



Network Time Protocol (NTP) Commands

This chapter describes the Cisco IOS XR Network Time Protocol (NTP) commands used to perform basic network time management tasks, including synchronizing time settings and coordinating time distribution over the network.

When an NTP server or client is configured, NTP features are available on all router interfaces. NTP features can be disabled for any specified interface, local or remote, to the route processor (RP).

For detailed information about NTP concepts, configuration tasks, and examples, see the *Implementing NTP on Cisco IOS XR Software* configuration module in *System Management Configuration Guide for Cisco ASR 9000 Series Routers*.

- [access-group \(NTP\)](#), on page 2
- [authenticate \(NTP\)](#), on page 4
- [authentication-key \(NTP\)](#), on page 6
- [broadcast](#), on page 8
- [broadcast client](#), on page 10
- [broadcastdelay](#), on page 11
- [interface \(NTP\)](#), on page 12
- [master](#), on page 14
- [master primary-reference-clock](#), on page 16
- [max-associations](#), on page 18
- [multicast client](#), on page 19
- [multicast destination](#), on page 20
- [ntp](#), on page 21
- [ntp clear](#), on page 23
- [ntp reset drift](#), on page 24
- [peer \(NTP\)](#), on page 26
- [server \(NTP\)](#), on page 29
- [show calendar](#), on page 32
- [show ntp associations](#), on page 33
- [show ntp status](#), on page 37
- [source \(NTP\)](#), on page 39
- [trusted-key](#), on page 41
- [update-calendar](#), on page 42

access-group (NTP)

To control access to Network Time Protocol (NTP) services for an IPv4 or IPv6 access list, use the **access-group** command in one of the NTP configuration modes. To remove the **access-group** command from the configuration file and restore the system to its default condition with respect to this command, use the **no** form of this command.

```
access-group [vrf vrf-name] [{ipv4 | ipv6}] {peer | query-only | serve | serve-only} access-list-name
no access-group [vrf vrf-name] [{ipv4 | ipv6}] {peer | query-only | serve | serve-only}
```

Syntax Description	
vrf <i>vrf-name</i>	(Optional) Applies the access control configuration to a specified nondefault VRF. If not specified, the configuration is applied to the default VRF.
ipv4	(Optional) Specifies an IPv4 access list (default).
ipv6	(Optional) Specifies an IPv6 access list.
peer	Allows time requests and NTP control queries and allows a networking device to synchronize to the remote system.
query-only	Allows only NTP control queries. Cisco IOS XR software uses NTP Version 4, but the RFC for Version 3 (RFC 1305: <i>Network Time Protocol (Version 3)—Specification, Implementation and Analysis</i>) still applies.
serve	Allows time requests and NTP control queries, but does not allow the networking device to synchronize to the remote system.
serve-only	Allows only time requests.
<i>access-list-name</i>	Name of an IPv4 or IPv6 access list.

Command Default No NTP access control is configured.

Command Modes NTP configuration
VRF-specific NTP configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The access group options are scanned in the following order from least restrictive to most restrictive:

1. **peer**—Allows time requests and NTP control queries and allows the router to synchronize itself to a system whose address passes the access list criteria.

2. **serve**—Allows time requests and NTP control queries, but does not allow the router to synchronize itself to a system whose address passes the access list criteria.
3. **serve-only**—Allows only time requests from a system whose address passes the access list criteria.
4. **query-only**—Allows only NTP control queries from a system whose address passes the access list criteria.

Access is granted for the first match that is found. If no access groups are specified, all access is granted to all sources. If any access groups are specified, only the specified access is granted. This facility provides minimal security for the time services of the system. However, it can be circumvented by a determined programmer. If tighter security is desired, use the NTP authentication facility.

If you use the **access-group** command in a VRF-specific NTP configuration mode, the command is applied to the specific VRF. If you are not in a VRF-specific NTP configuration mode, the command is applied to the default VRF unless you use the **vrf** *vrf-name* keyword and argument to specify a VRF.

Task ID**Task ID Operations**

```
ip-services read,
           write
```

The following example shows how to configure the router to allow itself to be synchronized by a peer from an IPv4 access list named `access1` and to restrict access to allow only time requests from an IPv4 access list named `access2`:

```
RP/0/RSP0/CPU0:router(config-ntp)# access-group peer access1
RP/0/RSP0/CPU0:router(config-ntp)# access-group serve-only access2
```

The following example shows how to configure the router to allow itself to be synchronized by peers from the IPv6 access list named `access20` that route through the `vrf10` VRF:

```
RP/0/RSP0/CPU0:router(config-ntp)# access-group vrf vrf10 ipv6 peer access20
```

Related Commands

Command	Description
ipv4 access-list	Defines an IPv4 access list by name.
ipv6 access-list	Defines an IPv6 access list by name.
vrf	Configures a VRF instance for a routing protocol.

authenticate (NTP)

To enable Network Time Protocol (NTP) authentication, use the **authenticate** command in NTP configuration mode. To restore the system to its default condition, use the **no** form of this command.

authenticate
no authenticate

Syntax Description This command has no keywords or arguments.

Command Default No NTP authentication is configured.

Command Modes NTP configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **authenticate** command to prevent the system from synchronizing with unauthenticated and unconfigured network peers.

If the **authenticate** command is specified, and when a symmetric active, broadcast, or multicast NTP packet is received, the system will not synchronize to the peer unless the packet carries one of the authentication keys specified in the **trusted-key** command.

You must enable **authenticate** when enabling **broadcast client** or **multicast client** command in NTP configuration mode unless you have other measures (such as using the **access-group** command in NTP configuration mode) to prevent unauthorized hosts from communicating with the NTP service on the device.

