

Network Parameters

- Prerequisites for Defining Network Parameters, on page 1
- Restrictions for Defining Network Parameters, on page 1
- Information About Defining Network Parameters, on page 2
- Define Network Parameters, on page 4
- Configuration Examples for Network Parameters, on page 25
- Where to Go Next, on page 26
- Feature Information for Network Parameters, on page 26

Prerequisites for Defining Network Parameters

- IP routing must be enabled.
- VoIP networking must be operational. For quality and security purposes, we recommend you have separate virtual LANs (VLANs) for data and voice. The IP network assigned to each VLAN should be large enough to support addresses for all nodes on that VLAN. Cisco Unified CME phones receive their IP addresses from the voice network, whereas all other nodes such as PCs, servers, and printers receive their IP addresses from the data network. For configuration information, see Configure VLANs on a Cisco Switch.
- If applicable, PSTN lines are configured and operational.
- If applicable, the WAN links are configured and operational.
- Trivial File Transfer Protocol (TFTP) must be enabled on the router to allow IP phones to download phone firmware files.
- To support IP phones that are running SIP to be directly connected to the Cisco Unified CME router, Cisco Unified CME 3.4 or later must be installed on the router.
- To provide voice-mail support for phones connected to the Cisco Unified CME router, install and configure voice mail on your network.

Restrictions for Defining Network Parameters

In Cisco Unified CME 4.0 and later versions, Layer-3-to-Layer-2 VLAN Class of Service (CoS) priority marking is not automatically processed. Cisco Unified CME 4.0 and later versions will continue to mark Layer

3, but Layer 2 marking is now only handled in the Cisco IOS software. Any Quality of Service (QoS) design that requires Layer 2 marking will have to be explicitly configured, either on a Catalyst switch that supports this capability or on the Cisco Unified CME router under the Ethernet interface configuration. For configuration information, see Enterprise QoS Solution Reference Network Design Guide.

Information About Defining Network Parameters

DHCP Service

When a Cisco Unified IP phone is connected to the Cisco Unified CME system, it automatically queries for a Dynamic Host Configuration Protocol (DHCP) server. The DHCP server responds by assigning an IP address to the Cisco Unified IP phone and providing the IP address of the TFTP server through DHCP option 150. Then the phone registers with the Cisco Unified CME server and attempts to get configuration and phone firmware files from the TFTP server.

For configuration information, perform only *one* of the following procedures to set up DHCP service for your IP phones:

- If your Cisco Unified CME router is the DHCP server and you can use a single shared address pool for all your DHCP clients, see Configure Single DHCP IP Address Pool, on page 7.
- If your Cisco Unified CME router is the DHCP server and you need separate pools for non-IP-phone DHCP clients, see Configure Separate DHCP IP Address Pool for Each DHCP Client, on page 9.
- If the Cisco Unified CME router is not the DHCP server and you want to relay DHCP requests from IP phones to a DHCP server on a different router, see Configure DHCP Relay, on page 11.

Network Time Protocol for the Cisco Unified CME Router

Network Time Protocol (NTP) allows you to synchronize your Cisco Unified CME router to a single clock on the network, which is known as the clock primary. NTP is disabled on all interfaces by default, but it is essential for Cisco Unified CME so you must ensure that it is enabled. For information about configuring NTP for the Cisco Unified CME router, see Enable Network Time Protocol, on page 12.

Olson Timezones

Before Cisco Unified CME 9.0, some Cisco Unified SCCP IP phones and Cisco Unified SIP IP phones displayed exactly the same time as that of the Cisco Unified CME. For these phones, the correct time was displayed whenever the Cisco Unified CME time was set correctly. The **clock timezone**, **clock summer-time**, and **clock set** commands were the only commands used to set the Cisco Unified CME time correctly.

Other phones used only the **time-zone** command in telephony-service configuration mode and the **timezone** command in voice register global configuration mode to specify which time zone they were in so that the correct local time was displayed on Cisco Unified SCCP IP phones and Cisco Unified SIP IP phones, respectively. The phones calculated and displayed the time based on the Greenwich Mean Time (GMT) provided by the Cisco Unified CME or the Network Time Protocol server. The problem with this method is that every time a new country or new time zone was available or an old time zone was changed, the Cisco Unified CME **time-zone** and **timezone** commands and the phone loads had to be updated.

In Cisco Unified CME 9.0 and later versions, the Olson Timezone feature eliminates the need to update time zone commands or phone loads to accommodate a new country with a new time zone or an existing country whose city or state wants to change their time zone. Oracle's Olson Timezone updater tool, tzupdater.jar, only needs to be current for you to set the correct time using the **olsontimezone** command in either telephony-service or voice register global configuration mode.

For Cisco Unified 3911 and 3951 SIP IP phones and Cisco Unified 6921, 6941, 6945, and 6961 SCCP and SIP IP phones, the correct Olson Timezone updater file is TzDataCSV.csv. The TzDataCSV.csv file is created based on the tzupdater.jar file.

