NTP Protocol

bintec-Dm 728-I

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Chapter 1 Introduction

1.1 Introduction to the NTP Protocol

The Network Time Protocol (NTP) is used to synchronize a set of network clocks using a distributed client and server set. NTP is built over the User Datagram Protocol (UDP) that supports transport mechanisms not linked to the connection.

NTP provides high precision synchronization mechanisms and makes local clock error estimation possible while revealing the characteristics of the reference clock.

Its goal is to ensure that all devices connected to a precise clock source synchronize with it. Each NTP client, therefore, sends requests to various NTP servers and processes the replies when these arrive. This allows you to select the most accurate clock at any given moment and to synchronize with it according to the examples received.

Our router incorporates:

- **An NTP client**. This synchronizes the router's base time with the NTP servers.
- **Simple-NTP Server**. This is a server for less precise applications (e.g., the synchronization of devices connected to the router over a local network).

The SNTP server can operate in two modes:

- **Unicast**: the server responds to synchronization requests from clients. This is the server's default mode.
- **Broadcast**: the server sends NTP broadcast packets over the interfaces defined through configuration. In this mode, the server also responds to synchronization requests from clients.

In devices that do not have a real-time clock (RTC), we recommend configuring an NTP client in order to obtain an adjusted base time from the SNTP server. In any case, even if the base time is not synchronized or adjusted, the server always responds to unicast requests. In broadcast mode, the base time must be synchronized or adjusted to real time. This behavior is defined in RFC 4330.

1.2 Protocol

In order to carry out synchronization, the devices exchange messages similar to those described below:

1.2.1 Message format

The NTP protocol operates over UDP in port 123. The following header fields are present in the UDP datagram data:

1.2.1.1 LEAP INDICATOR

2 bits. Indicates that the clock should not be synchronized if, during the last minute of the day, a second is added or removed.

1.2.1.2 VERSION NUMBER

3 bits. Displays the protocol version.

1.2.1.3 OPERATION MODE

3 bits. Indicates the operation mode.

1.2.1.4 STRATUM

1 octet. Indicates the reference stratum where the local clock is found. Value 0 is reserved. Value 1 is for primary references. All other values are used for secondary references.

1.2.1.5 POLL INTERVAL

1 octet. Polling interval between successive NTP messages.

1.2.1.6 PRECISION

1 octet. Local clock precision indicator.

1.2.1.7 ROOT DELAY

4 octets. Indicates the local clock delay with respect to the root reference.

1.2.1.8 ROOT DISPERSION

4 octets. Indicates the local clock dispersion with respect to the root reference.

1.2.1.9 REFERENCE IDENTIFIER

4 octets. Displays the clock reference. If the stratum is 0 or 1, it is encoded as a 4-octet ASCII chain, justified to the left and filled with zeros. If the stratum is a secondary reference, it is the reference IP address.

1.2.1.10 REFERENCE TIMESTAMP

8 octets. Local time at which the clock was established or corrected.

1.2.1.11 SOURCE TIMESTAMP

8 octets. Local time at which the client message was sent to the server.

In cases involving packets generated by the SNTP server, both in unicast and broadcast modes, this field is set to zero.

1.2.1.12 RECEPTION TIMESTAMP

8 octets. Local time at which the NTP message arrives at the server.

In cases involving packets generated by the SNTP server, either in unicast or in broadcast mode, this field is set to zero.

1.2.1.13 TRANSMISSION TIMESTAMP

8 octets. Local time for the outgoing NTP message to the server.

1.2.1.14 KEY IDENTIFIER

4 octets. Key identifier used to indicate whether or not the NTP source is using a key for authentication (key value "0").

1.2.1.15 MAC

16 octets. Message authentication code. This message digest is generated from the NTP packet (without the Key ID and the MAC itself) and the authentication key with an MD5 hash algorithm. It is used to authenticate NTP sources.