The **authenticate** command does not ensure authentication of peer associations that are created using the **server** and **peer** commands in NTP configuration mode. When creating associations using the **server** and **peer** commands in NTP configuration mode, specify the **key** keyword to ensure the authentication of packets that move to and from the remote peer.

Use the **no authenticate** command to allow synchronizing with unauthenticated and unconfigured network peers.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure the system to synchronize only to a system that provides an authentication key 42 in its NTP packets:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# authenticate
RP/0/RSP0/CPU0:router(config-ntp)# authentication-key 42 md5 clear key1
RP/0/RSP0/CPU0:router(config-ntp)# trusted-key 42
```

Related Topics

[authentication-key \(NTP\)](#), on page 6

[trusted-key](#), on page 41

authentication-key (NTP)

To define an authentication key for a trusted Network Time Protocol (NTP) time source, use the **authentication-key** command in NTP configuration mode. To restore the system to its default condition, use the **no** form of this command.

```
authentication-key key-number md5 [{clear | encrypted}] key-name
no authentication-key key-number
```

Syntax Description

<i>key-number</i>	Authentication key. A number in the range from 1 to 65535.
md5	Provides message authentication support using the Message Digest 5 (MD5) algorithm.
clear	(Optional) Specifies that the key value entered after this keyword is unencrypted.
encrypted	(Optional) Specifies that the key value entered after this keyword is encrypted.
<i>key-name</i>	Key value. The maximum length is 32 characters.

Command Default

No authentication key is defined for NTP.

Command Modes

NTP configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **authentication-key** command to define authentication keys for use with trusted NTP time sources.



Note

When this command is written to NVRAM, the key is encrypted so that it is not displayed when the configuration is displayed.

Task ID

Task ID	Operations
ip-services	read, write

The following example shows how to configure the system to synchronize only to systems providing authentication key 42 in their NTP packets:

```
RP/0/RSP0/CPU0:router (config) # ntp
```

```
RP/0/RSP0/CPU0:router(config-ntp)# authenticate  
RP/0/RSP0/CPU0:router(config-ntp)# authentication-key 42 md5 clear key1  
RP/0/RSP0/CPU0:router(config-ntp)# trusted-key 42
```

Related Topics

[authenticate \(NTP\)](#), on page 4

[peer \(NTP\)](#), on page 26

[server \(NTP\)](#), on page 29

[trusted-key](#), on page 41

broadcast

To create a Network Time Protocol (NTP) broadcast server on a specified NTP interface, use the **broadcast** command in NTP interface configuration mode. To remove the command from the configuration file and restore the system to its default condition, use the **no** form of this command.

broadcast [**destination** *ip-address*] [**key** *key-id*] [**version** *number*]
no broadcast [**destination** *ip-address*] [**key** *key-id*] [**version** *number*]

Syntax Description	
destination <i>ip-address</i>	(Optional) Specifies the host IPv4 address.
key <i>key-id</i>	(Optional) Defines the authentication key, where <i>key-id</i> is the authentication key to use when sending packets to this peer. The key identified by the <i>key-id</i> value is also used for packets received from the peer.
version <i>number</i>	(Optional) Specifies a number from 1 to 4, indicating the NTP version.

Command Default No NTP broadcast servers are configured.

Command Modes NTP interface configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **broadcast** command to create an NTP broadcast server on an NTP interface to send NTP broadcast packets.

Use the **broadcast client** command to set a specific interface to receive NTP broadcast packets.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure interface 0/0/0/1 to send NTP packets to destination host IP address 10.0.0.0:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# interface tengige 0/0/0/1
RP/0/RSP0/CPU0:router(config-ntp-int)# broadcast destination 10.0.0.0
```


Related Topics

[broadcast client](#), on page 10

[broadcastdelay](#), on page 11

broadcast client

To allow a networking device to receive Network Time Protocol (NTP) broadcast packets on an interface, use the **broadcast client** command in NTP interface configuration mode. To remove the configuration and restore the system to its default condition, use the **no** form of this command.

broadcast client
no broadcast client

Syntax Description This command has no keywords or arguments.

Command Default No NTP broadcast clients are configured.

Command Modes NTP interface configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **broadcast client** command to configure and create an NTP broadcast client and to associate the client with an interface to receive and handle NTP broadcast packets. If no NTP client has been created for an interface, the received NTP broadcast packets are dropped. Use this command to allow the system to listen to broadcast packets on an interface-by-interface basis.

To prevent synchronization with unauthorized systems, whenever this command is specified, authentication must be enabled using the **authenticate (NTP)** command or access must be restricted to authorized systems using the **access-group (NTP)** command. See the documentation of the respective commands for more information.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure interface 0/0/0/1 to send NTP packets:

```
RP/0/RSP0/CPU0:router(config)# ntp interface tengige 0/0/0/1
RP/0/RSP0/CPU0:router(config-ntp-int)# broadcast client
```

Related Topics

[broadcast](#), on page 8

[broadcastdelay](#), on page 11

broadcastdelay

To set the estimated round-trip delay between a Network Time Protocol (NTP) client and an NTP broadcast server, use the **broadcastdelay** command in NTP configuration mode. To restore the system to its default condition, use the **no** form of this command.

broadcastdelay *microseconds*
no broadcastdelay *microseconds*

Syntax Description	<i>microseconds</i> Estimated round-trip time for NTP broadcasts, in microseconds. The range is from 1 to 999999. The default is 3000.
---------------------------	--

Command Default	<i>microseconds</i> : 3000
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Command Modes	NTP configuration
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Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **broadcastdelay** command to change the default round-trip delay time on a networking device that is configured as a broadcast client.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to set the estimated round-trip delay between a networking device and the broadcast client to 5000 microseconds:

```
RP/0/RSP0/CPU0:router(config-ntp)# broadcastdelay 5000
```

interface (NTP)

To enter a Network Time Protocol (NTP) interface mode and run NTP interface configuration commands, use the **interface** command in one of the NTP configuration modes. To remove an NTP interface configuration, use the **no** form of this command.

```
interface type interface-path-id [vrf vrf-name] [disable]  
no interface type interface-path-id [disable]
```

Syntax Description

<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
vrf <i>vrf-name</i>	(Optional) Applies the interface configuration to a specific nondefault VRF.
disable	(Optional) Disables NTP on the specified interface.