To set the correct time zone, you must determine the Olson Timezone area/location where the Cisco Unified CME is located and download the latest tzupdater.jar or TzDataCSV.csv to a TFTP server that is accessible to the Cisco Unified CME, such as flash or slot 0.

After a complete reboot, the phone checks if the version of its configuration file is earlier or later than 2010o. If it is earlier, the phone loads the latest tzupdater.jar and uses that updater file to calculate the Olson Timezone.

To make the Olson Timezone feature backward compatible, both the **time-zone** and **timezone** commands are retained as legacy time zones. Because the **olsontimezone** command covers approximately 500 time zones (Version 2010o of the tzupdater.jar file supports approximately 453 Olson Timezone IDs.), this command takes precedence when either the **time-zone** or the **timezone** command (that covers a total of 90 to 100 time zones only) is present at the same time as the **olsontimezone** command.

For more information on setting the time zone so that the correct local time is displayed on an IP phone, see Set Olson Timezone for SCCP Phones, on page 14 or Set Olson Timezone for SIP Phones, on page 17.

DTMF Relay

IP phones connected to Cisco Unified CME systems require the use of out-of-band DTMF relay to transport DTMF (keypad) digits across VoIP connections. The reason for this is that the codecs used for in-band transport may distort DTMF tones and make them unrecognizable. DTMF relay solves the problem of DTMF tone distortion by transporting DTMF tones out-of-band, or separate, from the encoded voice stream.

For IP phones on H.323 networks, DTMF is relayed using the H.245 alphanumeric method, which is defined by the ITU H.245 standard. This method separates DTMF digits from the voice stream and sends them as ASCII characters in H.245 user input indication messages through the H.245 signaling channel instead of the RTP channel. For information about configuring a DTMF relay in a multisite installation, see Configure DTMF Relay for H.323 Networks in Multisite Installations, on page 20.

To use remote voice-mail or IVR applications on SIP networks from Cisco Unified CME phones, the DTMF digits used by the Cisco Unified CME phones must be converted to the RFC 2833 in-band DTMF relay mechanism used by SIP phones. The SIP DTMF relay method is needed in the following situations:

- When SIP is used to connect a Cisco Unified CME system to a remote SIP-based IVR or voice-mail application.
- When SIP is used to connect a Cisco Unified CME system to a remote SIP-PSTN voice gateway that goes through the PSTN to a voice-mail or IVR application.

The requirement for out-of-band DTMF relay conversion is limited to SCCP phones. SIP phones natively support in-band DTMF relay as specified in RFC 2833.

To use voice mail on a SIP network that connects to a Cisco Unity Express system, which uses a nonstandard SIP Notify format, the DTMF digits used by the Cisco Unified CME phones must be converted to the Notify format. Additional configuration may be required for backward compatibility with Cisco CME 3.0 and 3.1.

For configuration information about enabling DTMF relay for SIP networks, see Configure SIP Trunk Support, on page 21.

SIP Register Support

SIP register support enables a SIP gateway to register E.164 numbers with a SIP proxy or SIP registrar, similar to the way that H.323 gateways can register E.164 numbers with a gatekeeper. SIP gateways allow registration of E.164 numbers to a SIP proxy or registrar on behalf of analog telephone voice ports (FXS) and IP phone virtual voice ports (EFXS) for local SCCP phones.

When registering E.164 numbers in dial peers with an external registrar, you can also register them with a secondary SIP proxy or registrar to provide redundancy. The secondary registration can be used if the primary registrar fails.

Note No commands allow registration between the H.323 and SIP protocols.

By default, SIP gateways do not generate SIP Register messages, so the gateway must be configured to register the gateway's E.164 telephone numbers with an external SIP registrar. For information about configuring the SIP gateway to register phone numbers with Cisco Unified CME, see Configure SIP Trunk Support, on page 21.

Note When you configure SIP on a router, the ports on all its interfaces are open by default. This makes the router vulnerable to malicious attackers who can execute toll fraud across the gateway if the router has a public IP address and a public switched telephone network (PSTN) connection. To eliminate the threat, you should bind an interface to private IP address that is not accessible by untrusted hosts. In addition, you should protect any public or untrusted interface by configuring a firewall or an access control list (ACL) to prevent unwanted traffic from traversing the router.

Define Network Parameters

Enable Calls in Your VoIP Network

Restriction

- SIP endpoints are not supported on H.323 trunks. SIP endpoints are supported on SIP trunks only.
- Cisco Unified CME 3.4 and later versions support Media Flow-through mode only; enabling SIP-to-SIP calls is required before you can successfully make SIP-to-SIP calls.
- Media Flow-around configured with the **media flow-around** command is not supported by Cisco Unified CME with SIP phones.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice service voip**
4. **allow-connections** *from-type* **to** *to-type*
5. **sip**
6. **registrar server** [**expires** [**max** *sec*] [**min** *sec*]]
7. **exit**
8. **sip-ua**
9. **notify telephone-event max-duration** *time*
10. **registrar** {**dns:***host-name* | **ipv4:***ip-address*} **expires** *seconds* [**tcp**] [**secondary**]
11. **retry register** *number*
12. **timers register** *time*
13. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice service voip** **Example:** `Router(config)# voice service voip`	Enters voice service configuration mode and specifies Voice over IP (VoIP) encapsulation.

