully compliant with the EMC Directive [89/336/EC].

USB Port Information

The Cisco IP Phones 8851, 8861, and 8865 support a maximum of five devices that connect to each USB port. Each device that connects to the phone is included in the maximum device count. For example, your phone can support five USB devices on the side port and five more standard USB devices on the back port. Many third-party USB products count as multiple USB devices; for example, a device containing a USB hub and headset can count as two USB devices. For more information, see the USB device documentation.

Note

- Unpowered hubs are not supported, and powered hubs with more than four ports are not supported.
- USB headsets that connect to the phone through a USB hub are not supported.

Each key expansion module connects to the phone counts as a USB device. If three key expansion modules are connected to the phone, these count as three USB devices.