

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 ASR 9000 Series Routers*.

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clear SyncE esmc statistics

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

clear SyncE 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 6.1.2	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.

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 SyncE esmc statistics interface gigabitethenet 0/1/0/1
```

clear SyncE wait-to-restore

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

clear SyncE 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 6.1.2	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.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

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

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

Related Topics

wait-to-restore, on page 40

clock-interface timing-mode

To configure the type of timing sources that can be used to drive the output from the clock interfaces on the router, use the **clock-interface timing-mode** command in frequency synchronization configuration mode. To revert to the default timing mode, use the **no** form of this command.

clock-interface timing-mode {**independent** | **system**}
no clock-interface timing-mode

Syntax Description

independent	Specifies that the output of clock interfaces is driven only by the line interfaces (Ethernet and SONET). Each clock interface port on the router is completely independent. The same timing source cannot be used on more than one port and no loopbacks are allowed between clock interface ports.
system	Specifies that the output of a clock interface is driven by the system-selected timing source, which can be either the line interface or the clock interface.

Command Default

Clock interface output is driven only by input from line interfaces or the internal oscillator.

Command Modes

Frequency synchronization 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.

In the default clock mode, clock interface loopback detection is turned on. This means that heuristic tests are run to detect if the signal being sent out of one clock interface can be looped back by some external box and sent back in via the same, or another, clock interface. In addition, output from the clock interface is driven only by input from line interfaces (and the internal oscillator). It is never driven by input from another clock interface.

Task ID

Task ID	Operations
ethernet-services	execute
sonet-sdh	execute

Examples

The following examples show how to configure the timing source for the clock interfaces on the router:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# frequency synchronization
RP/0/RSP0/CPU0:router(config-freqsync)#clock-interface independent

RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# frequency synchronization
RP/0/RSP0/CPU0:router(config-freqsync)#clock-interface system
```

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 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
ethernet-services	execute
sonet-sdh	execute

Examples

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

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# clock-interface sync 0 location 0/1/cpu0
RP/0/RSP0/CPU0:router(config-clock-if)# frequency synchronization
RP/0/RSP0/CPU0:router(config-clk-freqsync)#
```

SyncE

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

SyncE
no SyncE

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 6.1.2	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.

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

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

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to enable SyncE in global configuration:

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

Examples

The following example shows how to enable SyncE 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)# SyncE
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 tod-format {**cisco** | **ntp4** | **gprmc** | **itu-t**} **pps-input** {**rs422** | **ttl**} **input-phase-delay***delay-nanoseconds*

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.
itu-t	Specifies that received time-of-day messages are in the itu-t format.
pps-input	Specifies the mode of one pulse-per-second signals.
rs422	Specifies that received 1PPS messages are in RS-422 mode.
ttl	Specifies that received 1PPS messages are in TTL mode.
input-phase-delay *input-phase-delay*	Specifies the compensation when there is phase delay. **Note** When you use an ASR 9000 router as Grand Master (GM), it may be connected to a GPS source. If there is a phase delay that is caused by either the GPS source itself or the cable, use the **input-phase-delay** keyword to compensate the delay.

Command Default

GPS parameters are not configured.

Command Modes

Clock interface port parameters configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.
Release 5.2.2	Support for GPRMC format.
Release 5.3.2	The **input-phase-delay** keyword was introduced.
Release 6.2.1	The **input-phase-delay** keyword was introduced.
Release 7.1.1	Support for itu-t format 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:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# clock-interface sync 2 location 0/rsp0/cpu0
RP/0/RSP0/CPU0:router(config-clock-if)# port-parameters
RP/0/RSP0/CPU0:router(config-clk-parms)# gps-input tod-format cisco pps-input rs422 offset
 utc
```

gps-output

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

gps-output tod-format {**cisco** | **ntp4** | **gprmc** | **itu-t**} **pps-output** {**rs422** | **ttl**}

Syntax Description

tod-format	Specifies the format of the time-of-day messages.
gprmc	Specifies that the time-of-day messages sent are in NMEA GPRMC format.
cisco	Specifies that time-of-day messages sent are in the Cisco ASCII format.
ntp4	Specifies that the time-of-day messages sent are in the NTP Type 4 format.
itu-t	Specifies that received time-of-day messages are in the itu-t format.
pps-output	Specifies the mode of 1PPS signals.
rs422	Specifies that 1PPS signal is sent from RS-422 port.
ttl	Specifies that 1PPS signal is sent from SMB port.