Step 4	**allow-connections** *from-type* **to** *to-type*
	Example:
	`Router(config-voi-srv)# allow-connections h323 to h323`
	`Router(config-voi-srv)# allow-connections h323 to SIP`
	`Router(config-voi-srv)# allow-connections SIP to SIP`
		Enables calls between specific types of endpoints in a VoIP network.
		• A separate allow-connections command is required for each type of endpoint to be supported.

Step 5	**sip** **Example:** `Router(config-voi-srv)# sip`	(Optional) Enters SIP configuration mode. • Required if you are connecting IP phones running SIP directly in Cisco CME 3.4 and later.

	Command or Action	Purpose
Step 6	**registrar server** [**expires** [**max** *sec*] [**min** *sec*]] **Example:** `Router(config-voi-sip)# registrar server expires max 600 min 60`	(Optional) Enables SIP registrar functionality in Cisco Unified CME. • Required if you are connecting IP phones running SIP directly in Cisco CME 3.4 and later. **Note** Cisco Unified CME does not maintain a persistent database of registration entries across reloads. Because SIP phones do not use a keepalive functionality, the SIP phones must register again. To decrease the amount of time after which the SIP phones register again, we recommend that you change the expiry. • **max** *sec*—(Optional) Range: 600 to 86400. Default: 3600. Recommended value: 600. **Note** Ensure that the registration expiration timeout is set to a value smaller than the TCP connection aging timeout to avoid disconnection from the TCP. • **min** *sec*—(Optional) Range: 60 to 3600. Default: 60.
Step 7	**exit** **Example:** `Router(config-voi-sip)# exit`	Exits dial-peer configuration mode.
Step 8	**sip-ua** **Example:** `Router(config)# sip-ua`	Enters SIP user-agent configuration mode.
Step 9	**notify telephone-event max-duration** *time* **Example:** `Router(config-sip-ua)# notify telephone-event max-duration 2000`	Configures the maximum time interval allowed between two consecutive NOTIFY messages for a single DTMF event. • **max-duration** *time*—Range: 500 to 3000. Default: 2000.
Step 10	**registrar** {**dns:***host-name* | **ipv4:***ip-address*} **expires** *seconds* [**tcp**] [**secondary**] **Example:** `Router(config-sip-ua)# registrar ipv4:10.8.17.40 expires 3600 secondary`	Registers E.164 numbers on behalf of analog telephone voice ports (FXS) and IP phone virtual voice ports (EFXS) with an external SIP proxy or SIP registrar server.
Step 11	**retry register** *number* **Example:** `Router(config-sip-ua)# retry register 10`	Sets the total number of SIP Register messages that the gateway should send. • *number*—Number of Register message retries. Range: 1 to 10. Default: 10.

	Command or Action	Purpose
Step 12	**timers register** *time* **Example:** `Router(config-sip-ua)# timers register 500`	Sets how long the SIP user agent (UA) waits before sending Register requests. • *time*—Waiting time, in milliseconds. Range: 100 to 1000. Default: 500.
Step 13	**end** **Example:** `Router(config-sip-ua)# end`	Exits configuration mode and enters privileged EXEC mode.

Configure DHCP

To set up DHCP service for your DHCP clients, perform only one of the following procedures:

- If your Cisco Unified CME router is the DHCP server and you can use a single shared address pool for all your DHCP clients, see Configure Single DHCP IP Address Pool, on page 7.
- If your Cisco Unified CME router is the DHCP server and you need separate pools for each IP phone and each non-IP-phone DHCP client, see Configure Separate DHCP IP Address Pool for Each DHCP Client, on page 9.
- If the Cisco Unified CME router is not the DHCP server and you want to relay DHCP requests from IP phones to a DHCP server on a different router, see Configure DHCP Relay, on page 11.

Configure Single DHCP IP Address Pool

To create a shared pool of IP addresses for all DHCP clients, perform the following step.

Note Do *not* perform this task if you already have a DHCP server on the LAN that can be used to provide addresses to the Cisco Unified CME phones. See Enable Network Time Protocol, on page 12.

Restriction A single DHCP IP address pool cannot be used if non-IP-phone clients, such as PCs, must use a different TFTP server address.

