Frequency Synchronization Commands

This chapter describes the Cisco IOS XR frequency synchronization commands that are used to distribute precision frequency around a network.

For detailed information about frequency synchronization concepts, configuration tasks, and examples, see the *Configuring Frequency Synchronization on Cisco IOS XR Software* configuration module in *System Management Configuration Guide for Cisco NCS 5500 Series RoutersSystem Management Configuration Guide for Cisco NCS 540 Series RoutersSystem Management Configuration Guide for Cisco NCS 560 Series Routers*.

clear frequency synchronization esmc statistics

To clear the Ethernet Synchronization Messaging Channel (ESMC) statistics, use the **clear frequency synchronization esmc statistics** command in EXEC mode.

clear frequency synchronization esmc statistics interface { *interface* | **all** | **summary** **location** { *node-id* | **all** } }

Syntax Description

interface	The command can be restricted to clear the ESMC statistics for a particular interface by specifying the interface.
node-id	The output can be restricted to clear the ESMC statistics for a particular node by specifying the location. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

The following example shows how to clear the ESMC statistics:

```
RP/0/0RP0/CPU0:router:hostname# clear frequency synchronization esmc statistics interface
gigabitethenet 0/1/0/1
```

clear frequency synchronization wait-to-restore

To clear the wait-to-restore timer, use the **clear frequency synchronization wait-to-restore** command in EXEC mode.

clear frequency synchronization wait-to-restore { { **all** | **sync** *port-num* **location** *node-id* } | **interface** { *type interface-path-id* | **all** } }

Syntax Description

all	Clears all wait-to-restore timers.
interface *type interface-path-id*	Clears the wait-to-restore timers for a specific interface or all interfaces.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

The following example shows how to clear the frequency synchronization wait-to-restore timer on la specific interface:

```
RP/0/0RP0/CPU0:router:hostname#clear frequency synchronization wait-to-restore interface
gigabitethenet 0/1/0/1
```

clock-interface sync

To configure a clock interface for frequency synchronization on a specific node, use the **clock-interface sync** command in global configuration mode. To remove the clock interface from a node, use the **no** form of this command.

clock-interface sync *port-id* **location** *node-id*
no clock-interface sync *port-id* **location** *node-id*

Syntax Description

port-id	Clock interface port number.
location *node-id*	Specifies the node for clock interface frequency synchronization. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

This example shows how to configure a clock interface for frequency synchronization on a specific node:

```
Router# config
Router(config)# clock-interface sync 0 location 0/RP0/CPU0
Router(config-clock-if)# frequency synchronization
Router(config-clk-freqsync)#
```

Frequency Synchronization

To enable Frequency Synchronization globally on the router and to configure Frequency Synchronization options for a controller or interface, use the **frequency synchronization** command in the appropriate configuration mode. To disable Frequency Synchronization, use the **no** form of this command.

frequency synchronization
no frequency synchronization

Syntax Description

This command has no keywords or arguments.

Command Default

Disabled

Command Modes

Global configuration (config)

Interface configuration (config-interface)

Command History

Release	Modification
Release 7.0.1	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.

Configuration of Frequency Synchronization on the router involves enabling it both in global configuration, and at the interface, where you can configure additional commands.

When you configure Frequency Synchronization in global configuration mode, the default clocking is configured for line timing mode.

Task ID

Task ID	Operations
ethernet-services	execute

The following example shows how to enable Frequency Synchronization in global configuration:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-freqsync)# commit
```

Examples

The following example shows how to enable Frequency Synchronization on an Ethernet interface:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# interface gigabitEthernet 0/5/0/0
RP/0/0RP0/CPU0:router:hostname(config-if)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)#
```

gps-input

To configure the GPS input parameters on an interface, use the **gps-input** command in clock interface port parameters configuration mode. To revert to the default parameters, use the **no** form of this command.

gps-input { **offset** { **gps** | **tai** | **utc** } | **tod-format** { **cisco** | **ntp4** | **gprmc** } | **baud-rate** *baud-rate-value* } [**pps-input** { **rs422** | **ttl** }]