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.
Release 7.1.1	Support for itu-t format was introduced.

Usage Guidelines

Use the **gps-output** command to specify output parameters for a clock interface that is configured for gps output (10Mhz, ToD and 1PPS).

On the below hardware 10Mhz output is not supported:

- A9K-RSP880-SE/TR
- A99-RSP-SE/TR
- RSP880-LT-SE/TR
- A9K-RSP440-TR/SE
- A99-RP-SE
- A99-RP2-TR/SE
- ASR-9001
- ASR-9901

Task ID

Task ID	Operation
drivers	read, write

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

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# clock-interface sync 2 location 0/rsp0/cpu0
RP/0/RSP0/CPU0:router(config-clock-if)# port-parameters
RP/0/RSP0/CPU0:router(config-clk-parms)# gps-output tod-format cisco pps-output rs422
```

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

SyncE configuration

Command History

Release	Modification
Release 6.1.2	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.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

This example shows how to enable logging of changes to :

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

#
```

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**
dti	Specifies a DOCSIS® Timing Interface (DTI).
ics	Enables inter-chassis clock synchronisation.

Command Default

No clocking type is defined.

Command Modes

Clock interface configuration mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 6.6.2	The **bits-default** keyword 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# clock-interface sync 1 location 0/RSP0/CPU0
RP/0/RSP0/CPU0:router(config-clock-if)# port-parameters dti
```

priority (SyncE)

To configure the priority of the frequency source on a controller or an interface, use the **priority** command in the appropriate SyncE configuration mode. To return the priority to the default value, use the no form of this command.

priority *priority-value*
no priority *priority-value*

Syntax Description

priority-value	Priority of the frequency source. The priority is used to select between sources with the same Quality Level (QL). The range is 1 (highest priority) to 254 (lowest priority).

Command Default

100

Command Modes

Controller SyncE configuration

Interface SyncE configuration

Command History

Release	Modification
Release 6.1.2	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.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to configure the SyncE priority on a controller:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname#(config)# controller 0/1/0/1
RP/0/0RP0/CPU0:router:hostname#(config-controller)# SyncE
RP/0/0RP0/CPU0:router:hostname#(config-controller-freqsync)# priority 150
RP/0/0RP0/CPU0:router:hostname#(config-controller-freqsync)# commit
```

quality itu-t option

To configure the ITU-T quality level (QL) options, use the **quality itu-t option** command in SyncE configuration mode. To return to the default levels, use the **no** form of this command.

quality itu-t option {**1** | **2 generation** {**1** | **2**}}
no quality

Syntax Description

{**1** | **2 generation** {**1** | **2**}}	Specifies the quality level for the router. Valid options are: • **1**—ITU-T QL option 1, which uses the PRC, SSU-A, SSU-B, SEC and DNU quality levels. • **2 generation 1**—ITU-T QL option 2 generation 1, which uses the PRS, STU, ST2, ST3, SMC, ST4, RES and DUS quality levels. • **2 generation 2**—ITU-T QL option 2, generation 2, which uses the PRS, STU, ST2, ST3 TNC, ST3E, SMC, ST4, PROV and DUS quality levels.

Command Default

ITU-T option 1

Command Modes

SyncEconfiguration

Command History

Release	Modification
Release 6.1.2	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 QL configured with the **quality itu-t option** command must match the QL specified in the **quality transmit** and **quality receive** commands configured in clock interface or interface SyncE configuration mode.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to configure the ITU-T QL options:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname#(config)# SyncE
RP/0/0RP0/CPU0:router:hostname#(config-sonet-freqsync)# quality itu-t option 1
```

Related Topics

quality receive, on page 17
quality transmit, on page 20

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 {**lowest** *ql-option ql* [**highest** *ql*] | **highest** *ql-option ql* | **exact** *ql-option 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: • PRC • SSU-A • SSU-B • SEC • DNU
	Valid QL values for ITU-T Option 2 Generation 1 are: • PRS • STU • ST2 • ST3 • SMC • ST4 • RES • DUS

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

- PRS
- STU
- ST2
- TNC
- ST3E
- ST3
- SMC
- ST4
- PROV
- DUS

Command Default

QL is unmodified.

Command Modes

Interface SyncE

Command History

Release	Modification
Release 6.1.2	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.

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:

```
RP/0/0RP0/CPU0:router:hostname# config
RP/0/0RP0/CPU0:router:hostname(config)# controller sonet 0/1/0/1
RP/0/0RP0/CPU0:router:hostname(config-sonet)# SyncE
RP/0/0RP0/CPU0:router:hostname(config-sonet-freqsync)# quality receive itu-t
option 2 generation 2 ST3
```

Related Topics

quality itu-t option, on page 16

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 SyncE mode. To return to the default levels, use the **no** form of this command.

quality transmit itu-t option {**lowest** *ql-option ql* [**highest** *ql*] | **highest** *ql-option ql* | **exact** *ql-option 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: • PRC • SSU-A • SSU-B • SEC • DNU
	Valid QL values for ITU-T Option 2 Generation 1 are: • PRS • STU • ST2 • ST3 • SMC • ST4 • RES • DUS

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

- PRS
- STU
- ST2
- TNC
- ST3E
- ST3
- SMC
- ST4
- PROV
- DUS

Command Default

The QL is unmodified

Command Modes

Interface SyncE

Command History

Release	Modification
Release 6.1.2	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.

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:

```
RP/0/0RP0/CPU0:router:hostname#(config)#controller sonet 0/1/0/1
RP/0/0RP0/CPU0:router:hostname(config-sonet)#SyncE
RP/0/0RP0/CPU0:router:hostname(config-sonet-freqsync)quality transmit itu-t option 2
generation 2
RP/0/0RP0/CPU0:router:hostname(config-sonet-freqsync)#commit
```

Related Topics

quality itu-t option, on page 16

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 SyncE 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 SyncE configuration

Interface SyncE configuration

Command History

Release	Modification
Release 6.1.2	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.

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)# SyncE
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 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
ethernet-services	execute
sonet-sdh	execute

Examples

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

```
RP/0/RSP0/CPU0:router# show frequency synchronization clock-interfaces

Node 0/0/CPU0:
==============
  Clock interface Sync0 (Up):
    Assigned as input for selection
    SSM supported and enabled
    Input:
      Going down in 00:00:20
      Last received QL: OPT-II,1/PRC
      Effective QL: OPT-II,1/PRC, Priority: 200
    Output:
      Selected source: GigabitEthernet0/0/0/3
```

```
    Selected source QL: OPT-II,1/PRC
    Effective QL: DNU
Next selection points: RP_SELECTOR

Clock interface Sync1 (Down: mode is not configured):
  Assigned as input for selection
  SSM supported and enabled
  Input:
    Restore in 00:02:00
    Last received QL: Opt-II,2/ST3
    Effective QL: Opt-II,2/ST3, Priority: 100
  Output:
    Selected source: GigabitEthernet0/0/0/3
    Selected source QL: Opt-II,2/PRC
    Effective QL: DNU
Next selection points: RP_SYSTEM

Clock interface Internal0 (Up):
  Input:
    Default QL: OPT-II,2/ST3
    Effective QL: OPT-II,2/ST3, Priority 255
Next selection points: RP_SELECTOR
```

Note The last received QL and effective output QL are only shown if SSM is supported and enabled on the clock.

The output in brief mode is as follows:

```
RP/0/RSP0/CPU0: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 0/0/CPU0:
==============
  Fl    Clock Interface     QLrcv  QLuse  Pri QLsnd  Source
  ===== ================== ====== ====== === ====== ======================
  >S    Sync0               PRC     PRC   100 DNU    GigabitEthernet0/0/0/3
  DS    Sync1               FAILED  DNU   100 n/a    GigabitEthernet0/0/0/3
  >S    Internal0           ST3     ST3   255 n/a
```

show SyncE configuration-errors

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

show SyncE 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 6.1.2	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.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

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

```
RP/0/0RP0/CPU0:router:hostname# show SyncE configuration-errors

Node 0/0/CPU0:
==============
  interface GigabitEthernet0/0/0/0 SyncE

* SyncE 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 SyncE interfaces

To show the SyncE information for all interfaces or for a specific interface, use the **show SyncE interfaces** command in EXEC mode.

show frequency SyncE { **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 6.1.2	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.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

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

```
RP/0/0RP0/CPU0:router:hostname# show SyncE 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 4.2.0	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.

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:

```
RP/0/RSP0/CPU0:router# show frequency synchronization ptp

Wed Feb 13 13:56:55.412 PST
Node 0/RSP0/CPU0
==============
  PTP is available.
    Supports frequency and time-of-day
    Input:
      Effective QL: Opt-II,2/PRS, Priority: 3, Time-of-day Priority 2
    Next selection points: T0-SEL-B CHASSIS-TOD-SEL

Node 0/RSP1/CPU0
==============
  PTP is available.
    Supports frequency and time-of-day
    Input:
```