Before you begin

Your Cisco Unified CME router is a DHCP server.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *pool-name*
4. **network** *ip-address* [*mask* | / *prefix-length*]

5. **option 150 ip** *ip-address*
6. **default-router** *ip-address*
7. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *pool-name* **Example:** `Router(config)# ip dhcp pool mypool`	Creates a name for the DHCP server address pool and enters DHCP pool configuration mode.
Step 4	**network** *ip-address* [*mask* | / *prefix-length*] **Example:** `Router(config-dhcp)# network 10.0.0.0 255.255.0.0`	Specifies the IP address of the DHCP address pool to be configured.
Step 5	**option 150 ip** *ip-address* **Example:** `Router(config-dhcp)# option 150 ip 10.0.0.1`	Specifies the TFTP server address from which the Cisco Unified IP phone downloads the image configuration file. • This is your Cisco Unified CME router's address.
Step 6	**default-router** *ip-address* **Example:** `Router(config-dhcp)# default-router 10.0.0.1`	(Optional) Specifies the router that the IP phones will use to send or receive IP traffic that is external to their local subnet. • If the Cisco Unified CME router is the only router on the network, this address should be the Cisco Unified CME IP source address. This command can be omitted if IP phones need to send or receive IP traffic only to or from devices on their local subnet. • The IP address that you specify for default router will be used by the IP phones for fallback purposes. If the Cisco Unified CME IP source address becomes unreachable, IP phones will attempt to register to the address specified in this command.

	Command or Action	Purpose
Step 7	**end** **Example:** `Router(config-dhcp)# end`	Returns to privileged EXEC mode.

What to do next

- If you are configuring Cisco Unified CME for the first time on this router, you are ready to configure NTP for the Cisco Unified CME router. For more information, see Enable Network Time Protocol, on page 12.
- If you are finished modifying network parameters for an already configured Cisco Unified CME router, see Configuration Files for Phones.

Configure Separate DHCP IP Address Pool for Each DHCP Client

To create a DHCP IP address pool for each DHCP client, including non-IP-phone clients such as PCs, perform the following steps.

Note Do *not* perform this task if you already have a DHCP server on the LAN that can be used to provide addresses to the Cisco Unified CME phones. See Enable Network Time Protocol, on page 12.

Restriction To use a separate DHCP IP address pool for each DHCP client, make an entry for each IP phone.

Before you begin

Your Cisco Unified CME router is a DHCP server.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *pool-name*
4. **host** *ip-address subnet-mask*
5. **client-identifier** *mac-address*
6. **option 150 ip** *ip-address*
7. **default-router** *ip-address*
8. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *pool-name* **Example:** `Router(config)# ip dhcp pool pool2`	Creates a name for the DHCP server address pool and enters DHCP pool configuration mode.
Step 4	**host** *ip-address subnet-mask* **Example:** `Router(config-dhcp)# host 10.0.0.0 255.255.0.0`	Specifies the IP address that you want the phone to get.
Step 5	**client-identifier** *mac-address* **Example:** `Router(config-dhcp)# client-identifier 01238.380.3056`	Specifies the MAC address of the phone, which is printed on a label on each Cisco Unified IP phone. • A separate client-identifier command is required for each DHCP client. • Add “01” prefix number before the MAC address.
Step 6	**option 150 ip** *ip-address* **Example:** `Router(config-dhcp)# option 150 ip 10.0.0.1`	Specifies the TFTP server address from which the Cisco Unified IP phone downloads the image configuration file. • This is your Cisco Unified CME router’s address.
Step 7	**default-router** *ip-address* **Example:** `Router(config-dhcp)# default-router 10.0.0.1`	(Optional) Specifies the router that the IP phones will use to send or receive IP traffic that is external to their local subnet. • If the Cisco Unified CME router is the only router on the network, this address should be the Cisco Unified CME IP source address. This command can be omitted if IP phones need to send or receive IP traffic only to or from devices on their local subnet. • The IP address that you specify for default router will be used by the IP phones for fallback purposes. If the Cisco Unified CME IP source address becomes unreachable, IP phones will attempt to register to the address specified in this command.

	Command or Action	Purpose
Step 8	**end** **Example:** `Router(config-dhcp)# end`	Returns to privileged EXEC mode.

What to do next

- If you are configuring Cisco Unified CME for the first time on this router, you are ready to configure NTP for the Cisco Unified CME router. See Enable Network Time Protocol, on page 12.
- If you are finished modifying network parameters for an already configured Cisco Unified CME router, see Configuration Files for Phones.

Configure DHCP Relay

To set up DHCP relay on the LAN interface where the Cisco Unified IP phones are connected and enable the DHCP relay to relay requests from the phones to the DHCP server, perform the following steps.



Restriction The Cisco Unified CME router cannot be the DHCP server.

Before you begin

There is a DHCP server that is not on this Cisco Unified CME router on the LAN that can provide addresses to the Cisco Unified CME phones.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **service dhcp**
4. **interface** *type number*
5. **ip helper-address** *ip -address*
6. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:**	Enters global configuration mode.