Command Default

No NTP interfaces are configured.

Command Modes

NTP configuration mode
VRF-specific NTP configuration mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the vrf keyword and the <i>vrf-name</i> argument.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **interface** command to place the router in NTP interface configuration mode, from which NTP broadcast and multicast servers and clients can be configured. By default, after the NTP process is started, NTP features become available for all interfaces. To exit NTP interface configuration mode, use the **exit** command.

If you use the **interface** command in a VRF-specific NTP configuration mode, the command is applied to the specific VRF. If you are not in a VRF-specific NTP configuration mode, the command is applied to the default VRF unless you use the **vrf** *vrf-name* keyword and argument to specify a VRF.

By default, NTP is enabled on every interface. To disable NTP on a specific interface, use the **interface** command with the **disable** keyword. To reenable NTP on an interface, use the **no** form of the **interface** command with the **disable** keyword.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to enter NTP configuration mode, specify an NTP interface to be configured, and enter NTP interface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# interface POS 0/1/0/0
RP/0/RSP0/CPU0:router(config-ntp-int)#
```

The following example shows how to enter a VRF-specific NTP interface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# interface TenGigE 0/1/1/0 vrf vrf_10
RP/0/RSP0/CPU0:router(config-ntp-int)#
```

The following example shows a different way to enter a VRF-specific NTP interface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# ntp vrf vrf_10
RP/0/RSP0/CPU0:router(config-ntp-vrf)# interface TenGigE 0/1/1/0
RP/0/RSP0/CPU0:router(config-ntp-int)#
```

master

To configure the router to use its own Network Time Protocol (NTP) master clock to synchronize with peers when an external NTP source becomes unavailable, use the **master** command in NTP configuration mode. To restore the system to its default condition, use the **no** form of this command.

master [*stratum*]
no master [*stratum*]

Syntax Description

stratum (Optional) NTP stratum number that the system claims. Range is from 1 to 15. The default is 8.

Command Default

By default, the master clock function is disabled. When the function is enabled, the default stratum is 8.

Command Modes

NTP configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

NTP uses the concept of a “stratum” to describe how many NTP “hops” away a machine is from an authoritative time source. A stratum 1 time server has a radio or atomic clock attached directly. A stratum 2 time server receives its time through NTP from a stratum 1 time server, a stratum 3 from a stratum 2, and so on.



Caution

Use the **master** command with extreme caution. It is easy to override other valid time sources using this command, especially if a low-stratum number is configured. Configuring multiple machines in the same network with the **master** command can lead to instability in time-keeping if the machines do not agree on the time.

The networking device is normally synchronized, directly or indirectly, with an external system that has a clock. Cisco IOS XR software does not support directly attached radio or atomic clocks. The **master** command should be used only when there is a temporary disruption in a reliable time service. It should not be employed as an alternative source by itself in the absence of a real-time service.

If the system has the **master** command configured and it cannot reach any clock that has a lower stratum number, the system claims to be synchronized at the configured stratum number. Other systems synchronize with it through NTP.



Note

The system clock must have been manually set from some source before the **master** command has an effect. This precaution protects against the distribution of erroneous time after the system is restarted.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure a networking device as an NTP master clock to which peers may synchronize:

```
RP/0/RSP0/CPU0:router(config)# ntp  
RP/0/RSP0/CPU0:router(config-ntp)# master 9
```

master primary-reference-clock

To configure the router to use PTP and external timing sources, such as PTP grandmaster, Data over Cable Service Interface Specification (DOCSIS) Timing Interface [DTI] or global positioning system (GPS) clock, as the time-of-day source for NTP and operating system time, use the **master primary-reference-clock** command in NTP configuration mode. To remove the PTP configuration, use the **no** form of this command.

master primary-reference-clock
no master primary-reference-clock

Syntax Description This command has no keywords or arguments.

Command Default PTP is not used as the time-of-day source for NTP.

Command Modes NTP configuration

Command History	Release	Modification
	Release 4.3.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

PTP must be enabled on the router before this command can be used. If PTP is not enabled, you receive an error message similar to the following when you try to commit the configuration:

```
RP/0/RSP0/CPU0:router(config)# ntp master primary-reference-clock
RP/0/RSP0/CPU0:router(config)# commit

% Failed to commit one or more configuration items. Please issue
'show configuration failed' from this session to view the errors

RP/0/RSP0/CPU0:router(config)# show configuration failed
[:::]
ntp
  master primary-reference-clock
!!% 'ip-ntp' detected the 'fatal' condition 'PTP is not supported on this platform'
!
end
```

To verify that PTP is used as the reference clock, use the **show ntp association** command.

