



# Configuring Synchronous Ethernet ESMC and SSM

**Table 1: Feature History**

Feature Name	Release Information	Feature Description
Synchronous Ethernet ESMC and SSM	Cisco IOS XE Bengaluru 17.4.1	Effective Cisco IOS XE Bengaluru 17.4.1, the Cisco NCS 520 Ethernet Access Device support Synchronization Status Message (SSM) and Ethernet Synchronization Message Channel (ESMC) for synchronous ethernet clock synchronization.

Synchronous Ethernet is an extension of Ethernet designed to provide the reliability found in traditional SONET/SDH and T1/E1 networks to Ethernet packet networks by incorporating clock synchronization features.

- [Clock Selection Modes, on page 1](#)
- [Managing Clock Selection, on page 2](#)
- [Restrictions and Usage Guidelines, on page 2](#)
- [Specifying a Clock Source, on page 3](#)
- [Disabling a Clock Source, on page 4](#)
- [Verifying the Configuration, on page 5](#)
- [Troubleshooting, on page 5](#)

## Clock Selection Modes

The Cisco Router supports two clock selection modes, which are described in the following sections.

### QL-Enabled Mode

In QL-enabled mode, the router considers the following parameters when selecting a clock source:

- Clock quality level (QL)
- Clock availability
- Priority

## QL-Disabled Mode

In QL-disabled mode, the router considers the following parameters when selecting a clock source:

- Clock availability
- Priority



---

**Note** You can use override the default clock selection by using the commands described in *Specifying a Clock Source* and *Disabling a Clock Source* sections.

---

## Managing Clock Selection

You can manage clock selection by changing the priority of the clock sources; you can also influence clock selection by modifying the following clock properties:

- **Hold-Off Time:** If a clock source goes down, the router waits for a specific hold-off time before removing the clock source from the clock selection process. By default, the value of hold-off time is 300 ms.
- **Wait to Restore:** The amount of time that the router waits before including a newly active synchronous Ethernet clock source in clock selection. The default value is 300 seconds.
- **Force Switch:** Forces a switch to a clock source regardless of clock availability or quality.
- **Manual Switch:** Manually selects a clock source, provided the clock source has a equal or higher quality level than the current source.

For more information about how to use these features, see the *Specifying a Clock Source* and *Disabling a Clock Source* sections.

## Restrictions and Usage Guidelines

The following restrictions apply when configuring Synchronous Ethernet SSM and ESMC:

- To use the **network-clock synchronization ssm option** command, ensure that the router configuration does not include the following:
  - Input clock source
  - Network clock quality level
  - Network clock source quality source (Synchronous Ethernet interfaces)
- The **network-clock synchronization ssm option** command must be compatible with the **network-clock eec** command in the configuration.
- To use the **network-clock synchronization ssm option** command, ensure that a network clocking configuration applied to the Synchronous Ethernet interfaces and timing port interfaces.

- It is recommended that you do not configure multiple input sources with the same priority as the TSM (Switching message delay).
- You can configure a maximum of two clock sources on interface modules.

## Specifying a Clock Source

The following sections describe how to specify a synchronous Ethernet clock source during the clock selection process:

### Selecting a Specific Clock Source

To select a specific interface as a synchronous Ethernet clock source, use the **network-clock switch manual** command in global configuration mode.



**Note** The new clock source must be of higher quality than the current clock source; otherwise the router does not select the new clock source.

Command	Purpose
<b>network-clock switch manual external R0</b>  Router(config)# network-clock switch manual external r0 crc4	Manually selects a synchronization source, provided the source is available and is within the range.
<b>network-clock clear switch {t0   external slot/card/port [10m   2m]}</b>  Router(config)# network-clock clear switch t0	Disable a clock source selection.

### Forcing a Clock Source Selection

To force the router to use a specific synchronous Ethernet clock source, use the **network-clock switch force** command in global configuration mode.



**Note** This command selects the new clock regardless of availability or quality.

Command	Purpose
<b>network-clock switch force external R0</b>  Router# network-clock switch force r0	Forces the router to use a specific synchronous Ethernet clock source, regardless of clock quality or availability.

Command	Purpose
<pre>network-clock clear switch {t0   external slot/card/port [10m   2m ]}  Router# network-clock clear switch t0</pre>	Disable a clock source selection.

## Disabling Clock Source Specification Commands

To disable a **network-clock switch manual** or **network-clock switch force** configuration and revert to the default clock source selection process, use the **network-clock clear switch** command.