Chapter 2 Configuration

2.1 NTP configuration

This chapter explains what parameters to use to configure NTP in the router. As the operation mode is client, the parameters to be configured are the following:

The global parameters to be configured are:

- **Protocol:** When this command is executed, NTP is enabled.
- **Authenticate:** This command enables authentication. This is only needed if the device requires authentication of NTP sources.

The reference parameters to be configured are:

- **Peer IP address or hostname.**
- Peer **Poll interval:** This is only significant if the NTP client is not going to behave as client with respect to this reference.
- Peer **Key:** This is only significant if the NTP peer requires authentication.
- Authentication Key: This is only needed if a key is used for a peer or if authentication is required from NTP sources.
- Trusted Key: This is only needed when authentication is required from NTP sources.

2.2 NTP configuration commands

This section describes the steps to configure NTP in the router.

To access the NTP configuration environment, you must enter the following commands:

```
*P 4
Config>feature ntp
-- NTP Protocol user configuration --
NTP config>
```

The following commands are available at the NTP configuration environment:

Command	Function
? (HELP)	Lists the available commands or options.
AUTHENTICATE	Enables NTP authentication. Requires authentication from NTP sources.
AUTHENTICATION-KEY	Creates an authentication key for the NTP.
BROADCAST	Serves as a client for servers that perform broadcasts in the network.
FAST-POLL-INTERVAL	Configures the minimum poll interval that will be used by default.
LIST	Displays the NTP configuration.
NO	Disables NTP or the option to act as client for servers that perform broadcasts in the network. It also allows you to eliminate information for a reference peer.
PEER	Allows you to configure reference peers in NTP. Each reference peer will be identified by a number assigned by the user.
PERSISTENT-SAVE	Saves the current time in the specific period to persistent memory.
POLL-INTERVAL	Configures the poll interval that will be used by default.
PROTOCOL	Enables NTP.
TRUSTED-KEY	Authenticates the identity of an NTP source
UTC	Configures the difference in hours with respect to UTC time.
EXIT	Exits the NTP configuration prompt.

Normally, the device will request all the parameters required to complete the command in the command line.

2.2.1 ? (HELP)

Lists all valid commands available at the router configuration level. You can also use this command after a specific command in order to list the available options.

Syntax:

```
NTP config>?
```

Example:

```
NTP config>?
  authenticate        Enable NTP authentication
  authentication-key  Create an authentication key for NTP
  broadcast           Enable the NTP broadcast server client behavior option
  fast-poll-interval  Configure the fast poll interval to be used by default
  list                List current configuration
  no                  Negate a command or sets its defaults
  peer                Configure or changes a peer
  persistent-save     Save to persistent memory the current time in the specified period
  poll-interval       Configure the poll interval to be used by default
  protocol            Enable the protocol (enabled NTP client operation)
  sntp-server         Configure Simple NTP Server
  trusted-key         Authenticate the identity of a NTP source
  exit
NTP config>
```

2.2.2 AUTHENTICATE

Enables authentication for NTP. This means that all NTP sources have to pass authentication to be considered valid.

Example:

```
NTP config>authenticate
NTP config>
```

Command history:

Release	Modification
11.00.04	This command is available as of version 11.00.04.

2.2.3 AUTHENTICATION-KEY

Creates or modifies a key for NTP. This key will be used to authenticate NTP sources or authenticate us as an NTP client. It is saved as an id-value pair, meaning it is configured with a key identifier and a value. The algorithm used with this key for encrypting/decrypting NTP messages is also specified.

Syntax:

```
NTP config>authentication-key <key identifier> <algorithm> <value>
```

Example:

```
NTP config>authentication-key 1 md5 prueba
NTP config>
```

Command history:

Release	Modification
11.00.04	This command is available as of version 11.00.04.

2.2.4 BROADCAST

Allows you to enable the NTP broadcast server client option.

Example:

```
NTP config>broadcast
NTP config>
```

2.2.5 FAST-POLL-INTERVAL

Allows you to set a minimum poll interval. This means that the poll interval will start at the value configured.