Syntax Description

tod-format	Specifies the format of the time-of-day messages.
gprmc	Specifies that the received time of day messages are in the NMEA GPRMC format.
cisco	Specifies that received time-of-day messages are in the Cisco ASCII format.
ntp4	Specifies that received time-of-day messages are in the NTP Type 4 format.
offset	Specifies the leap second correction to be applied on GPS input time. This is an optional parameter. If no option is specified, the GPS input time is based on UTC (Coordinated Universal Time) and the leap second correction is performed accordingly.
gps	Specifies the GPS input time based on GPS epoch.
tai	Specifies the GPS input time based on TAI (Temps Atomique International also known as International Atomic Time) time scale and no leap second correction is required.
utc	Specifies the GPS input time based on UTC.
rs422	Specifies that received 1PPS messages are in RS-422 mode.
ttl	Specifies that received 1PPS messages are in TTL mode.
baud-rate*baud-rate-value*	Specifies the baud-rate for the ToD UART input.

Command Default

GPS parameters are not configured.

Command Modes

Clock interface port parameters configuration

Command History

Release	Modification
Release 7.0.1	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 **gps-input** command to specify input parameters for a clock interface that is configured for GPS timing.

Task ID

Task ID	Operation
drivers	read, write

This example shows how to specify sample input parameters for a clock interface:

```
Router# configure
Router(config)# clock-interface sync 2 location 0/RP0/CPU0
Router(config-clock-if)# port-parameters
Router(config-clk-parms)# gps-input tod-format cisco pps-input rs422 offset utc
```

log selection

To enable logging of changes or errors to, use the **log selection** command in configuration mode. To disable logging, use the **no** form of this command.

log selection {**changes** | **errors**}
no log selection

Syntax Description

changes	Logs every time there is a change to the selected source, including any logs that the **errors** keyword logs.
errors	Logs only when there are no available frequency sources, or when the only available frequency source is the internal oscillator.

Command Default

No default behavior or values

Command Modes

Frequency synchronization configuration

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

This example shows how to enable logging of changes to frequency synchronization:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname#(config)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname#(config-freqsync)# log selection changes

#
```

quality receive

To configure all the Synchronization Status Message (SSM) quality levels (QLs) for the frequency source from the receive interface, use the **quality receive** command in the appropriate SyncE mode. To return to the default levels, use the no form of this command.

quality receive itu-t option { **exact** *ql-option ql* | **highest** *ql-option ql* | **lowest** *ql-option ql* [**highest** *ql*] }
no quality receive receive

Syntax Description

ql-option Quality Level (QL) ITU-T options.

Valid values are:

- **1**—ITU-T Option 1
- **2 generation 1**—ITU-T Option 2 Generation 1
- **2 generation 2**—ITU-T Option 2 Generation 2

ql Quality Level (QL) value.

For line interfaces and clock interface with SSM support, any of the following combinations of QL values can be specified to modify the QL value received via SSM:

- If the **exact** keyword is used and the received or default QL is not DNU, then this value is used (rather than the received/default QL).
- If the **lowest** keyword is used and the received QL is a lower quality than this, then the received QL value is ignored and DNU is used instead.
- If the **highest** keyword is used and the received QL is higher quality than this, then the received QL value is ignored and this value is used instead.
- If the **lowest** and **highest** keywords are used, the behavior is as above. The maximum QL must be at least as high quality as the minimum QL.

Valid QL values for ITU-T Option 1 are:

- DNU
- EEC1
- PRC
- PRTC
- SSU-A
- SSU-B
- SEC
- eEEC
- ePRC
- ePRTC

Valid QL values for ITU-T Option 2 Generation 1 are:

- EEC2
- PRS
- PRTC
- STU
- ST2
- ST3
- SMC
- ST4
- RES
- eEEC
- ePRTC
- ePRC
- DUS

Valid QL values for ITU-T Option 2 Generation 2 are:

- PRS
- EEC2
- STU
- ST2
- TNC
- ST3E
- ST3
- SMC
- ST4
- PROV
- eEEC
- ePRTC
- PRTC
- ePRC
- DUS

Command Default

QL is unmodified.

Command Modes

Interface SyncE

Command History

Release	Modification
Release 7.0.1	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.

In cases where the clock interface supports SSM but it is not always enabled, all options are available. For clock interfaces where SSM is disabled or not being received, the QL used with the **exact** keyword specifies a precise QL to use for the interface. The QL specified with the **lowest** and **highest** keywords only acts on a received QL, which is only detected in cases where SSM is not running and a loopback has been detected. In this case the **lowest** and **highest** QL values modify the effective input QL.

Note If SSM is disabled, only the exact QL option is available.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to configure all the SSM quality levels for the frequency source from the receive interface:

```
Router# configure
Router(config)# int HundredGigE0/0/1/0
Router(config-if)# frequency synchronization
Router(config-if-freqsync)# quality receive exact itu-t option 2 generation 2 ST3
```

port-parameters

To specify the type of external clock source for a clock interface, use the **port-parameters** command in clock interface configuration mode. To remove the clock source definition, use the **no** form of this command.

port-parameters {**bits-input** *mode* | **bits-output** *mode* | **dti** | **ics**}
no port-parameters {**bits-input** *mode* | **bits-output** *mode* | **dti** | **ics**}

Syntax Description

{**bits-input** }	Specifies a building integrated timing supply (BITS) input timing device.
{**bits-output**}	Specifies a building integrated timing supply (BITS) output timing device.
mode	Type of BITS signal. Valid options are: • **2m** • **6m-output-only** • **e1** • **t1**

Command Default

No clocking type is defined.

Command Modes

Clock interface configuration mode

Command History

Release	Modification
Release 7.0.1	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	Operation
drivers	read, write

This example shows how to configure the external clock source to be DTI:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# clock-interface sync 1 location 0/RSP0/CPU0
RP/0/RP0/CPU0:router(config-clock-if)# port-parameters dti
```

quality transmit

To configure all the Synchronization Status Message (SSM) quality levels for the frequency source from the transmit interface, use the **quality transmit** command in the appropriate frequency synchronization mode. To return to the default levels, use the **no** form of this command.

quality transmit itu-t option { **exact** *ql-option ql* | **highest** *ql-option ql* | **lowest** *ql-option ql* [**highest** *ql*] }
no quality transmit

Syntax Description

ql-option	Quality Level (QL) ITU-T options. Valid values are: • **1**—ITU-T Option 1 • **2 generation 1**—ITU-T Option 2 Generation 1 • **2 generation 2**—ITU-T Option 2 Generation 2
ql	Quality Level (QL) value. • If the **exact** keyword is used and the received or default QL is not DNU, then this value is used (rather than the received/default QL). • If the **lowest** keyword is used and the received QL is a lower quality than this, then the received QL value is ignored and DNU is used instead. • If the **highest** keyword is used and the received QL is higher quality than this, then the received QL value is ignored and this value is used instead. • If the **lowest** and **highest** keywords are used, the behavior is as above. The maximum QL must be at least as high quality as the minimum QL.

Valid QL values for ITU-T Option 1 are:

- EEC1
- PRC
- PRTC
- SSU-A
- SSU-B
- SEC
- DNU
- eEEC
- ePRC
- ePRTC
- PRC

Valid QL values for ITU-T Option 2 Generation 1 are:

- EEC2
- PRS
- PRTC
- STU
- SMC
- ST2
- ST3
- eEEC
- ePRC
- ePRTC
- SMC
- ST4
- RES
- DUS

Valid QL values for ITU-T Option 2 Generation 2 are:

- EEC2
- PROV
- PRS
- PRTC
- STU
- ST2
- TNC
- eEEC
- ePRC
- ePRTC
- ST3E
- ST3
- SMC
- ST4
- PROV
- DUS

Command Default

The QL is unmodified

Command Modes

Interface SyncE

Command History

Release	Modification
Release 7.0.1	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.