```
  Effective QL: Opt-II,2/PRS, Priority: 3, Time-of-day Priority 2
Next selection points: T0-SEL-B CHASSIS-TOD-SEL
```

show SyncE selection

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

show SyncE 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 6.1.2	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 **show SyncE 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 SyncE selection** command:

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

Node 0/0/CPU0:
==============
Selection point: LC_INGRESS (4 inputs, 2 selected)
  Last programmed 00:01:30 ago, and selection made 00:01:29 ago
  Next selection points:
    SPA scoped    : None
    Node scoped   : None
    Chassis scoped: None
    Router scoped : RP_SELECTOR RP_CLOCK_INTF_SELECTOR
  S  Input                     Last Selection Point         QL  Pri  Status
  == ========================  ========================  =====  ===  ===========
  1  GigabitEthernet0/0/0/3    n/a                         PRC  100  Unmonitored
  2  GigabitEthernet0/0/0/0    n/a                         PRC  200  Down
     GigabitEthernet0/0/0/1    n/a                         ST2   50  Unmonitored
     GigabitEthernet0/0/0/2    n/a                         ST3  100  Unmonitored

Selection point: LC_EGRESS (2 inputs, 1 selected)
  Last programmed 00:25:42 ago, and selection made 00:00:15 ago
  Next selection points:
    SPA scoped    : None
```

```
    Node scoped   : None
    Chassis scoped: None
    Router scoped : None
  Used for local line interface output
  Used for local clock-interface output
  S  Input                     Last Selection Point         QL  Pri  Status
  == ========================  ========================  =====  ===  ===========
  1  GigabitEthernet0/0/0/3    0/1/CPU0 RP_SELECTOR 1      PRC  100  Ok
     GigabitEthernet0/0/0/3    0/2/CPU0 RP_SELECTOR 1      PRC  100  Ok

Node 0/1/CPU0:
==============
Selection point: RP_SELECTOR (5 inputs, 1 selected)
  Last programmed 00:01:32 ago, and selection made 00:01:28 ago
  Next selection points:
    SPA scoped    : None
    Node scoped   : None
    Chassis scoped: None
    Router scoped : LC_EGRESS
  S  Input                     Last Selection Point         QL  Pri  Status
  == ========================  ========================  =====  ===  ===========
  1  GigabitEthernet0/0/0/3    0/0/CPU0 LC_INGRESS 1       PRC  100  Ok
     Sync0 [0/1/CPU0]          n/a                         PRC   50  LOS
     GigabitEthernet0/0/0/3    0/2/CPU0 RP_SELECTOR 1      PRC  100  Ok
     GigabitEthernet0/0/0/0    0/0/CPU0 LC_INGRESS 2       PRC  200  Ok
     Internal0 [0/1/CPU0]      n/a                         ST3  255  Ok

Selection point: RP_CLOCK_INTF_SELECTOR (4 inputs, 1 selected)
  Last programmed 00:01:32 ago, and selection made 00:01:28 ago
  Next selection points:
    SPA scoped    : None
    Node scoped   : None
    Chassis scoped: None
    Router scoped : None
  Used for local clock-interface output
  S  Input                     Last Selection Point         QL  Pri  Status
  == ========================  ========================  =====  ===  ===========
  1  GigabitEthernet0/0/0/3    0/0/CPU0 LC_INGRESS 1       PRC  100  Ok
     GigabitEthernet0/0/0/3    0/2/CPU0 RP_SELECTOR 1      PRC  100  Ok
     GigabitEthernet0/0/0/0    0/0/CPU0 LC_INGRESS 2       PRC  200  Ok
     Internal0 [0/1/CPU0]      n/a                         ST3  255  Ok

Node 0/2/CPU0:
==============
Selection point: RP_SELECTOR (4 inputs, 1 selected)
  Last programmed 00:28:55 ago, and selection made 00:00:20 ago
  Next selection points:
    SPA scoped    : None
    Node scoped   : None
    Chassis scoped: None
    Router scoped : LC_EGRESS
  S  Input                     Last Selection Point         QL  Pri  Status
  == ========================  ========================  =====  ===  ===========
  1  GigabitEthernet0/0/0/3    0/1/CPU0 RP_SELECTOR 1      PRC  100  Ok
     GigabitEthernet0/0/0/3    0/0/CPU0 LC_INGRESS 1       PRC  100  Ok
     GigabitEthernet0/0/0/0    0/0/CPU0 LC_INGRESS 2       PRC  200  Ok
     Internal0 [0/2/CPU0]      n/a                         ST3  255  Ok

Selection point: RP_CLOCK_INTF_SELECTOR (4 inputs, 1 selected)
  Last programmed 00:28:55 ago, and selection made 00:00:20 ago
  Next selection points:
    SPA scoped    : None
    Node scoped   : None
    Router scoped : None
```

```
  Chassis scoped: None
Used for local clock-interface output
S  Input                     Last Selection Point          QL  Pri  Status
== ========================  ========================  =====  ===  ===========
1  GigabitEthernet0/0/0/3    0/1/CPU0 RP_SELECTOR 1      PRC  100  Ok
   GigabitEthernet0/0/0/3    0/0/CPU0 LC_INGRESS 1       PRC  100  Ok
   GigabitEthernet0/0/0/0    0/0/CPU0 LC_INGRESS 2       PRC  200  Ok
   Internal0 [0/2/CPU0]      n/a                         ST3  255  Ok
```