Example:

```
NTP config>fast-poll-interval 32
NTP config>
```

> **Note**
>
> Admissible values range from 16 to 1024 seconds (approx. 17 minutes). The power remains two notches below the value entered. The default value is 16.

> ⚠️ **Warning**
>
> We do not recommend changing this value. It should only be modified on networks with speed or congestion problems.

Command history:

Release	Modification
11.01.08.70.06	The "*fast-poll-interval*" command was introduced as of version 11.01.08.70.06.
11.01.10	The "*fast-poll-interval*" command was introduced as of version 11.01.10.

2.2.6 LIST

Allows you to list the NTP configuration information. You can either list the global information separately from the peer information or have both at the same time.

Syntax:

```
NTP config>list <Type of information to display>
  all       Display global information and configured
            peers
  global    Display global information
  peers     Display peer parameters
  sntp      Display SNTP information
NTP config>
```

2.2.6.1 LIST ALL

Example:

```
NTP Config>list all

Global NTP Parameters
Protocol Status      Enabled
Operation Mode       Client Mode
Poll Interval        64
Fast Poll Interval   16
Authentication       Enabled

NTP Peer List
ID   Peer Address/Hostname        Peer Port  Peer VRF    Broadcast Server  Poll Interval Max Clock Age Key
---------------------------------------------------------------------------------------------------------
1    192.168.214.54               123        global      Client Mode       64            0             1
2    0.es.pool.ntp.org            123        global      Client Mode       64            0             1

NTP Config>
```

Command history:

Release	Modification
11.01.03	The peer's hostname is shown as of version 11.01.03.
11.01.08.70.06	The fast poll interval is shown as of version 11.01.08.70.06.
11.01.10	The fast poll interval is shown as of version 11.01.10.

2.2.6.2 LIST GLOBAL

Example:

```
NTP Config>list global

Global NTP Parameters
Protocol Status      Enabled
Operation Mode       Client Mode
Poll Interval        64
Fast Poll Interval   16
Authentication       Enabled
NTP Config>
```

Command history:

Release	Modification
11.01.08.70.06	The fast poll interval is shown as of version 11.01.08.70.06.
11.01.10	The fast poll interval is shown as of version 11.01.10.

2.2.6.3 LIST PEERS

Example:

```
NTP Config>list peers

NTP Peer List
ID   Peer Address/Hostname          Peer Port  Peer VRF    Broadcast Server  Poll Interval Max Clock Age Key
-------------------------------------------------------------------------------------------------------------
1    192.168.214.54                 123        global      Client Mode       64            0             1
2    0.es.pool.ntp.org              123        global      Client Mode       64            0             1

NTP config>
```

Command history:

Release	Modification
11.01.03	The peer's hostname is shown as of version 11.01.03.

2.2.6.4 LIST SNTP

This command is explained in the section devoted to the SNTP server.

2.2.7 NO

Allows you to disable the protocol (NTP client operation disabled), the NTP broadcast server client option and the Authentication feature. It also helps you delete the options included in the following console if they have been previously configured. In addition, the *NO* command disables the server mode configured under "SNTP Server".

Syntax:

```
NTP config>no ?
  authenticate          Enable NTP authentication
  authentication-key    Create an authentication key for NTP
  broadcast             Enable the NTP broadcast server client behavior option
  peer                  Configure or changes a peer
  persistent-save       Save to persistent memory the current time in the specified period
  protocol              Enable the protocol (enabled NTP client operation)
  sntp-server           Configure Simple NTP Server
  trusted-key           Authenticate the identity of a NTP source
NTP config>
```

2.2.7.1 NO AUTHENTICATE

Disables the NTP authentication.

Example:

```
NTP config>no authenticate
NTP config>
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.

2.2.7.2 NO AUTHENTICATION-KEY

Deletes an NTP authentication key by its ID.

Syntax:

```
NTP config>no authentication-key <key identifier>
```

Example:

```
NTP config>no authentication-key 1
NTP config>
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.

2.2.7.3 NO BROADCAST

Disables the NTP broadcast server client option.