If the interface is the selected source, DNU is always sent regardless of this configuration.

This configuration has no effect when SSM is disabled.

Note For clock interfaces that do not support SSM, only the lowest QL can be specified. In this case, rather than sending DNU, the output is squelched, and no signal is sent.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example show how to configure all the SSM quality levels for the frequency source from the transmit interface:

```
Router# configure
Router(config)# int HundredGigE0/0/1/0
Router(config-if)# frequency synchronization
Router(config-if-freqsync)# quality transmit exact itu-t option 2 generation 2 ST3
```

selection input

To configure an interface so that it is available as a timing source for selection by the system, use the **selection input** command in the appropriate frequency synchronization configuration mode. To remove the interface as an available timing source, use the **no** form of this command.

selection input
no selection input

Syntax Description

This command has no keywords or arguments.

Command Default

Disabled

Command Modes

Controller frequency synchronization configuration

Interface frequency synchronization configuration

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

The following example shows how to configure an interface so that it is available as a timing source for selection by the system:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# interface gigabitethernet 0/1/0/1
RP/0/0RP0/CPU0:router:hostname(config-if)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# selection input
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# commit
```

show frequency synchronization clock-interfaces

To display the frequency synchronization information for all clock-interfaces or for a specific node, use the **show frequency synchronization clock-interfaces** command in EXEC mode.

show frequency synchronization clock-interfaces [**brief**] [**location** *node-id*]

Syntax Description

brief	Displays summary information for all clock interfaces.
location *node-id*	Displays information for a specific interface. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

The following example shows the output for the **show frequency synchronization clock-interfaces** command:

```
Router# show frequency synchronization clock-interfaces brief
Flags: > - Up D - Down S - Assigned for selection
d - SSM Disabled s - Output squelched L - Looped back
Node 0/RP0/CPU0:
==============
Fl Clock Interface QLrcv QLuse Pri QLsnd Output driven by
===== ================== ===  === ====== === ====== ========================
D Sync0 n/a n/a n/a n/a n/a
D Sync1 n/a n/a n/a n/a n/a
>S Sync2 None PRC 100 n/a n/a
>S Internal0 n/a SEC 255 n/a n/a
```

show Frequency Synchronization configuration-errors

To display information about any configuration inconsistencies that are detected, but that are not rejected by verification, use the **show frequency synchronization configuration-errors** command in EXEC mode.

show frequency synchronization configuration-errors [**location** *node-id*]

Syntax Description

location	Location of the card, specified by *node-id*.
node-id	The output can be restricted to a particular node by specifying the location. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

This example shows the normal output for the **show frequency synchronization configuration-errors** command:

```
Router# show frequency synchronization configuration-errors

Node 0/RP0/CPU0:
==============
  interface GigabitEthernet0/0/0/0 frequency synchronization

* frequency synchronization is enabled on this interface, but isn't enabled globally.

* The QL that is configured is from a different QL option set than is configured globally.
```

show Frequency Synchronization interfaces

To show the Frequency Synchronization information for all interfaces or for a specific interface, use the **show frequency synchronization interfaces** command in EXEC mode.

show frequency Synchronization { **brief** | **summary** [**location** *node-id*] | *type interface-path-id* }

Syntax Description

brief	Displays brief information for all interfaces.
summary [**location** *node-id*]	Displays summary information for all notes or a specific node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.
type interface-path-id	Displays information for a specific interface.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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
ethernet-services	execute

Examples

The following example shows the display output for the **show frequency synchronization interfaces** command:

```
RP/0/0RP0/CPU0:router:hostname# show frequency synchronization interfaces

Interface GigabitEthernet0/0/0/0 (Up)
  Assigned as input for selection
  SSM Enabled
    Peer Up for 00:01:30, last SSM received 0.345s ago
    Peer has come up 4 times and timed out 3 times
    ESMC SSMs        Total  Information     Event        DNU
      Sent:          98765        98665       100         50
      Received:      54321        54320         1      54300
    13 malformed packets received
    11 received packets were not handled
  Input:
    Restore in 00:03:30
    Last received QL: Opt-II,2/PRC
    Effective QL: DNU, Priority 100
```

```
  Output:
    Selected source: Sync0 [0/0/CPU0]
    Selected source QL: OPT-II,2/SEC
    Effective QL: OPT-II,2/SEC
    Output is squelched
  Next selection points: LC_INGRESS

Interface SONET0/2/0/0 (Up)
  Assigned as input for selection
  SSM Enabled
  Input:
    Restore in 00:03:30
    Last received QL: Opt-II,2/PRC
    Effective QL: DNU, Priority 100
  Output:
    Selected source: Sync0 [0/0/CPU0]
    Selected source QL: OPT-II,2/SEC
    Effective QL: OPT-II,2/SEC
    Output is squelched
  Next selection points: LC_INGRESS
```

The output in brief mode is as follows:

```
Flags:  > - Up                D - Down              S - Assigned for selection
        d - SSM Disabled      x - Peer timed out    i - Init state
        s - Output squelched
Fl   Interface                QLrcv QLuse Pri QLsnd Source
==== ======================== ===== ===== === ===== ======================
>S   GigabitEthernet0/0/0/0   ST2   ST3   100 PRC   Sync0 [0/0/CPU0]
>S   GigabitEthernet0/0/0/1   PROV  DNU   100 PRC   Sync0 [0/0/CPU0]
DdS  GigabitEthernet0/1/0/0   n/a   ST3   50        Sync0 [0/0/CPU0]
D    SONET0/1/0/0             n/a   n/a   100 DNU   Sync0 [0/0/CPU0]
>    GigabitEthernet0/12/0/13 PRC   n/a   200 DNU   Sync0 [0/0/CPU0]
```

The output in summary mode is as follows, for each node:

```
Node 0/0/CPU0:
  34 Ethernet interfaces in Synchronous mode, 10 assigned for selection, 23 with SSM enabled

  ESMC SSMs        Total  Information    Event        DNU
    Sent:         198765       189665     9100        650
    Received:     654321       654320       91      54321

  12 SONET interfaces in Synchronous mode, 5 assigned for selection, 11 with SSM enabled
```

show frequency synchronization ptp

To display whether a PTP clock is available to frequency synchronization, use the **show frequency synchronization ptp** command in EXEC mode.

show frequency synchronization ptp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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 **show frequency synchronization ptp** command shows whether a PTP clock is available to frequency synchronization or not. Options are “available” or “not available”.

Note This is not to be confused with output from the **show frequency synchronization selection** command, which displays the status of the timing stream from the PTP source.

Task ID

Task ID	Operation
ethernet-services	read

This example shows sample output from the **show frequency synchronization ptp** command:

```
Router# show frequency synchronization ptp

Wed Feb 13 13:56:55.412 PST
Node 0/RP0/CPU0
==============
  PTP is unavailable.
```

show frequency synchronization selection

To display the frequency synchronization selection information for all selection points or for a specific node, use the **show frequency synchronization selection** command in EXEC mode.

show frequency synchronization selection { **location** *node-id* }

Syntax Description

location *node-id*	Displays information for a specific node on the router. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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 **show frequency synchronization selection** command shows the status of the timing stream from the timing source

Task ID

Task ID	Operations
ethernet-services	execute

Examples

This example shows the normal output for the **show frequency synchronization selection** command:

```
Router# show frequency synchronization selection
Node 0/0/CPU0:
==============
Selection point: ETH_RXMUX (0 inputs, 0 selected)
Last programmed 1w2d ago, and selection made 1w2d ago
Next selection points
SPA scoped : None
Node scoped : None
Chassis scoped: T0-SEL-B 1588-SEL
Router scoped : None
Uses frequency selection