This example shows output from the **show frequency synchronization selection summary** command. The timing sources which are selected in the system are displayed and are clocking one or more outputs:

```
RP/0/RSP0/CPU0:router# show frequency synchronization selection summary

GigabitEthernet0/0/0/3 is selected for 2 outputs
Sync0 [0/0/CPU0] is selected for 25 outputs
```

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 4.0.0	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.

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:

```
RP/0/RSP0/CPU0: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/RSP0/CPU0 T0_SEL_B 1
  0/RSP0/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*}

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 4.0.0	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.

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:

```
RP/0/RSP0/CPU0:router# show frequency synchronization selection forward-trace interface
GigabitEthernet0/2/0/0

0/2/CPU0 EZ_RX_0_9
  0/2/CPU0 ETH_RXMUX
    0/RSP0/CPU0 T4_SEL_A
                  0/RSP0/CPU0 T0_SEL_B
        0/RSP0/CPU0 CHASSIS_TOD_SEL

                                  0/RSP0/CPU0 T4_SEL_C
          Sync0 [0/0/CPU0]
          Sync1 [0/0/CPU0]
```

```
    0/2/CPU0 LC_TX_SELECT
      GigabitEthernet 0/2/0/3

    0/3/CPU0 LC_TX_SELECT
      GigabitEthernet 0/3/0/0
      GigabitEthernet 0/3/0/1

0/RSP0/CPU0 T4_SEL_A
              0/RSP1/CPU0 T0_SEL_B
    0/RSP1/CPU0 CHASSIS_TOD_SEL

              0/RSP1/CPU0 T4_SEL_C
  0/2/CPU0 LC_TX_SELECT
  0/3/CPU0 LC_TX_SELECT
```

ssm disable

To disable Synchronization Status Messaging (SSM) on an interface, use the **ssm disable** command in the appropriate SyncE 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 SyncE configuration

Command History

Release	Modification
Release 6.1.2	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.

For SyncE 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)# SyncE
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# ssm disable
RP/0/0RP0/CPU0:router:hostname(config-if-freqsync)# commit
```

timing-accuracy enhanced

To switch from Class B mode to Class C mode, use the **timing-accuracy enhanced** command in the frequency synchronization mode. To revert to Class B, use the **no** form of this command.

timing-accuracy enhanced

Syntax Description

This command has no keywords or arguments.

Command Default

The default mode is ClassB/Legacy mode.

Command Modes

Frequency synchronization mode

Command History

Release	Modification
Release 7.6.2	This command was introduced.

Usage Guidelines

To use this command in XR VM, you must be in a user group associated with appropriate command rules and data rules. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	execute

Examples

This example shows how to switch Class B to Class C mode:

```
Router# configure
Router(config)# frequency synchronization
Router(config-freqsync)# timing-accuracy enhanced
Router(config-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 SyncE 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 SyncE 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 SyncE

Command History

Release	Modification
Release 6.1.2	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.

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 SyncE:

```
RP/0/0RP0/CPU0:router:hostname(config)# interface Gig 0/1/0/0
RP/0/0RP0/CPU0:router:hostname(config-if)# SyncE
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 SyncE on an interface, use the **wait-to-restore** command in the appropriate SyncE 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 SyncE after an interface comes up.

Command Modes

Interface SyncE (config-if-freqsync)

Command History

Release	Modification
Release 6.1.2	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 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 SyncE 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 SyncE 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)# SyncE
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
```

Related Topics

clear SyncE wait-to-restore, on page 3