Chapter 16

Configuring NTP on C-Series Controllers with the SRC CLI

This chapter discusses how to configure the Network Time Protocol (NTP) on a C-series Controller with the SRC CLI. Topics include:

- Configuration Statements for NTP on C-series Controllers on page 117
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuring NTP Client Mode for a C-series Controller with the SRC CLI* on page 119
- *Configuring an NTP Peer on a C-series Controller with the SRC CLI* on page 120
- *Configuring NTP Broadcast Mode on a C-series Controller with the SRC CLI* on page 121
- *Configuring NTP Authentication on a C-series Controller with the SRC CLI* on page 122
- *Configuring NTP as a Broadcast Client on a C-series Controller with the SRC CLI* on page 124
- *Configuring NTP as a Multicast Client on a C-series Controller with the SRC CLI* on page 125
- *Verifying NTP Configuration on a C-series Controller* on page 126

Configuration Statements for NTP on C-series Controllers

Use the following configuration statements to configure NTP on a C-series Controller at the [edit] hierarchy level.

```
system ntp {
    boot-server boot-server;
    broadcast-client;
    trusted-key [trusted-key...];
}
```

```
system ntp authentication-key key-number {
    value value;
}

system ntp broadcast address {
    key key;
    ttl ttl;
    version version;
}

system ntp multicast-client {
    address;
}

system ntp peer address {
    key key;
    version version;
    prefer;
}

system ntp server address {
    key key;
    version version;
    prefer;
}
```

Related Topics

- *SRC-PE CLI Command Reference*
- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118

Specifying Which NTP Server a C-series Controller Contacts on Startup

When you boot a C-series Controller, it issues an ntpdate request, which polls a network server to determine the local date and time. Configure a server that the system uses to determine the time when the system boots. Otherwise, NTP cannot synchronize with a time server if the server's time is very far off the local system's time.

To configure the NTP boot server:

1. From configuration mode, access the configuration statement that configures NTP.

   ```
   [edit]
   user@host# edit system ntp
   ```

2. Specify the address or hostname of the network NTP server.

   [edit system ntp]
   user@host# **set boot-server** *address*

   For example:

   [edit system ntp]
   user@host# **set boot-server 192.0.2.20**

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Configuration Statements for NTP on C-series Controllers* on page 117
- *Verifying NTP Configuration on a C-series Controller* on page 126

Configuring NTP Client Mode for a C-series Controller with the SRC CLI

Use the following configuration statements to configure NTP on a C-series Controller to operate in client mode:

```
system ntp server address{
    version version;
    prefer;
}
```

To configure NTP to operate in client mode:

1. From configuration mode, access the configuration statement that configures an NTP server, and specify the IP address or hostname of an NTP server.

   [edit system ntp]
   user@host# **edit server** *address*

   For example, to specify an NTP server that has an IP address of 192.0.2.30:

   [edit system ntp]
   user@host# **edit server 192.0.2.30**

   [edit system ntp server 192.0.2.30]
   user@host#

2. (Optional) Specify the version of NTP to be used for outgoing packets.

   [edit system ntp server *address*]
   user@host# **set version** *version*

3. (Optional) If you configure more than one time server, specify whether this server is to be contacted first for synchronization.

   [edit system ntp server *address*]
   user@host# **set prefer**

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117
- *Verifying NTP Configuration on a C-series Controller* on page 126

Configuring an NTP Peer on a C-series Controller with the SRC CLI

Use the following configuration statements to configure NTP on a C-series Controller to operate in symmetric active mode:

```
edit system ntp peer address {
    version version;
    prefer;
}
```

To configure NTP to operate in symmetric active mode:

1. From configuration mode, access the configuration statement that configures an NTP peer, and specify the IP address or hostname of an NTP peer.

   ```
   [edit system ntp]
   user@host# edit peer address
   ```

   For example, to specify an NTP peer that has an IP address of 192.0.2.40:

   ```
   [edit system ntp]
   user@host# edit peer 192.0.2.40

   [edit system ntp peer 192.0.2.40]
   user@host#
   ```

2. (Optional) Specify the version of NTP to be used for outgoing packets.

   ```
   [edit system ntp server address]
   user@host# set version version
   ```

3. (Optional) If you configure more than one peer, specify whether this server is to be contacted first for synchronization.

   ```
   [edit system ntp server address]
   user@host# set prefer
   ```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117
- *Verifying NTP Configuration on a C-series Controller* on page 126

Configuring NTP Broadcast Mode on a C-series Controller with the SRC CLI

Use the following configuration statements to configure NTP on a C-series Controller to operate in broadcast mode:

```
system ntp broadcast address {
    ttl ttl;
    version version;
}
```

To configure NTP to operate in broadcast mode:

1. From configuration mode, access the configuration statement that configures NTP broadcast, and specify the broadcast address on one of the local networks or a multicast address assigned to NTP. You can specify an IP address or a hostname.

   We recommend that you use the multicast address 224.0.1.1 because the Internet Assigned Numbers Authority (IANA) assigns this address for NTP; however, you can use a different address for local deployments.

   ```
   [edit system ntp]
   user@host# edit broadcast address
   ```

   For example, to specify the broadcast address of 244.0.1.1:

   ```
   [edit system ntp]
   user@host# edit broadcast 224.0.1.1

   [edit system ntp broadcast 224.0.1.1]
   user@host#
   ```

2. (Optional) Specify the version of NTP to be used for outgoing packets.