```
RP/0/RSP0/CPU0:router# show ntp association

  address          ref clock      st  when  poll reach  delay  offset  disp
*~127.127.45.1    .PTP.         0   54   64   377   0.00  6.533  1.905

* sys_peer, # selected, + candidate, - outlayer, x falseticker, ~ configured
```


Task ID	Task ID	Operation
	ip-services	read, write

This example shows how to configure PTP as the reference clock for NTP:

```
RP/0/RSP0/CPU0:router(config)# ntp  
RP/0/RSP0/CPU0:router(config-ntp)# master primary-reference-clock
```

Related Topics

[master](#), on page 14

max-associations

To set the maximum number of Network Time Protocol (NTP) associations, use the **max-associations** command in NTP configuration mode. To restore the default setting, use the **no** form of this command.

max-associations *number*
no max-associations *number*

Syntax Description *number* Maximum number of NTP associations. Range is from 0 to 4294967295. The default is 100.

Command Default The default setting for the maximum number of NTP associations is 100.

Command Modes NTP configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **max-associations** command to specify the maximum number of associations for an NTP server.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to set the maximum number of associations to 200:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# max-associations 200
```

Related Topics

[show ntp associations](#), on page 33

multicast client

To configure an NTP interface as an NTP multicast client, use the **multicast client** command in NTP interface configuration mode. To remove the NTP multicast client configuration from an interface, use the **no** form of this command.

```
multicast client [ip-address]  
no multicast client [ip-address]
```

Syntax Description	<i>ip-address</i> IPv4 or IPv6 IP address of the multicast group to join. The default is the IPv4 address 224.0.1.1.				
Command Default	The interface is not configured as an NTP multicast client.				
Command Modes	NTP interface configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 3.9.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 3.9.0	This command was introduced.
Release	Modification				
Release 3.9.0	This command was introduced.				

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **multicast client** command to configure an NTP interface to receive multicast packets that are sent to an IPv4 or IPv6 multicast group IP address. If you do not specify an IP address, the interface is configured to receive multicast packets sent to the IPv4 multicast group address 224.0.1.1. You can configure multiple multicast groups on the same interface.

To prevent synchronization with unauthorized systems, whenever this command is specified, authentication must be enabled using the **authenticate (NTP)** command or access must be restricted to authorized systems using the **access-group (NTP)** command. See the documentation of the respective commands for more information.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure the router to receive NTP multicast packets to the multicast group address of 224.0.1.1:

```
RP/0/RSP0/CPU0:router(config)# ntp interface TenGigE 0/1/1/0  
RP/0/RSP0/CPU0:router(config-ntp-int)# multicast client
```

Related Topics

[multicast destination](#), on page 20

multicast destination

To configure an NTP interface as an NTP multicast server, use the **multicast destination** command in NTP interface configuration mode. To remove the NTP multicast server configuration from an interface, use the **no** form of this command.

```
multicast destination ip-address [key key-id] [ttl tll] [version number]  
no multicast destination ip-address [key key-id] [ttl tll] [version number]
```

Syntax Description		
	<i>ip-address</i>	The IPv4 or IPv6 multicast group IP address to which to send NTP multicast packets.
	key <i>key-id</i>	(Optional) Specifies an authentication key, where the value of the <i>key-id</i> argument is the authentication key to use when sending multicast packets to the specified multicast group.
	tll <i>tll</i>	(Optional) Specifies the time to live (TTL) of a multicast packet.
	version <i>number</i>	(Optional) Specifies the NTP version number.

Command Default The interface is not configured as an NTP multicast server.

Command Modes NTP interface configuration

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure the router to send NTP multicast packets to the multicast group address of 224.0.1.1:

```
RP/0/RSP0/CPU0:router(config)# ntp interface TenGigE 0/1/1/0  
RP/0/RSP0/CPU0:router(config-ntp-int)# multicast destination 224.0.1.1
```

Related Topics

[multicast client](#), on page 19

ntp

To enter Network Time Protocol (NTP) configuration mode and run NTP configuration commands, use the **ntp** command in

global

configuration mode.

ntp [**vrf** *vrf-name*]

Syntax Description	vrf <i>vrf-name</i> (Optional) Enters a VRF-specific NTP configuration mode.
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Command Default	No defaults behavior or values
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Command Modes	Global configuration
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Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	Support was added for the vrf <i>vrf-name ip-address</i> keyword and arguments.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

NTP configuration commands can also be run from global configuration mode by preceding the command string with the **ntp** keyword. From NTP configuration mode, the following NTP configuration commands are available:

```
RP/0/RSP0/CPU0:router(config-ntp)# ?

  access-group      Control NTP access
  authenticate      Authenticate time sources
  authentication-key Authentication key for trusted time sources
  broadcastdelay    Estimated round-trip delay
  commit            Commit the configuration changes to running
  default           Set a command to its defaults
  describe          Describe a command without taking real actions
  do                Run an exec command
  exit              Exit from this submode
  interface         Configure NTP on an interface
  master            Act as NTP master clock
  max-associations  Set maximum number of associations
  no                Negate a command or set its defaults
  peer             Configure NTP peer
  port              Enable NTP port
  server            Configure NTP server
  show              Show contents of configuration
  source            Configure interface for source address
  trusted-key       Key numbers for trusted time sources
```

```
update-calendar      Periodically update calendar with NTP time
```

Use the **ntp** command with the **vrf** *vrf-name* keyword and argument to enter an NTP configuration mode specific to the specified VRF.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to enter NTP configuration mode:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)#
```

The following example shows how to enter an NTP configuration mode for a VRF called VRF1:

```
RP/0/RSP0/CPU0:router(config)# ntp vrf vrf1
RP/0/RSP0/CPU0:router(config-ntp-vrf)#
```

ntp clear

To clear all Network Time Protocol (NTP) peers or a specific NTP peer, use the **ntp clear** command in EXEC

mode.