Command	Purpose
<pre>network-clock clear switch {t0   external slot/card/port [10m   2m]}</pre>	Disable a clock source selection.
<pre>Router# network-clock clear switch t0</pre>	

## Disabling a Clock Source

The following sections describe how to manage the synchronous Ethernet clock sources that are available for clock selection:

### Locking Out a Clock Source

To prevent the router from selecting a specific synchronous Ethernet clock source, use the **network-clock set lockout** command in global configuration mode.

Command	Purpose
<pre>network-clock set lockout {interface interface_name slot/card/port   external R0  Router(config)# network-clock set lockout interface GigabitEthernet 0/0/0</pre>	Prevents the router from selecting a specific synchronous Ethernet clock source.
<pre>network-clock clear lockout {interface interface_name slot/card/port   external R0  Router(config)# network-clock clear lockout interface GigabitEthernet 0/0/0</pre>	Disable a lockout configuration on a synchronous Ethernet clock source.

### Restoring a Clock Source

To restore a clock in a lockout condition to the pool of available clock sources, use the **network-clock clear lockout** command in global configuration mode.

Command	Purpose
<pre>network-clock clear lockout {interface interface_name slot/card/port   external external R0  Router(config)# network-clock clear lockout interface GigabitEthernet 0/0/0</pre>	Forces the router to use a specific synchronous Ethernet clock source, regardless of clock quality or availability.

## Verifying the Configuration

You can use the following commands to verify your configuration:

- show esmc—Displays the ESMC configuration.
- show esmc detail—Displays the details of the ESMC parameters at the global and interface levels.
- show network-clock synchronization—Displays the router clock synchronization state.
- show network-clock synchronization detail—Displays the details of network clock synchronization parameters at the global and interface levels.

## Troubleshooting

The table below list the debug commands that are available for troubleshooting the SyncE configuration on the Cisco Router:



**Caution** We recommend that you do not use debug commands without TAC supervision.

**Table 2: SyncE Debug Commands**

Debug Command	Purpose
debug platform network-clock	Debugs issues related to the network clock, such as alarms, OOR, active-standby sources not selected correctly, and so on.
debug network-clock	Debugs issues related to network clock selection.

Debug Command	Purpose
<pre>debug esmc error  debug esmc event  debug esmc packet [interface &lt;interface name&gt;]  debug esmc packet rx [interface &lt;interface name&gt;]  debug esmc packet tx [interface &lt;interface name&gt;]</pre>	Verify the ESMC packets are transmitted and received with proper quality-level values.

The table below provides the information about troubleshooting your configuration.

**Table 3: Troubleshooting Scenarios**

Problem	Solution
<b>Clock selection</b>	<ul style="list-style-type: none"> <li>• Verify that there are no alarms on the interfaces using the <b>show network-clock synchronization detail</b> command.</li> <li>• Ensure that the nonrevertive configurations are in place.</li> <li>• Reproduce the issue and collect the logs using the <b>debug network-clock errors</b>, <b>debug network-clock event</b>, and <b>debug network-clock sm</b> commands. Contact Cisco Technical Support if the issue persists.</li> </ul>
<b>Incorrect QL values</b>	<ul style="list-style-type: none"> <li>• Ensure that there is no framing mismatch with the SSM option.</li> <li>• Reproduce the issue using the <b>debug network-clock errors</b> and <b>debug network-clock event</b> commands.</li> </ul>
<b>Alarms</b>	<ul style="list-style-type: none"> <li>• Reproduce the issue using the <b>debug platform network-clock command</b>. Alternatively, enable the <b>debug network-clock event</b> and <b>debug network-clock errors</b> commands.</li> </ul>
<b>Incorrect clock limit set or queue limit disabled mode</b>	<ul style="list-style-type: none"> <li>• Verify that there are no alarms on the interfaces using the <b>show network-clock synchronization detail</b> command.</li> <li>• Use the <b>show network-clock synchronization</b> command to confirm if the system is in revertive mode or nonrevertive mode and verify the non-revertive configurations.</li> <li>• Reproduce the current issue and collect the logs using the <b>debug network-clock errors</b>, <b>debug network-clock event</b>, and <b>debug network-clock sm</b> commands.</li> </ul>

Problem	Solution
<p><b>Incorrect QL values</b> when you use the <b>show network-clock synchronization detail</b> command.</p>	<ul style="list-style-type: none"><li>• Use the <b>network clock synchronization SSM</b> (<i>option 1 /option 2</i>) command to confirm that there is no framing mismatch. Use the <b>show run interface</b> command to validate the framing for a specific interface. For the SSM option 1, framing should be SDH or E1, and for SSM option 2, it should be T1.</li><li>• Reproduce the issue using the <b>debug network-clock errors</b> and <b>debug network-clock event</b> commands.</li></ul>