   ```
   [edit system ntp broadcast address]
   user@host# set version version
   ```

3. (Optional) Specify the time-to-live value to transmit.

   ```
   [edit system ntp server address]
   user@host# set ttl ttl
   ```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117
- *Verifying NTP Configuration on a C-series Controller* on page 126

Configuring NTP Authentication on a C-series Controller with the SRC CLI

You can authenticate time synchronization to ensure that a C-series Controller obtains its time services only from known sources. By default, network time synchronization is unauthenticated; the system synchronizes to whatever system appears to have the most accurate time. We highly recommend that you configure authentication of network time services.

Use the following configuration mode statements to configure authentication for NTP on a C-series Controller:

```
system ntp {
    trusted-key [trusted-key...];
}

system ntp authentication-key key-number {
    value value;
}

system ntp broadcast address {
    key key;
}

system ntp peer address {
    key key;
}

system ntp server address {
    key key;
}
```

To configure NTP authentication:

1. Specify authentication for other time servers.

   Only time servers transmitting network time packets that contain one of the specified key numbers and whose key matches the value configured for that key number are eligible for synchronization. Other systems can synchronize with the local system without being authenticated.

   ```
   [edit system ntp]
   user@host# set trusted-key [trusted-key...]
   ```

   where *trusted-key* is a value in the range 1–2147483647.

For example:

[edit system ntp]
user@host# **set trusted-key 1**

2. Depending on the mode configured for NTP, specify a key value at the [edit system ntp server], [edit system ntp peer], or [edit system ntp broadcast] hierarchy level. For example:

   [edit system ntp server *address*]
   user@host# **set key** *key*

   For example:

   [edit system ntp server 192.0.2.30]
   user@host# **set key key1**

   The system transmits the specified authentication key when transmitting packets. The key is necessary if the remote system has authentication enabled so that it can synchronize with the local system.

3. Define the authentication keys by assigning a number to the key and configuring its value.

   [edit system ntp]
   user@host# **edit authentication-key** *key-number*

   [edit system ntp authentication-key *key-number*]
   user@host# **set value** *value*

   The *key-number* is the key number for the key. The key number must match on all systems using that particular key for authentication.

   For example:

   [edit system ntp]
   user@host# **edit authentication-key 1**

   [edit system ntp authentication-key 1]
   user@host# **set value X7VY4ZE**

4. Verify the configuration.

```
[edit system ntp]
user@host# show
trusted-key 1;
server 192.0.2.30 key 1;
authentication-key 1 {
  value ********;
}
```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117

Configuring NTP as a Broadcast Client on a C-series Controller with the SRC CLI

You can configure NTP on a C-series Controller to listen for broadcast messages on the local network to discover other servers on the same subnet. When NTP receives a broadcast message for the first time, it measures the nominal network delay using a brief client-server exchange with the remote server. It then enters *broadcast client* mode, in which it listens for, and synchronizes with, succeeding broadcast messages.

To avoid accidental or malicious disruption in this mode, both the local and remote systems must use authentication and the same trusted key and key identifier.

To configure NTP to listen for broadcast messages:

1. From the [edit system ntp] hierarchy level, specify that NTP listen for broadcast messages.

   ```
   [edit system ntp]
   user@host# set broadcast-client
   ```

2. Authenticate time synchronization to ensure that the local system obtains its time only from known sources.

   See *Configuring NTP Authentication on a C-series Controller with the SRC CLI* on page 122.

3. Verify the configuration. For example:

   ```
   [edit system ntp]
   user@host# show
   broadcast-client;
   trusted-key 1;
   server 192.0.2.30 key 1;
   authentication-key 1 {
     value ********;
   }
   ```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117

Configuring NTP as a Multicast Client on a C-series Controller with the SRC CLI

You can configure NTP on a C-series Controller to listen for multicast messages on the local network to discover other servers on the same subnet. When NTP receives a multicast message for the first time, it measures the nominal network delay using a brief client-server exchange with the remote server. It then enters *multicast client* mode, in which it listens for, and synchronizes with, succeeding multicast messages.

You can specify one or more IP addresses or hostnames. The hosts then join those multicast groups.

To avoid accidental or malicious disruption in this mode, both the local and remote systems must use authentication and the same trusted key and key identifier.

To configure NTP to listen for multicast messages:

1. From the [edit system ntp] hierarchy level, specify that NTP listen for multicast messages.

   edit system ntp]
   user@host# **set multicast-client** *address*

   For example:

   [edit system ntp]
   user@host# **set multicast-client 224.0.1.1**

2. Authenticate time synchronization to ensure that the local system obtains its time only from known sources.

   See *Configuring NTP Authentication on a C-series Controller with the SRC CLI* on page 122.

3. Verify the configuration. For example:

```
[edit system ntp]
user@host# show
multicast-client 224.0.1.1;
trusted-key 1;
server 192.0.2.30 key 1;
authentication-key 1 {
  value ********;
}
```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117

Verifying NTP Configuration on a C-series Controller

Purpose To verify the configuration for NTP.

Action At the [edit system ntp] hierarchy level, enter the show command. For example:

```
[edit system ntp]
user@host# show
boot-server 192.0.2.20;
multicast-client 192.0.2.15;
trusted-key 1;
server 192.0.2.30 key 1;
server 192.0.2.25;
authentication-key 1 {
  value ********;
}
```

Related Topics

- *NTP Support on C-series Controllers* on page 113
- *Specifying Which NTP Server a C-series Controller Contacts on Startup* on page 118
- *Configuration Statements for NTP on C-series Controllers* on page 117