```
ntp clear {peer | all | vrf vrf-name ip-address}
```

Syntax Description

<i>peer</i>	IPv4 address or hostname of the NTP peer to be cleared.
all	Clears all NTP peers.
vrf <i>vrf-name</i>	Clears a peer on the specified nondefault VRF.
<i>ip-address</i>	IPv4 or IPv6 IP address of the peer.

Command Default

No defaults behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the vrf <i>vrf-name ip-address</i> keyword and arguments.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ip-services	read, write

The following example shows how to clear all NTP peers:

```
RP/0/RSP0/CPU0:router# ntp clear all
```

ntp reset drift

To reset the NTP drift and loopfilter state, use the **ntp reset drift** command in EXEC mode.

ntp reset drift

Syntax Description This command has no keywords or arguments.

Command Default No defaults behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ntp reset drift** command to set the loopfilter state to NSET (never set) and reset the drift. Resetting the loopfilter state and drift enables the router to relearn the frequency of the NTP server clock. This is necessary if there is a synchronization error caused by a large frequency error. This can arise, for example, if the router switches from synchronizing with one NTP server to synchronizing with another NTP server with a different frequency.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to reset the NTP drift and loopfilter state:

```
RP/0/RSP0/CPU0:router# ntp reset drift
Thu Nov 13 11:21:04.381 JST
```

The following example shows NTP status before and after resetting NTP drift and loopfilter state:

```
RP/0/RSP0/CPU0:router# show ntp status
Thu Nov 13 11:20:53.122 JST

Clock is synchronized, stratum 3, reference is 192.168.128.5
nominal freq is 1000.0000 Hz, actual freq is 1000.2787 Hz, precision is 2**24
reference time is CCC60CBE.9F836478 (11:17:34.623 JST Thu Nov 13 2008)
clock offset is -3.172 msec, root delay is 189.289 msec
```



```
root dispersion is 70.03 msec, peer dispersion is 0.11 msec  
loopfilter state is 'CTRL' (Normal Controlled Loop), drift is -0.0002785891 s/s  
system poll interval is 128, last update was 199 sec ago
```

```
RP/0/RSP0/CPU0:router# ntp reset drift  
Thu Nov 13 11:21:04.381 JST
```

```
RP/0/RSP0/CPU0:router# show ntp status  
Thu Nov 13 11:21:10.595 JST
```

```
Clock is unsynchronized, stratum 16, no reference clock  
nominal freq is 1000.0000 Hz, actual freq is 1000.0000 Hz, precision is 2**24  
reference time is CCC60CBE.9F836478 (11:17:34.623 JST Thu Nov 13 2008)  
clock offset is -3.172 msec, root delay is 0.000 msec  
root dispersion is 0.09 msec, peer dispersion is 0.00 msec  
loopfilter state is 'NSET' (Never set), drift is 0.0000000000 s/s  
system poll interval is 64, last update was 216 sec ago
```

Related Topics

[show ntp status](#), on page 37

peer (NTP)

To configure the system clock to synchronize a peer or to be synchronized by a peer, use the **peer** command in one of the NTP configuration modes. To remove the **peer** command from the configuration file and restore the system to its default condition with respect to the command, use the **no** form of this command.

```
peer [vrf vrf-name] [{ipv4 | ipv6}] ip-address [version number] [key key-id] [minpoll interval]
[maxpoll interval] [source type interface-path-id] [prefer] [burst] [iburst]
no peer [vrf vrf-name] [{ipv4 | ipv6}] ip-address
```

Syntax Description

vrf <i>vrf-name</i>	(Optional) Applies the peer configuration to the specified nondefault VRF.
ipv4	(Optional) Specifies an IPv4 IP address.
ipv6	(Optional) Specifies an IPv6 IP address.
<i>ip-address</i>	IPv4 or IPv6 address of the peer providing or being provided with the clock synchronization.
version <i>number</i>	(Optional) Defines the Network Time Protocol (NTP) version number, where the <i>number</i> argument is a value from 1 to 4. The default is 4.
key <i>key-id</i>	(Optional) Defines the authentication key, where the <i>key-id</i> argument is the authentication key to use when packets are sent to this peer. The authentication key is also used for packets received from the peer. By default, no authentication key is used.
minpoll <i>interval</i>	(Optional) Defines the shortest polling interval, where the <i>interval</i> argument is specified in powers of two seconds. Range is from 4 to 17. The default value is 6.
maxpoll <i>interval</i>	(Optional) Defines the longest polling interval, where the <i>interval</i> argument is specified in powers of two seconds. Range is from 4 to 17. The default value is 10.
source	(Optional) IP source address. The default is the outgoing interface.
<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	(Optional) Physical interface or virtual interface.
	Note Use the show interfaces command to see a list of all interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (?) online help function.
prefer	(Optional) Makes this peer the preferred peer that provides synchronization.
burst	(Optional) Sends a series of packets instead of a single packet within each synchronization interval to achieve faster synchronization.
iburst	(Optional) Sends a series of packets instead of a single packet within the initial synchronization interval to achieve faster initial synchronization.

Command Default No peers are configured by default.

Command Modes NTP configuration
VRF-specific NTP configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	Support was added for the following keywords and arguments: <ul style="list-style-type: none"> • vrf <i>vrf-name</i> • ipv4 • ipv6 • burst • iburst

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **peer** command to allow this machine to synchronize with the peer, or conversely.



Caution Although using the **prefer** keyword can help reduce the switching among peers, you should avoid using the keyword because it interferes with the source selection mechanism of NTP and can result in a degradation in performance.

The value for the **minpoll** keyword must be less than or equal to the value for the **maxpoll** keyword. If this is not the case, the system issues an error message.

To provide peer-level service (as opposed to client/server-level service), it may be necessary to explicitly specify the NTP version for the peer if it is not version 4.

If you use the **peer** command in a VRF-specific NTP configuration mode, the command is applied to the specific VRF. If you are not in a VRF-specific NTP configuration mode, the command is applied to the default VRF unless you use the **vrf** *vrf-name* keyword and argument to specify a VRF.



Note To change the configuration of a specific IP address from peer to server or from server to peer, use the **no** form of the **peer** or **server** command to remove the current configuration before you perform the new configuration. If you do not remove the old configuration before performing the new configuration, the new configuration does not overwrite the old configuration.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure a networking device to allow its system clock to be synchronized with the clock of the peer (or conversely) at IP address 10.0.0.0 using NTP. The source IP address is the address of interface 0/0/0/1.

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# peer 10.0.0.0 minpoll 8 maxpoll 12 source tengige 0/0/0/1
```