Example:

```
NTP config>no broadcast

Broadcast Client disabled
NTP config>
```

2.2.7.4 NO PEER

Deletes the reference peer with the specified identifier. The range of admissible values is 1 to 9999.

Syntax:

```
NTP config>no peer <peer identifier>
```

Example:

You wish to delete the peer with identifier 4.

```
NTP config>no peer 4
NTP config>
```

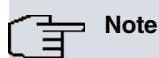### 2.2.7.5 NO PERSISTENT-SAVE

Allows you to stop saving the NTP time periodically.

```
NTP config$no persistent-save <period>
```

Example:

```
NTP config$no persistent-save 12
```

The last saved time will remain saved, it will not be erased.

> **Note**
>
> This feature is not available for all models. This command will only work in models that support the feature. If you try to use this command and it returns an error, it means that your model does not support this feature.

Release	Modification
11.01.04	This command was introduced as of version 11.01.04

2.2.7.6 NO PROTOCOL

Disables the protocol (NTP client operation disabled).

Example:

```
NTP config>no protocol
NTP config>
```

2.2.7.7 NO SNTP SERVER

This command is explained in the section devoted to the SNTP server.

2.2.7.8 NO SOURCE-ADDRESS

Deletes the value previously configured as source IP address for packets directed to the server and restores the default value, 0.0.0.0, in which case the source address for outgoing packets is the IP address of the interface the packets are sent through.

Example:

```
NTP config>no source-address
NTP config>
```

Command history:

Release	Modification
11.01.05	This command was obsoleted as of version 11.01.05. Please, see the "peer source-address" option to configure source address by peer.

2.2.7.9 NO TRUSTED-KEY

Invalidates the authentication of an NTP source that uses the specified key.

Syntax:

```
NTP config>no trusted-key <key identifier>
```

Example:

```
NTP config>no trusted-key 1
NTP config>
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.

2.2.8 PEER

Allows you to configure reference peers for NTP. Reference peers are identified by a user-assigned number. This number can range from 1 to 9999.

When configuring parameters for the reference peers, the command is specified followed by the peer identifier and the parameter value.

If you pass an identifier that is not associated with any peer, a new peer is created with this identifier. If the identifier is associated with an existing peer, then the parameter in question is modified.

Syntax:

```
NTP config>peer ?
  address         Configure IP address for a peer
  broadcast       Enable broadcast for a peer
  client          Enable client mode for a peer
  max-clock-age   Configure max interval for reference time stamp to be valid for a peer
```

```
poll-interval    Configure poll interval for a peer
port             Configure peer port
source-address   Configure IP source address for outgoing packets of a peer
```

2.2.8.1 PEER ADDRESS

Allows you to configure an IP address or hostname for the NTP peer you wish to synchronize. The first parameter to pass is the peer identifier and, subsequently, the IP address/hostname.

This command also allows you to associate the peer with one of the VRFs configured in the device. The device, when transmitting an NTP packet addressed to this peer, searches for the route in the configured VRF. If no VRF has been specified through this command, the main VRF is taken.

Syntax:

```
NTP config>peer address <peer identifier> {<IPv4 address> | <IPv6 address> | <hostname>} [use-vrf <vrf-name>]
```

Example 1:

```
NTP config>peer address 5 0.es.pool.ntp.org
NTP config>
```

Example 2:

```
NTP config>peer address 6 172.24.81.6 use-vrf vpn-2
NTP config>
```

Example 3:

```
NTP config>peer address 7 1111::1123
NTP config>
```

Example 2 shows that the peer has been configured with identifier 6 and associated with the VRF *vpn-2*. This VRF must have been previously configured using the VRF-Lite feature. For further information on the VRF-Lite feature, please see the following manual: "*bintec-Dm775-I - VRF Lite Facility*".

Command history:

Release	Modification
11.01.03	The *hostname* option was introduced as of version 11.01.03.
11.01.05	The *ipv6-address* option was introduced as of version 11.01.05.
11.01.09	The *use-vrf* option was introduced for IPv6 addresses as of version 11.01.09.

2.2.8.2 PEER BROADCAST

Makes the NTP peer you wish to synchronize operate in broadcast mode. Here you only need to specify the NTP peer identifier that operates in broadcast mode. The range of admissible values is 1 to 9999. If the identifier is not associated with any peer, a new one is created with the default values.

Syntax:

```
NTP config>peer broadcast <peer identifier>
```

Example:

```
NTP config>peer broadcast 1
NTP config>
```

2.2.8.3 PEER CLIENT

Makes the NTP peer you wish to synchronize operate in client mode. Here you only need to specify the NTP peer identifier that operates in client mode. The range of admissible values is 1 to 9999. If the identifier is not associated with any peer, a new one is created with the default values.

Syntax:

```
NTP config>peer client <peer identifier>
```

Example:

```
NTP config>peer client 1
NTP config>
```

2.2.8.4 PEER KEY

Forces our client to send NTP packets with the key ID and a MAC generated with this key in order to pass peer authentication.

Syntax:

```
NTP config>peer key <peer identifier> <key id>
```

Example:

```
NTP config>peer key 1 1
NTP config>
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.

2.2.8.5 PEER MAX-CLOCK-AGE

Specifies the maximum time in seconds that the NTP server can remain without updating its base time with a server that belongs to a higher level. The range of admissible values is 0 to 86400 seconds. The default is 0, meaning the time the NTP server has remained without refreshing is not taken into account when filtering the response packets.

Syntax:

```
NTP config>peer max-clock-age <peer identifier> <time>
```

Example:

```
NTP config>peer max-clock-age 3 3600
NTP config>
```
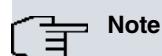
2.2.8.6 PEER POLL-INTERVAL

Specifies the polling interval for the NTP peer. You are first prompted for the identifier of the peer you wish to configure and then for the interval. The range of admissible values for the peer identifier is 1 to 9999.

Syntax:

```
NTP config>peer poll-interval <peer identifier> <interval>
```

Example:

```
NTP config>peer poll 3 128
NTP config>
```

> **Note**
>
> The range of admissible values for the interval is 16 to 16384 seconds (approx. 273 minutes). The power is two notches below the value entered. The default value is 64.

2.2.8.7 PEER PORT

Specifies the port where the NTP server for the indicated peer operates. You first need to specify the peer identifier and then the port number. The range of admissible values is 1 to 9999 for the peer identifier and 1 to 65535 for the port.

Syntax:

```
NTP config>peer port <peer identifier> <port>
```

Example:

```
NTP config>peer port 6 123
NTP config>
```

2.2.8.8 PEER SOURCE-ADDRESS

Specifies the source IP address assigned to packets going to the peer. If this parameter is not configured, the source address of the outgoing packets is the IP address of the interface they are sent through.

Syntax:

```
NTP config>peer source-address <peer identifier> {<IPv4 address> | <IPv6 address>}
```

Example 1:

```
NTP config>peer source-address 5 192.168.1.1
NTP config>
```

Example 2:

```
NTP config>peer source-address 6 1111::1123
NTP config>
```

Command history:

Release	Modification
11.01.05	This option was introduced as of version 11.01.05.

2.2.9 PERSISTENT-SAVE

Allows you to set an interval to save the time currently obtained through NTP in persistent memory.

```
NTP config$persistent-save <period>
```

Parameter	Definition
period	Time-saving period.

Example 1:

```
NTP config$persistent-save 24
```

Time will be saved every 24 hours from the moment this command is entered or the router is started.

> **Note**
>
> This feature is not available for all models. This command will only work in models that support the feature. If you try to use this command and it returns an error, it means that your model does not support this feature.

Release	Modification
11.01.04	This command was introduced as of version 11.01.04.

2.2.10 POLL-INTERVAL

Allows you to set a default poll interval.

Syntax:

```
NTP config>poll-interval <interval>
```

Example:

```
NTP config>poll-interval 256
NTP config>
```

> **Note**
>
> The range of admissible values is from 16 to 1024 seconds (approx. 17 minutes). This takes the power of two below the value entered. The default value is 64.