Selection point: LC_TX_SELECT (1 inputs, 1 selected)
Last programmed 01:53:50 ago, and selection made 01:53:50 ago
Next selection points
SPA scoped : None
Node scoped : None
Chassis scoped: None
Router scoped : None
Uses frequency selection
Used for local line interface output
```

```
S Input Last Selection Point QL Pri Status
== ======================== ======================== ===== === ===========
7 Sync2 [0/RP0/CPU0] 0/RP0/CPU0 T0-SEL-B 1 PRC 100 Available

Node 0/RP0/CPU0:
==============
Selection point: T0-SEL-B (2 inputs, 1 selected)
Last programmed 01:53:50 ago, and selection made 00:34:20 ago
Next selection points
SPA scoped : None
Node scoped : None
Chassis scoped: LC_TX_SELECT
Router scoped : None
Uses frequency selection
Used for local line interface output
S Input Last Selection Point QL Pri Status
== ======================== ======================== ===== === ===========
1 Sync2 [0/RP0/CPU0] n/a PRC 100 Locked
Internal0 [0/RP0/CPU0] n/a SEC 255 Available

Selection point: 1588-SEL (2 inputs, 1 selected)
Last programmed 01:53:50 ago, and selection made 00:34:19 ago
Next selection points
SPA scoped : None
Node scoped : None
Chassis scoped: None
Router scoped : None
Uses frequency selection
S Input Last Selection Point QL Pri Status
== ======================== ======================== ===== === ===========
1 Sync2 [0/RP0/CPU0] n/a PRC 100 Locked
Internal0 [0/RP0/CPU0] n/a SEC 255 Available

Selection point: CHASSIS-TOD-SEL (2 inputs, 1 selected)
Last programmed 01:53:50 ago, and selection made 01:53:49 ago
Next selection points
SPA scoped : None
Node scoped : None
Chassis scoped: None
Router scoped : None
Uses time-of-day selection
S Input Last Selection Point Pri Time Status
== ======================== ======================== === ==== ===========
1 Sync2 [0/RP0/CPU0] n/a 100 Yes Available
Internal0 [0/RP0/CPU0] n/a 255 No Available
```

show frequency synchronization selection back-trace

To display the path that was followed by the clock source that is being used to drive a particular interface use the **show frequency synchronization selection back-trace** command in EXEC mode.

show frequency synchronization selection back-trace {**clock-interface sync** *port-nu* | **interface** *type interface-path-id* | **ptp location** *node-id*}

Syntax Description

clock-interface sync *port- nu*	Displays the path to the specified clock interface.
interface *type interface-path-id*	Displays the path to the specified interface.
ptp location *node-id*	Displays the path to the specified PTP clock location.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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 **show frequency synchronization selection back-trace** command displays the trace from the specified target interface, back to the clock source being used to drive it. The display includes the selection points that are being hit along the way.

Task ID

Task ID	Operation
ethernet-services	read

This example shows sample output from the **show frequency synchronization selection back-trace** command:

```
Router# show frequency synchronization selection back-trace interface GigabitEthernet0/2/0/0

Selected Source: GigabitEthernet0/3/0/0
Selection Points:
  0/2/CPU0 LC_TX_SELECT 1
  0/RP0/CPU0 T0_SEL_B 1
  0/RP0/CPU0 T4_SEL_A 1
  0/3/CPU0 ETH_RXMUX 1
  0/3/CPU0 EZ_RX_0_9 1
```

show frequency synchronization selection forward-trace

To display the path that was recovered from a particular interface, use the **show frequency synchronization selection forward-trace**

show frequency synchronization selection forward-trace {**clock-interface sync** *port-nu* | **interface** *type interface-path-id* | **ptp location** *node-id* | **gnss-receiver** *number* }

Syntax Description

clock-interface sync *port- nu*	Displays the path to the specified clock interface.
interface *type interface-path-id*	Displays the path to the specified interface.
ptp location *node-id*	Displays the path to the specified PTP clock location.
ntp location *node-id*	Displays the path to the specified NTP clock location.
gnss-receiver *number*	Specifies the number of gnss-receiver ranging from 0-4294967295.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	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 **show frequency synchronization selection forward-trace** command displays the trace from the specified interface, out to all selection points that receive the clock from the interface, and from any interfaces that are potentially being driven by this clock source.

Task ID

Task ID	Operation
ethernet-services	read

This example shows sample output from the **show frequency synchronization selection forward-trace** command:

```
Router# show frequency synchronization selection forward-trace clock-interface sync 2
location 0/RP0/CPU0
0/RP0/CPU0 T0-SEL-B
0/0/CPU0 LC_TX_SELECT
FortyGigE0/0/1/2
TenGigE0/0/0/12

0/RP0/CPU0 1588-SEL
0/RP0/CPU0 CHASSIS-TOD-SEL
```

ssm disable

To disable Synchronization Status Messaging (SSM) on an interface, use the **ssm disable** command in the appropriate frequency synchronization configuration mode. To return SSM to the default value of enabled, use the **no** form of this command.

ssm disable
no ssm disable

Command Default

Enabled

Command Modes

Interface frequency synchronization configuration

Command History

Release	Modification
Release 7.0.1	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.

For frequency synchronization interfaces, the **ssm disable** command disables sending ESMC packets, and ignores any received ESMC packets.

The received QL value that is used if SSM is disabled depends on the option:

- Option 1: DNU
- Option 2: STU

Note If a clock interface does not support SSM, you are advised to disable SSM on the clock interface. This ensures that the clock interface output is squelched if the output QL from the clock interface would otherwise be DNU.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to disable SSM on an interface:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# interface gigabitethernet 0/1/0/1
RP/0/0RP0/CPU0:router:hostname(config-if)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# ssm disable
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# commit
```

time-of-day-priority

To control the order for which sources are selected for time-of-day (ToD), use the **time-of-day-priority** command in the appropriate frequency synchronization configuration mode. To revert to the default time-of-day priority, use the **no** form of this command.

time-of-day-priority *priority*
no time-of-day-priority

Syntax Description

priority	Priority that is used for frequency synchronization as the source for the ToD. Values can range from 1 (highest priority) to 254 (lowest priority).

Command Default

The default priority is 100.

Command Modes

Interface frequency synchronization

Command History

Release	Modification
Release 7.0.1	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 **time-of-day-priority** to prioritize between different sources of the ToD source.

Task ID

Task ID	Operation
ethernet-services	read, write

This example shows how to configure the ToD priority for frequency synchronization:

```
RP/0/0RP0/CPU0:router:hostname(config)# interface Gig 0/1/0/0
RP/0/0RP0/CPU0:router:hostname(config-if)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# time-of-day-priority 200
```

wait-to-restore

To configure the wait-to-restore time for frequency synchronization on an interface, use the **wait-to-restore** command in the appropriate frequency synchronization configuration mode. To return the wait-to-restore time to the default value, use the **no** form of this command.

wait-to-restore *minutes*
no wait-to-restore *minutes*

Syntax Description

minutes	The delay time (in minutes) between when an interface comes up and when it is used for synchronization. The range is 0 to 12.

Command Default

There is a 5-minute delay for frequency synchronization after an interface comes up.

Command Modes

Interface frequency synchronization (config-if-freqsync)

Command History

Release	Modification
Release 7.0.1	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 wait-to-restore time is in minutes. When the configuration is changed, it does not affect any timers that are currently running. Any currently running wait-to-restore timers can be cleared using the **clear frequency synchronization wait-to-restore** command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to configure the wait-to-restore time for frequency synchronization on an interface:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# interface gigabitethernet 0/1/0/1
RP/0/0RP0/CPU0:router:hostname(config-if)# frequency synchronization
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# wait-to-restore 0
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# selection input
RP/0/0RP0/CPU0:router:hostname(config-sonet-freqsync)# commit
```