	Command or Action	Purpose
	`Router# configure terminal`	
Step 3	**service dhcp** **Example:** `Router(config)# service dhcp`	Enables the Cisco IOS DHCP server feature on the router.
Step 4	**interface** *type number* **Example:** `Router(config)# interface vlan 10`	Enters interface configuration mode for the specified interface.
Step 5	**ip helper-address** *ip -address* **Example:** `Router(config-if)# ip helper-address 10.0.0.1`	Specifies the helper address for any unrecognized broadcast for TFTP server and DNS server requests. • A separate **ip helper-address** command is required for each server if the servers are on different hosts. • You can also configure multiple TFTP server targets by using the **ip helper-address** commands for multiple servers.
Step 6	**end** **Example:** `Router(config-if)# end`	Returns to privileged EXEC mode.

What to do next

- If you are configuring Cisco Unified CME for the first time on this router, you are ready to configure NTP for the Cisco Unified CME router. See Enable Network Time Protocol, on page 12.
- If you are finished modifying network parameters for an already configured Cisco Unified CME router, see Configuration Files for Phones.

Enable Network Time Protocol

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **clock timezone** *zone hours-offset* [*minutes-offset*]
4. **clock summer-time** *zone* **recurring** [*week day month hh*:*mm week day month hh*:*mm* [*offset*]]
5. **ntp server** *ip-address*
6. **exit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**clock timezone** *zone hours-offset* [*minutes-offset*] **Example:** `Router(config)# clock timezone pst -8`	Sets the local time zone.
Step 4	**clock summer-time** *zone* **recurring** [*week day month hh*:*mm week day month hh*:*mm* [*offset*]] **Example:** `Router(config)# clock summer-time pdt recurring`	(Optional) Specifies daylight savings time. • Default: summer time is disabled. If the **clock summer-time** *zone* **recurring** command is specified without parameters, the summer time rules default to United States rules. Default of the *offset* argument is 60.
Step 5	**ntp server** *ip-address* **Example:** `Router(config)# ntp server 10.1.2.3`	Synchronizes software clock of router with the specified NTP server.
Step 6	**exit** **Example:** `Router(config-telephony)# end`	Returns to privileged EXEC mode.

What to do next

- If you are configuring Cisco Unified CME for the first time on this router and if you have a multisite installation, you are ready to configure a DTMF relay. See Configure DTMF Relay for H.323 Networks in Multisite Installations, on page 20.
- If Cisco Unified CME will interact with a SIP Gateway, you must set up support for the gateway. See Configure SIP Trunk Support, on page 21.
- If you are configuring Cisco Unified CME for the first time on this router and you are ready to configure system parameters. See System-Level Parameters.
- If you are finished modifying network parameters for an already configured Cisco Unified CME router, see Configuration Files for Phones.

Set Olson Timezone for SCCP Phones

To set the Olson Timezone so that the correct local time is displayed on a Cisco Unified SCCP IP phone, perform the following steps.

Before you begin

- TzDataCSV.csv file is added to the configuration files of Cisco Unified 6921, 6941, 6945, and 6961 SCCP IP phones.
- tzupdater.jar file is added to the configuration files of Cisco Unified 7961 SCCP IP phones.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **tftp-server** *device:* **tzupdater.jar**
4. **tftp-server** *device:* **TZDataCSV.csv**
5. **telephony-service**
6. **olsontimezone** *timezone* **version** *number*
7. **create cnf-files**
8. **time-zone** *number*
9. **exit**
10. **clock timezone** *zone hours-offset*
11. **clock summer-time** *zone* **date** *date month year hh:mm date month year hh:mm*
12. **exit**
13. **clock set** *hh:mm:ss day month year*
14. **configure terminal**
15. **telephony-service**
16. **reset**
17. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**tftp-server** *device:* **tzupdater.jar**	Enables access to the tzupdater.jar file on the TFTP server.

	Command or Action	Purpose
	Example: `Router(config)# tftp-server flash:tzupdater.jar`	• *device*—TFTP server that is accessible to the Cisco Unified CME, such as flash or slot 0.
Step 4	**tftp-server** *device:* **TZDataCSV.csv** **Example:** `Router(config)# tftp-server flash:TZDataCSV.csv`	Enables access to the TZDataCSV.csv file on the TFTP server. • *device*—TFTP server that is accessible to the Cisco Unified CME, such as flash or slot 0.
Step 5	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 6	**olsontimezone** *timezone* **version** *number* **Example:** `Router(config-telephony)# olsontimezone America/Argentina/Buenos Aires version 2010o`	Sets the Olson Timezone so that the correct local time is displayed on Cisco Unified SCCP IP phones or Cisco Unified SIP IP phones. • *timezone*—Olson Timezone names, which include the area (name of continent or ocean) and location (name of a specific location within that region, usually cities or small islands). • **version** *number*—Version of the tzupdater.jar or TzDataCSV.csv file. The version indicates whether the file needs to be updated or not. **Note** In Cisco Unified CME 9.0, the latest version is 2010o.
Step 7	**create cnf-files** **Example:** `Router(config-telephony)# create cnf-files`	Builds the eXtensible Markup Language (XML) configuration files that are required for Cisco Unified SCCP IP phones in Cisco Unified CME.
Step 8	**time-zone** *number* **Example:** `Router(config-telephony)# time-zone 21`	Sets the time zone so that the correct local time is displayed on Cisco Unified SCCP IP phones. • *number*—Numeric code for a named time zone.
Step 9	**exit** **Example:** `Router(config-telephony)# exit`	Exits telephony-service configuration mode.
Step 10	**clock timezone** *zone hours-offset* **Example:** `Router(config)# clock timezone CST -6`	Sets the time zone for display purposes. • *zone*—Name of the time zone to be displayed when standard time is in effect. The length of the *zone* argument is limited to 7 characters. • *hours-offset*—Hours difference from UTC.