2.2.11 PROTOCOL

Enables the protocol (both for the NTP client as well as for the SNTP server).

Example:

```
NTP config>protocol
NTP config>
```

2.2.12 SOURCE-ADDRESS

Specifies the source IP address assigned to packets going to the server. If this parameter is not configured, the source address of the outgoing packets is the IP address of the interface they are sent through.

Syntax:

```
NTP config>source-address <ip address>
```

Example:

```
NTP config>source-address 192.168.2.2
NTP config>
```

Command history:

Release	Modification
11.01.05	This command was obsoleted as of version 11.01.05. Please, see the "peer source-address" option to configure source address by peer.

2.2.13 TRUSTED-KEY

Validates the identity of an NTP source. With this command, a key ID can be configured as a trusted key for the system. This way, an NTP source that uses this key (the same ID and the same value) for authentication will be considered valid.

Syntax:

```
NTP config>trusted-key <key identifier>
```

Example:

```
NTP config>trusted-key 1
NTP config>
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.

2.2.14 UTC Shift

> **Note**
>
> This command has been replaced by the 'timezone' command found in the 'time' menu. We recommend you use the new command.

The value configured here overwrites the value of the 'timezone' command.

This allows you to adjust the time offset from UTC to set the device's local time zone.

Syntax:

```
NTP config>utc <number hours>
```

Example:

When you try to configure this, the following message appears:

```
NTP config>utc 2
CLI Warning: This is a superseded command.
CLI Warning: It may become obsolete in future versions.
CLI Warning: Please use timezone config instead.
NTP config>
```

> **Note**
>
> The range of admissible values is -12 to 12. The default value is 1.

2.2.15 EXIT

Allows you to exit the NTP protocol configuration environment.

Syntax:

```
NTP Config>exit
```

Example:

```
NTP Config>exit
Config>
```

Returns to the configuration process prompt.

2.3 Configuring the SNTP protocol

This section explains what parameters to use to configure the SNTP server in the router.

The basic configuration parameters for unicast mode are as follows:

• Enable the SNTP server.

• The default mode is unicast.

• Stratum the SNTP server belongs to. The default value is 1, as SNTP servers usually belong to a higher stratum (lower value), closer to the highest precision time source.

The basic configuration parameters for broadcast mode are as follows:

• Enable the SNTP server.

• Broadcast mode.

• Establish the router interfaces through which the broadcast NTP packets are sent.

2.4 SNTP configuration commands

This section describes the necessary steps to configure the SNTP server in routers. Once you have finished configuring the server, you need to save the configuration and restart the device so the configuration activates.

To access the server configuration environment, enter the following commands:

```
*P 4
Config>feature ntp
-- NTP Protocol user configuration --
NTP config>sntp-server <command>
```

The following commands are available in the SNTP server configuration environment:

Command	Function
? (HELP)	Lists the commands and their available options.
BROADCAST	Accesses the broadcast mode menu.
ENABLE	Enables the SNTP server.
MODE	SNTP server operation mode.
PORT	SNTP server listening port.
SOURCE-ADDRESS	Specifies the source IP address for broadcast packets and packets to clients.

STRATUM	Stratum the SNTP server belongs to.

The following commands are available in the broadcast mode configuration environment:

```
*P 4
Config>feature ntp
-- NTP Protocol user configuration --
NTP config>sntp-server broadcast <command>
```

Command	Function
? (HELP)	Lists the commands or their available options.
HEARTBEAT-TIME	Time in seconds between broadcast packets.
INTERFACE	Interface the broadcast packets are sent through.

Generally speaking, if any of the command line parameter values required to complete a command are missing, the device requests them.

2.4.1 ? (HELP)

Lists all valid commands at the router configuration level. You can also use this command after a specific command to list the available options.

Syntax:

```
NTP config>sntp-server ?
```

Example:

```
NTP config>sntp-server ?
  broadcast        Menu SNTP broadcast
  enable           Enable Simple NTP Server
  mode             Configure SNTP mode
                   (unicast/broadcast)
  port             Server port
  source-address   Configure source IP address for the
                   SNTP
  stratum          Configure the stratum for the SNTP
```

2.4.2 SNTP-SERVER BROADCAST

This is the server configuration menu when operating in broadcast mode. This menu is used to configure the time interval between the sending of broadcast packets and the interfaces through which the broadcasts are sent. If the interface has several IP addresses, packets are sent with the same destination address as the broadcast address for each of the subnets to which the interface IP addresses belong.

2.4.2.1 SNTP-server broadcast interface

Configures the interface the broadcast packets are sent through.

Syntax:

```
NTP config>sntp-server broadcast interface <interface>
```

Example:

```
NTP config>sntp-server broadcast interface ethernet0/0.10
NTP config>
```

2.4.2.2 SNTP-server broadcast heartbeat-time

Configures the time in seconds between the sending of broadcast packets. Default is *32 seconds*. The valid values for this command range from 16 to 65536, to the power of 2. The limitation is due to the NTP frame POLL field, which is completed after applying the log2 operation to the heartbeat-time value. Whenever a value that does not correspond to the power of 2 is entered, the final value is approximated to the closest valid value.

Syntax:

```
NTP config>sntp-server broadcast heartbeat-time <value>
```

Example:

```
NTP config>sntp-server broadcast heartbeat-time 64
NTP config>
```

2.4.3 SNTP-SERVER ENABLE

Enables the SNTP server. Default is *disabled*.

Example:

```
NTP config>sntp-server enable
NTP config>
```

2.4.4 SNTP-SERVER MODE

Configures the SNTP server mode. Default is *unicast*.

Syntax:

```
NTP config>sntp-server mode <unicast/broadcast>
```

Example:

```
NTP config>sntp-server mode broadcast
NTP config>
```

2.4.5 SNTP-SERVER PORT

Configures the server listening port. Default is *123*.

Syntax:

```
NTP config>sntp-server port <value>
```

Example:

```
NTP config>sntp-server port 1234
NTP config>
```

2.4.6 SNTP-SERVER SOURCE-ADDRESS

Configures the source IP address for packets going to clients. If this parameter is not configured, the source address of the outgoing packets is the IP address of the interface they are sent through.

Syntax:

```
NTP config>sntp-server source-address <ip address>
```

Example:

```
NTP config>sntp-server source-address 192.168.2.2
NTP config>
```

2.4.7 SNTP-SERVER STRATUM

Configures the stratum to which the SNTP server belongs. Default is *1*.

Syntax:

```
NTP config>sntp-server stratum <value>
```

Example:

```
NTP config>sntp-server stratum 2
NTP config>
```

2.4.8 NO SNTP-SERVER

Disables the server. It also allows you to delete a broadcast interface and the source address of SNTP packets.

Syntax:

```
NTP config>no sntp-server ?
  broadcast        SNTP broadcast menu
  enable           Disables Simple NTP Server
  source-address   Configures source IP address for the SNTP
NTP config>
```

2.4.8.1 No sntp-server broadcast

Deletes a broadcast interface.

Syntax:

```
NTP config>no sntp-server broadcast <interface>
```

Example:

```
NTP config>no sntp-server broadcast ethernet0/0.12
NTP config>
```

2.4.8.2 No sntp-server enable

Disables the SNTP server.

Syntax:

```
NTP config>no sntp-server enable
```

2.4.8.3 No sntp-server source-address

Deletes the source address for SNTP packets.

Syntax:

```
NTP config>no sntp-server broadcast <IP address>
```

Example:

```
NTP config>no sntp-server broadcast 192.168.212.105
NTP config>
```

2.4.9 LIST

Allows you to list information on the SNTP server configuration.

Syntax:

```
NTP config>list <Type of information to display>
  all      Displays global information and configured peers
  global   Displays global information
  peers    Displays peer parameters
  sntp     Displays SNTP information
NTP config>
```

2.4.9.1 LIST SNTP

Example:

```
NTP config>list sntp

Global SNTP Parameters
Protocol Status      Enabled
Operation Mode       Broadcast Mode
Stratum              2
Server port          123
Source IP Address    200.200.200.2

Broadcasting over the interfaces
ethernet0/0.10
ethernet0/0.11
ethernet0/0.12
```

```
ethernet0/0.13

Time between Broadcasting packets 64
NTP config>
```

Chapter 3 Monitoring

3.1 NTP monitoring

NTP monitoring displays statistics on the NTP messages exchanged or received via broadcasting from the various peers. These are displayed separately as global statistics and in detail for each peer.

3.2 NTP monitoring commands

This section describes the steps needed to monitor the NTP in the router.

To access the NTP monitoring environment, you must enter the following commands:

```
*p 3
Console Operator
+feature ntp
-- NTP user console --
NTP+
```

The following commands are found within the NTP monitoring environment:

Command	Function
? (HELP)	Lists the available commands and their options.
LIST	Displays the NTP monitoring.
EXIT	Exits the NTP monitoring prompt.

Generally speaking, if any of the command line parameter values required to complete a command are missing, the device requests them.

3.2.1 ? (HELP)

Lists all valid commands available at the router configuration level. You can also use this command after a specific command in order to list the available options.

Syntax:

```
NTP+?
```

Example:

```
NTP+?
  list    Show NTP monitoring information
  exit
NTP+
```

3.2.2 LIST

Allows you to list the global statistics or the peers. The syntax is shown below.

Syntax:

```
NTP+list ?
  global    List global information
  peers     List information about the peer specified
```

3.2.2.1 LIST GLOBAL

To list the global information, you need to enter the following:

```
NTP+list global

Global NTP Statistics

-----------------------------------------------------------------
Received Packets        12
Sent Packets        4
```

```
New Version Packets      12
Old Version Packets      0
Wrong Version Packets    0
Rejected Packets         0
Broadcast Packets        12
Control Mode Packets     0
Private Mode Packets     0
Client Mode Packets      0
Server Mode Packets      0
Active Mode Packets      0
Passive Mode Packets     0
Processed Packets        12
Old Packets              0
Bogus Packets            0
NTP+
```

3.2.2.2 LIST PEERS

To obtain information on the peers, you need to enter the address and port linked to the peer you wish to monitor.

If the peer you want to monitor is associated with a secondary VRF, you must specify the VRF name through the *peer-vrf* option.

Syntax:

```
NTP+list peers [peer-address <ip-address>] [peer-port <port>] [peer-vrf <vrf-name>]
```

Example:

```
NTP+list peers peer-address 129.67.1.160 peer-port 123
Peer 1: vrf global, 129.67.1.160:123, hostname: 0.es.pool.ntp.org
  Received Packets         2
  New Version Packets      2
  Old Version Packets      0
  Wrong Version Packets    0
  Rejected Packets         0
  Broadcast Packets        0
  Control Mode Packets     0
  Private Mode Packets     0
  Client Mode Packets      0
  Server Mode Packets      2
  Active Mode Packets      0
  Passive Mode Packets     0
  Leap:            0 (no warning)
  Stratum:         1
  Max. clock age:  unlimited
  Reference Timestamp: d7c52b41.76804966  Thu, Sep 18 2014  9:58:25.462894999
  Originate Timestamp: d7c52b7b.71803cd1  Thu, Sep 18 2014  9:59:23.443362999
  Receive Timestamp:   d7c52b7b.85a1ca26  Thu, Sep 18 2014  9:59:23.521999964
  Transmit Timestamp:  d7c52b7b.618936db  Thu, Sep 18 2014  9:59:23.380999973
NTP+
```

Command history:

Release	Modification
11.01.03	The peer's hostname is shown as of version 11.01.03.

3.2.3 EXIT

Allows you to exit the NTP monitoring environment.

Syntax:

```
NTP+exit
```

Example:

```
NTP+exit
+
```

Returns to the monitoring process prompt.