Related Topics

[authentication-key \(NTP\)](#), on page 6

[server \(NTP\)](#), on page 29

[source \(NTP\)](#), on page 39

server (NTP)

To allow the system clock to be synchronized by a time server, use the **server** command in one of the NTP configuration modes. To remove the **server** command from the configuration file and restore the system to its default condition with respect to this command, use the **no** form of this command.

```
server [vrf vrf-name][{ipv4 | ipv6}] ip-address [version number] [key key-id] [minpoll interval]
[maxpoll interval] [source type interface-path-id][prefer] [burst] [iburst]
no server [vrf vrf-name] [{ipv4 | ipv6}] ip-address
```

Syntax Description

vrf <i>vrf-name</i>	(Optional) Applies the server configuration to the specified nondefault VRF.
ipv4	(Optional) Specifies an IPv4 IP address.
ipv6	(Optional) Specifies an IPv6 IP address.
<i>ip-address</i>	IPv4 or IPv6 address of the time server providing the clock synchronization.
version <i>number</i>	(Optional) Defines the Network Time Protocol (NTP) version number, where the <i>number</i> argument is a value from 1 to 4. The default is 4.
key <i>key-id</i>	(Optional) Defines the authentication key, where the <i>key-id</i> argument is the authentication key to use when packets are sent to this peer. By default, no authentication key is used.
minpoll <i>interval</i>	(Optional) Defines the shortest polling interval, where the <i>interval</i> argument is specified in powers of two seconds. Range is from 4 to 17. The default value is 6.
maxpoll <i>interval</i>	(Optional) Defines the longest polling interval, where the <i>interval</i> argument is specified in powers of two seconds. Range is from 4 to 17. The default value is 10.
source	(Optional) Specifies the IP source address. The default is the outgoing interface.
<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	(Optional) Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
prefer	(Optional) Makes this peer the preferred server that provides synchronization.
burst	(Optional) Sends a series of packets instead of a single packet within each synchronization interval to achieve faster synchronization.
iburst	(Optional) Sends a series of packets instead of a single packet within the initial synchronization interval to achieve faster initial synchronization.

Command Default

No servers are configured by default.

Command Modes NTP configuration
VRF-specific NTP configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	Support was added for the following keywords and arguments: <ul style="list-style-type: none"> • vrf <i>vrf-name</i> • ipv4 • ipv6 • burst • iburst

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The value for the **minpoll** keyword must be less than or equal to the value for the **maxpoll** keyword. If this is not the case, the system issues an error message.

Using the **prefer** keyword reduces switching back and forth among servers.

If you use the **server** command in a VRF-specific NTP configuration mode, the command is applied to the specific VRF. If you are not in a VRF-specific NTP configuration mode, the command is applied to the default VRF unless you use the **vrf** *vrf-name* keyword and argument to specify a VRF.



Note To change the configuration of a specific IP address from peer to server or from server to peer, use the **no** form of the **peer** or **server** command to remove the current configuration before you perform the new configuration. If you do not remove the old configuration before performing the new configuration, the new configuration does not overwrite the old configuration.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure a router to allow its system clock to be synchronized with the clock of the peer at IP address 209.165.201.1 using NTP:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# server 209.165.201.1 minpoll 8 maxpoll 12
```

Related Topics

[authentication-key \(NTP\)](#), on page 6

[peer \(NTP\)](#), on page 26

[source \(NTP\)](#), on page 39

show calendar

To display the system time and date, use the **show calendar** command in the EXEC .

show calendar

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes EXEC

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	No modification.

Usage Guidelines The time format of the **show calendar** output depends on the time format set using the **clock timezone** command.

Task ID	Task ID	Operations
	basic-services	read

The following example shows sample output from the **show calendar** command:

```
RP/0/RSP0/CPU0:router# show calendar
01:29:28 UTC Thu Apr 01 2004
```

Related Topics

[show clock](#)

show ntp associations

To display the status of Network Time Protocol (NTP) associations, use the **show ntp associations** command in privileged EXEC mode.

```
show ntp associations [detail] [location node-id]
```

Syntax Description	detail	(Optional) Displays detailed information about each NTP association.
	location node-id	(Optional) Displays the status of NTP associations from the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default None

Command Modes EXEC

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	The output was modified to display nondefault VRF instances and to accommodate IPv6 addresses.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Output for the **show ntp associations** command is displayed only if NTP is configured on the router.

Task ID	Task ID	Operations
	ip-services	read

This example shows sample output from the **show ntp associations** command:

```
RP/0/RSP0/CPU0:router# show ntp associations

Wed Jul 30 04:03:13.471 PST DST

      address          ref clock      st  when  poll reach  delay  offset  disp
~172.19.69.1          172.24.114.33   3   25    64    3    2.89  57550122 39377
~2001:db8::feed      .INIT.          16   -     64    0    0.00   0.000   15937
~2001:db8::beef vrf vrf_1
                    .INIT.          16   -     64    0    0.00   0.000   16000
* sys_peer, # selected, + candidate, - outlayer, x falseticker, ~ configured
```

Table 1: show ntp associations Field Descriptions

Field	Description
*	Peer has been declared the system peer and lends its variables to the system variables.
#	Peer is a survivor, but not among the first six peers sorted by synchronization distance. If the association is ephemeral, it may be demobilized to conserve resources.
+	Peer is a survivor and a candidate for the combining algorithm.
-	Peer is discarded by the clustering algorithm as an outlier.
x	Peer is discarded by the intersection algorithm as a falseticker.
~	Indicates peer is statically configured.
address	IPv4 or IPv6 address of the peer. If a nondefault VRF is configured for the peer, the VRF follows the address.
ref clock	Reference clock type or address for the peer.
st	Stratum setting for the peer.
when	Time since last NTP packet was received from peer, in milliseconds.
poll	Polling interval, in seconds.
reach	Peer reachability (bit string, in octal).
delay	Round-trip delay to peer, in milliseconds.
offset	Relative time difference between a peer clock and a local clock, in milliseconds.
disp	Dispersion.

This example shows sample output from the **show ntp associations** command with the **detail** keyword:

```
RP/0/RSP0/CPU0:router# show ntp associations detail

172.19.69.1 configured, our_master, sane, valid, stratum 2
ref ID 171.68.10.150, time C4143AAE.00FCF396 (18:27:58.003 UTC Tue Mar 30 2004)
our mode client, peer mode server, our poll intvl 64, peer poll intvl 64
root delay 5.23 msec, root disp 4.07, reach 3, sync dist 0.0077
delay 1.9829 msec, offset -3.7899 msec, dispersion 0.0358
precision 2**18, version 4
org time C4143B8D.7EBD5FEF (18:31:41.495 UTC Tue Mar 30 2004)
rcv time C4143B8D.801DFA44 (18:31:41.500 UTC Tue Mar 30 2004)
xmt time C4143B8D.7F595E44 (18:31:41.497 UTC Tue Mar 30 2004)
filtdelay =    2.99    1.98    1.98    1.99    1.99    1.99    2.98    1.98
filtoffset =   -3.89   -3.74   -3.78   -3.81   -3.76   -3.73   -4.08   -3.64
filtererror =    0.00    0.02    0.03    0.05    0.06    0.08    0.09    0.32

2001:0DB8::FEED vrf xxx configured, candidate, sane, valid, stratum 2
ref ID 64.103.34.14, time CB0C8C66.38285D84 (14:00:22.219 JST Fri Dec 14 2007)
our mode client, peer mode server, our poll intvl 64, peer poll intvl 64
root delay 181.17 msec, root disp 3.19, reach 377, sync dist 0.1463
```

```

delay 104.9158 msec, offset -15.4552 msec, dispersion 0.0439
precision 2**16, version 4
org time CB0C8D0A.70282853 (14:03:06.438 JST Fri Dec 14 2007)
rcv time CB0C8D0A.81CA0E2B (14:03:06.506 JST Fri Dec 14 2007)
xmt time CB0C8D0A.66AAB677 (14:03:06.401 JST Fri Dec 14 2007)
filtdelay = 105.90 104.92 104.91 104.91 105.90 105.85 105.90 104.91
filtoffset = -15.92 -15.67 -15.54 -15.59 -15.58 -15.54 -15.41 -14.36
filtererror = 0.02 0.03 0.05 0.06 0.08 0.09 0.11 1.05

2001:0DB8::BEEF vrf yyy configured, our_master, sane, valid, stratum 2
ref ID 64.104.193.12, time CB0C8CC1.2C14CED1 (14:01:53.172 JST Fri Dec 14 2007)
our mode client, peer mode server, our poll intvl 64, peer poll intvl 64
root delay 160.83 msec, root disp 4.35, reach 377, sync dist 0.1372
delay 104.9302 msec, offset -14.6327 msec, dispersion 0.0183
precision 2**18, version 4
org time CB0C8CCB.684619D8 (14:02:03.407 JST Fri Dec 14 2007)
rcv time CB0C8CCB.79782B09 (14:02:03.474 JST Fri Dec 14 2007)
xmt time CB0C8CCB.5E9A5429 (14:02:03.369 JST Fri Dec 14 2007)
filtdelay = 104.93 104.93 104.93 104.93 104.93 104.93 104.93 104.93
filtoffset = -14.71 -14.53 -14.78 -14.73 -14.70 -14.52 -14.59 -14.50
filtererror = 0.00 0.02 0.03 0.05 0.06 0.08 0.09 0.11

```

Table 2: show ntp associations detail Field Descriptions

Field	Descriptions
vrf	Nondefault VRF, if specified for this peer.
configured	Statically configured peer.
dynamic	Dynamically discovered peer.
our_master	Synchronization of the local machine to this peer.
sane	Passing of basic sanity checks by this peer.
ref ID	Address of machine to which the peer is synchronized.
time	Last time stamp that the peer received from its master.
our mode	Mode relative to peer (active/passive/client/server/bdcast/bdcast client).
peer mode	Mode of peer relative.
our poll intvl	Poll interval to peer.
peer poll intvl	Poll interval of interval.
root delay	Delay along path to root (ultimate stratum 1 time source).
root disp	Dispersion of path to root.
reach	Peer reachability (bit string in octal).
sync dist	Peer synchronization distance.

Field	Descriptions
delay	Round-trip delay to peer.
offset	Offset of peer clock relative to this clock.
dispersion	Dispersion of peer clock.
precision	Precision of peer clock in (Hertz) Hz.
version	NTP version number that peer is using.
org time	Originate time stamp.
rcv time	Receive time stamp.
xmt time	Transmit time stamp.
filtdelay	Round-trip delay of each sample, in milliseconds.
filtoffset	Clock offset of each sample, in milliseconds.
filtererror	Approximate error of each sample.

Related Topics

[show ntp status](#), on page 37

show ntp status

To display the status of Network Time Protocol (NTP), use the **show ntp status** command in

EXEC

mode.

show ntp status [**location** *node-id*]

Syntax Description	location <i>node-id</i> (Optional) Displays the status of NTP from the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.	
Command Default	No defaults behavior or values	
Command Modes	EXEC	
Command History	Release	Modification
	Release 3.7.2	This command was introduced.
	Release 3.9.0	The output was modified to display nondefault VRF instances and IPv6 addresses. The loopfilter state, drift, system poll interval, and last update display fields were added to the output.
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.	
Task ID	Task ID	Operations
	ip-services	read

This example shows sample output from the **show ntp status** command:

```
RP/0/RSP0/CPU0:router# show ntp status
```

```
Clock is synchronized, stratum 3, reference is 192.168.128.5
nominal freq is 1000.0000 Hz, actual freq is 1000.0021 Hz, precision is 2**24
reference time is CC38EC6A.8FCCA1C4 (10:10:02.561 JST Tue Jul 29 2008)
clock offset is -124.051 msec, root delay is 174.060 msec
root dispersion is 172.37 msec, peer dispersion is 0.10 msec
loopfilter state is 'CTRL' (Normal Controlled Loop), drift is -0.0000021106 s/s
system poll interval is 32, last update was 19 sec ago
```

Table 3: show ntp status Field Descriptions

Field	Description
synchronized	Synchronized system to an NTP peer.
stratum	NTP stratum of this system.
reference	IPv4 address or first 32 bits of the MD5 hash of the IPv6 address of the peer to which clock is synchronized.
vrf	VRF through which the peer routes.
nominal freq	Nominal frequency in Hertz (Hz) of the system hardware clock.
actual freq	Measured frequency in Hz of the system hardware clock.
precision	Precision of the clock of this system in Hz.
reference time	Reference time stamp.
clock offset	Offset of clock to synchronized peer, in milliseconds.
root delay	Total delay along path to root clock, in milliseconds.
root dispersion	Dispersion of root path.
peer dispersion	Dispersion of synchronized peer.
loopfilter state	The state of the clock state machine transition function.
drift	Drift of the hardware clock.
system poll interval	Poll interval of the peer.
last update	Time the router last updated its NTP information.

Related Topics

[show ntp associations](#), on page 33

source (NTP)

To use a particular source address in Network Time Protocol (NTP) packets, use the **source** command in one of the NTP configuration modes. To remove the **source** command from the configuration file and restore the system to its default condition, use the **no source** form of this command.

```
source [vrf vrf-name] type interface-path-id
no source
```

Syntax Description

vrf <i>vrf-name</i>	(Optional) Applies the source address configuration to the specified nondefault VRF.
<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	(Optional) Physical interface or virtual interface.
Note	Use the show interfaces command to see a list of all interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

The source address is determined by the outgoing interface.

Command Modes

NTP configuration
VRF-specific NTP configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the vrf <i>vrf-name</i> keyword and argument.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **source** command to use a particular source IP address for all NTP packets. The address is taken from the named interface. This command is useful if the address on an interface cannot be used as the destination for reply packets. If the **source** keyword has been configured with the **server** (NTP) or **peer** (NTP) command, that value overrides the global value.

Use the **source** command in a VRF-specific NTP configuration mode or use the **vrf** *vrf-name* keyword and argument to configure the source address for a specific nondefault VRF. Otherwise, the configuration is applied to the default VRF.

Task ID

Task ID	Operations
ip-services	read, write

This example shows how to configure the router to use the IP address of interface 0/0/0/1 as the source address of all outgoing NTP packets:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# source interface 0/0/0/1
```

Related Topics

[peer \(NTP\)](#), on page 26

[server \(NTP\)](#), on page 29

trusted-key

To designate a Network Time Protocol (NTP) trusted key, use the **trusted-key** command in NTP configuration mode. To remove the **trusted-key** command from the configuration file and restore the system to its default condition with respect to this command, use the **no** form of this command.

trusted-key *key-number*
no trusted-key *key-number*

Syntax Description	<i>key-number</i> Authentication key number to be trusted. Range is from 1 to 65535.
---------------------------	--

Command Default	No NTP trusted key is designated.
------------------------	-----------------------------------

Command Modes	NTP configuration
----------------------	-------------------

Command History	Release	Modification
	Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.	

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.
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If authentication is enabled, use the **trusted-key** command to define one or more key numbers (corresponding to the keys defined with the **authentication-key** [NTP] command) that a NTP system must provide in its NTP packets for this system to synchronize to it. Because the other system must know the correct authentication key, this precaution provides protection against accidentally synchronizing the system to a system that is not trusted.

Task ID	Task ID	Operations
	ip-services	read, write

The following example shows how to configure the system to synchronize only to systems providing authentication key 42 in its NTP packets:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# authenticate
RP/0/RSP0/CPU0:router(config-ntp)# authentication-key 42 md5 clear key1
RP/0/RSP0/CPU0:router(config-ntp)# trusted-key 42
```

Related Topics

[authenticate \(NTP\)](#), on page 4

[authentication-key \(NTP\)](#), on page 6

update-calendar

To update the calendar periodically from Network Time Protocol (NTP), use the **update-calendar** command in NTP configuration mode. To remove the **update-calendar** command from the configuration file and restore the system to its default condition with respect to the command, use the **no** form of this command.

update-calendar
no update-calendar

Syntax Description	This command has no keywords or arguments.
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Command Default	This command is disabled.
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Command Modes	NTP configuration
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Command History	Release	Modification
	Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.	

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.
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Your router has a calendar that is separate from the software clock. This calendar runs continuously, even if the router is powered off or rebooted.

If a router is synchronized to an outside time source through NTP, it is a good idea to update the router's calendar with the time learned from NTP. Otherwise, the calendar may gradually lose or gain time.

After you configure the **update-calendar** command, NTP updates the calendar with the software clock every hour.

Task ID	Task ID	Operations
	ip-services	read, write

This example shows how to configure the router to update the calendar periodically from the software clock:

```
RP/0/RSP0/CPU0:router(config)# ntp
RP/0/RSP0/CPU0:router(config-ntp)# update-calendar
```

Related Topics

[clock read-calendar](#)

[clock update-calendar](#)