	Command or Action	Purpose
Step 11	**clock summer-time** *zone* **date** *date month year hh:mm date month year hh:mm* **Example:** `Router(config)# clock summer-time CST date 12 October 2010 2:00 26 April 2011 2:00`	(Optional) Configures the Cisco Unified CME system to automatically switch to summer time (daylight saving time). • *zone*—Name of the time zone (for example, "PDT" for Pacific Daylight Time) to be displayed when summer time is in effect. The length of the zone argument is limited to 7 characters. • **date**—Indicates that summer time should start on the first specific date listed in the command and end on the second specific date in the command. • *date*—Date of the month (1 to 31). • *month*—Month (January, February, and so on). • *year*—Year (1993 to 2035). • *hh:mm*—Time (24-hour format) in hours and minutes.
Step 12	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.
Step 13	**clock set** *hh:mm:ss day month year* **Example:** `Router# clock set 19:29:00 13 May 2011`	Manually sets the system software clock. • *hh:mm:ss*—Current time in hours (24-hour format), minutes, and seconds. • *day*—Current day (by date) in the month. • *month*—Current month (by name). • *year*—Current year (no abbreviation).
Step 14	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 15	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 16	**reset** **Example:** `Router(config-telephony)# reset`	Performs a complete reboot of Cisco Unfiied SCCP IP phones associated with a Cisco Unified CME router.
Step 17	**end** **Example:**	Exits to privileged EXEC mode.

	Command or Action	Purpose
	`Router(config-telephony)# end`	

Set Olson Timezone for SIP Phones

To set the Olson Timezone so that the correct local time is displayed on a Cisco Unified SIP IP phone, perform the following steps.

Before you begin

- TzDataCSV.csv file is added to the configuration files of Cisco Unified 3911, 3951, 6921, 6941, 6945, and 6961 SIP IP phones.
- tzupdater.jar file is added to the configuration files of Cisco Unified 7961 SIP IP phones.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **tftp-server** *device*: **tzupdater.jar**
4. **tftp-server** *device*: **TZDataCSV.csv**
5. **voice register global**
6. **olsontimezone** *timezone* **version** *number*
7. **create profile**
8. **timezone** *number*
9. **exit**
10. **clock timezone** *zone hours-offset*
11. **clock summer-time** *zone* **date** *date month year hh:mm date month year hh:mm*
12. **exit**
13. **clock set** *hh:mm:ss day month year*
14. **configure terminal**
15. **voice register global**
16. **reset**
17. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**tftp-server** *device*: **tzupdater.jar** **Example:** `Router(config)# tftp-server slot0:tzupdater.jar`	Enables access to the tzupdater.jar file on the TFTP server. • *device*—TFTP server that is accessible to the Cisco Unified CME, such as flash or slot 0.
Step 4	**tftp-server** *device*: **TZDataCSV.csv** **Example:** `Router(config)# tftp-server slot0:TZDataCSV.csv`	Enables access to the TZDataCSV.csv file on the TFTP server. • *device*—TFTP server that is accessible to the Cisco Unified CME, such as flash or slot 0.
Step 5	**voice register global** **Example:** `Router(config)# voice register global`	Enters voice register global configuration mode.
Step 6	**olsontimezone** *timezone* **version** *number* **Example:** `Router(config-register-global)# olsontimezone America/Argentina/Buenos Aires version 2010o`	Sets the Olson Timezone so that the correct local time is displayed on Cisco Unified SCCP IP phones or Cisco Unified SIP IP phones. • *timezone*—Olson Timezone names, which include the area (name of continent or ocean) and location (name of a specific location within that region, usually cities or small islands). • **version** *number*—Version of the tzupdater.jar or tzdatacsv.csv file. The version indicates whether the file needs to be updated or not. **Note** In Cisco Unified CME 9.0, the latest version is 2010o.
Step 7	**create profile** **Example:** `Router(config-register-global)# create profile`	Generates the configuration profile files required for Cisco Unified SIP IP phones.
Step 8	**timezone** *number* **Example:** `Router(config-register-global)# timezone 21`	Sets the time zone used for Cisco Unified SIP IP phones. • *number*—Range is 1 to 53. Default is 5, Pacific Standard/Daylight Time.
Step 9	**exit** **Example:** `Router(config-register-global)# exit`	Exits voice register global configuration mode.
Step 10	**clock timezone** *zone hours-offset*	Sets the time zone for display purposes.

	Command or Action	Purpose
	Example: `Router(config)# clock timezone CST -6`	• *zone*—Name of the time zone to be displayed when standard time is in effect. The length of the *zone* argument is limited to 7 characters. • *hours-offset*—Hours difference from UTC.
Step 11	**clock summer-time** *zone* **date** *date month year hh:mm date month year hh:mm* **Example:** `Router(config)# clock summer-time CST date 12 October 2010 2:00 26 April 2011 2:00`	(Optional) Configures the Cisco Unified CME system to automatically switch to summer time (daylight saving time). • *zone*—Name of the time zone (for example, "PDT" for Pacific Daylight Time) to be displayed when summer time is in effect. The length of the zone argument is limited to 7 characters. • **date**—Indicates that summer time should start on the first specific date listed in the command and end on the second specific date in the command. • *date*—Date of the month (1 to 31). • *month*—Month (January, February, and so on). • *year*—Year (1993 to 2035). • *hh:mm*—Time (24-hour format) in hours and minutes.
Step 12	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.
Step 13	**clock set** *hh:mm:ss day month year* **Example:** `Router# clock set 15:25:00 17 November 2011`	Manually sets the system software clock. • *hh:mm:ss*—Current time in hours (24-hour format), minutes, and seconds. • *day*—Current day (by date) in the month. • *month*—Current month (by name). • *year*—Current year (no abbreviation).
Step 14	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 15	**voice register global** **Example:** `Router(config)# voice register global`	Enters voice register global configuration mode.

	Command or Action	Purpose
Step 16	**reset** **Example:** `Router(config-register-global)# reset`	Performs a complete reboot of Cisco Unified SIP phones associated with a Cisco Unified CME router.
Step 17	**end** **Example:** `Router(config-register-global)# end`	Exits to privileged EXEC mode.

Configure DTMF Relay for H.323 Networks in Multisite Installations

To configure DTMF relay for H.323 networks in a multisite installation only, perform the following steps.

Note To configure DTMF relay on SIP networks, see Configure SIP Trunk Support, on page 21.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *tag* **voip**
4. **dtmf-relay h245-alphanumeric**
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 2 voip`	Enters dial-peer configuration mode.

	Command or Action	Purpose
Step 4	**dtmf-relay h245-alphanumeric** **Example:** `Router(config-dial-peer)# dtmf-relay h245-alphanumeric`	Specifies the H.245 alphanumeric method for relaying dual tone multifrequency (DTMF) tones between telephony interfaces and an H.323 network.
Step 5	**end** **Example:** `Router(config-dial-peer)# end`	Returns to privileged EXEC mode.

What to do next

- To set up support for a SIP trunk, see Configure SIP Trunk Support, on page 21.
- If you are configuring Cisco Unified CME for the first time on this router and you are ready to configure system parameters. For more information, see System-Level Parameters.
- If you are finished modifying network parameters for an already configured Cisco Unified CME router, see Configuration Files for Phones.

Configure SIP Trunk Support

To enable DTMF relay on a dial-peer for a SIP gateway and set up the gateway to register phone numbers with Cisco Unified CME, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *tag* **voip**
4. **dtmf-relay rtp-nte**
5. **dtmf-relay sip-notify**
6. **exit**
7. **sip-ua**
8. **notify telephone-event max-duration** *msec*
9. **registrar** {**dns:** *host-name* | **ipv4:** *ip-address*} **expires** *seconds* [**tcp**] [**secondary**]
10. **retry register** *number*
11. **timers register** *msec*
12. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Router> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 2 voip`	Enters dial-peer configuration mode.
Step 4	**dtmf-relay rtp-nte** **Example:** `Router(config-dial-peer)# dtmf-relay rtp-nte`	Forwards DTMF tones by using Real-Time Transport Protocol (RTP) with the Named Telephone Event (NTE) payload type and enables DTMF relay using the RFC 2833 standard method.
Step 5	**dtmf-relay sip-notify** **Example:** `Router(config-dial-peer)# dtmf-relay sip-notify`	Forwards DTMF tones using SIP NOTIFY messages.
Step 6	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode.
Step 7	**sip-ua** **Example:** `Router(config)# sip-ua`	Enters SIP user-agent configuration mode.
Step 8	**notify telephone-event max-duration** *msec* **Example:** `Router(config-sip-ua)# notify telephone-event max-duration 2000`	Sets the maximum milliseconds allowed between two consecutive NOTIFY messages for a single DTMF event. • **max-duration** *time*—Range: 500 to 3000. Default: 2000.
Step 9	**registrar** {**dns:** *host-name* | **ipv4:** *ip-address*} **expires** *seconds* [**tcp**] [**secondary**] **Example:** `Router(config-sip-ua)# registrar ipv4:10.8.17.40 expires 3600 secondary`	Registers E.164 numbers on behalf of analog telephone voice ports (FXS) and IP phone virtual voice ports (EFXS) with an external SIP proxy or SIP registrar server.
Step 10	**retry register** *number* **Example:** `Router(config-sip-ua)# retry register 10`	Sets the total number of SIP Register messages that the gateway should send. • *number*—Number of Register message retries. Range: 1 to 10. Default: 10.

	Command or Action	Purpose
Step 11	**timers register** *msec* **Example:** `Router(config-sip-ua)# timers register 500`	Sets how long the SIP user agent (UA) waits before sending Register requests. • *time*—Waiting time, in milliseconds. Range: 100 to 1000. Default: 500.
Step 12	**end** **Example:** `Router(config-sip-ua)# end`	Returns to privileged EXEC mode.

Verify SIP Trunk Support Configuration

To verify SIP trunk configuration, perform the following steps in any order.

Procedure

Step 1 **show sip-ua status**

Use this command to display the time interval between consecutive NOTIFY messages for a telephone event. In the following example, the time interval is 2000 ms:

Example:

```
Router# show sip-ua status
SIP User Agent Status
SIP User Agent for UDP :ENABLED
SIP User Agent for TCP :ENABLED
SIP User Agent bind status(signaling):DISABLED
SIP User Agent bind status(media):DISABLED
SIP early-media for 180 responses with SDP:ENABLED
SIP max-forwards :6
SIP DNS SRV version:2 (rfc 2782)
NAT Settings for the SIP-UA
Role in SDP:NONE
Check media source packets:DISABLED
Maximum duration for a telephone-event in NOTIFYs:2000 ms
SIP support for ISDN SUSPEND/RESUME:ENABLED
Redirection (3xx) message handling:ENABLED
SDP application configuration:
 Version line (v=) required
 Owner line (o=) required
 Timespec line (t=) required
```

```
Media supported:audio image
Network types supported:IN
Address types supported:IP4
Transport types supported:RTP/AVP udptl
```

Step 2 **show sip-ua timers**

This command displays the waiting time before Register requests are sent; that is, the value that has been set with the **timers register** command.

Step 3 **show sip-ua register status**

This command displays the status of local E.164 registrations.

Step 4 **show sip-ua statistics**

This command displays the Register messages that have been sent.

Change the TFTP Address on a DHCP Server

To change the TFTP IP address after it has already been configured, perform the following steps.



Restriction If the DHCP server is on a different router than Cisco Unified CME, reconfigure the external DHCP server with the new IP address of the TFTP server.

Before you begin

Your Cisco Unified CME router is a DHCP server.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *pool-name*
4. **option 150 ip** *ip-address*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *pool-name* **Example:** `Router(config)# ip dhcp pool pool2`	Enters DHCP pool configuration mode to create or modify a DHCP pool. • *pool-name*—Previously configured unique identifier for the pool to be configured.
Step 4	**option 150 ip** *ip-address* **Example:** `Router(config-dhcp)# option 150 ip 10.0.0.1`	Specifies the TFTP server IP address from which the Cisco Unified IP phone downloads the image configuration file, XmlDefault.cnf.xml.
Step 5	**end** **Example:** `Router(config-dhcp)# end`	Returns to privileged EXEC mode.

Configuration Examples for Network Parameters

NTP Server

The following example defines the pst timezone as 8 hours offset from UTC, using a recurring daylight savings time called pdt, and synchronizes the clock with the NTP server at 10.1.2.3:

```
clock timezone pst -8
clock summer-time pdt recurring
ntp server 10.1.2.3
```

DTMF Relay for H.323 Networks

The following excerpt from the **show running-config** command output shows a dial peer configured to use H.245 alphanumeric DTMF relay:

```
dial-peer voice 4000 voip
 destination-pattern 4000
 session target ipv4:10.0.0.25
 codec g711ulaw
 dtmf-relay h245-alphanumeric
```

Where to Go Next

- If you are configuring Cisco Unified CME for the first time on this router, you are ready to configure system-level parameters. See System-Level Parameters.
- If you modified network parameters for an already configured Cisco Unified CME router, you are ready to generate the configuration file to save the modifications. See Configuration Files for Phones.

Feature Information for Network Parameters

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Table 1: Feature Information for Network Parameters

Feature Name	Cisco Unified CME Version	Modification
Olson Timezone	9.0	Eliminates the need to update time zone commands or phone loads to accommodate a new country with a new time zone or an existing country whose city or state wants to change their time zone, using the **olsontimezone** command in either telephony-service or voice register global configuration mode.