



CHAPTER 10

Timing

This chapter provides information about Cisco ONS 15454 SDH users and SDH timing. To provision security and timing, refer to the *Cisco ONS 15454 SDH Procedure Guide*.

Chapter topics include:

- [10.1 Timing Parameters, page 10-1](#)
- [10.2 Network Timing, page 10-2](#)
- [10.3 Synchronization Status Messaging, page 10-3](#)

10.1 Timing Parameters

SDH timing parameters must be set for each ONS 15454 SDH. Each ONS 15454 SDH independently accepts its timing reference from one of three sources:

- The building integrated timing supply (BITS) pins on the MIC-C/T/P coaxial connectors.



Note For more information on BITS timing, see the [“2.3.1 TCC2P Functionality” section on page 2-10](#).

- An STM-N card installed in the ONS 15454 SDH. The card is connected to a node that receives timing through a BITS source.
- The internal ST3 clock on the TCC2/TCC2P card.

You can set ONS 15454 SDH timing to one of three modes: external, line, or mixed. If timing is coming from the BITS pins, set the ONS 15454 SDH timing to external. If the timing comes from an STM-N card, set the timing to line. In typical ONS 15454 SDH networks:

- One node is set to external. The external node derives its timing from a BITS source wired to the BITS MIC-C/T/P coaxial connectors. The BITS source, in turn, derives its timing from a primary reference source (PRS) such as a Stratum 1 clock or global positioning satellite (GPS) signal.
- The other nodes are set to line. The line nodes derive timing from the externally timed node through the STM-N trunk (span) cards. The MSTP normally derives timing from the line using an OSCM or OSC-CSM card located inside an STM-1 channel.

You can set three timing references for each ONS 15454 SDH. The first two references are typically two BITS-level sources, or two line-level sources optically connected to a node with a BITS source. The third reference is usually assigned to the internal clock provided on every ONS 15454 SDH TCC2/TCC2P

card. However, if you assign all three references to other timing sources, the internal clock is always available as a backup timing reference. The internal clock is a Stratum 3 (ST3), so if an ONS 15454 SDH node becomes isolated, timing is maintained at the ST3 level.

The CTC Maintenance > Timing > Report tabs show current timing information for an ONS 15454 SDH, including the timing mode, clock state and status, switch type, and reference data.

**Caution**

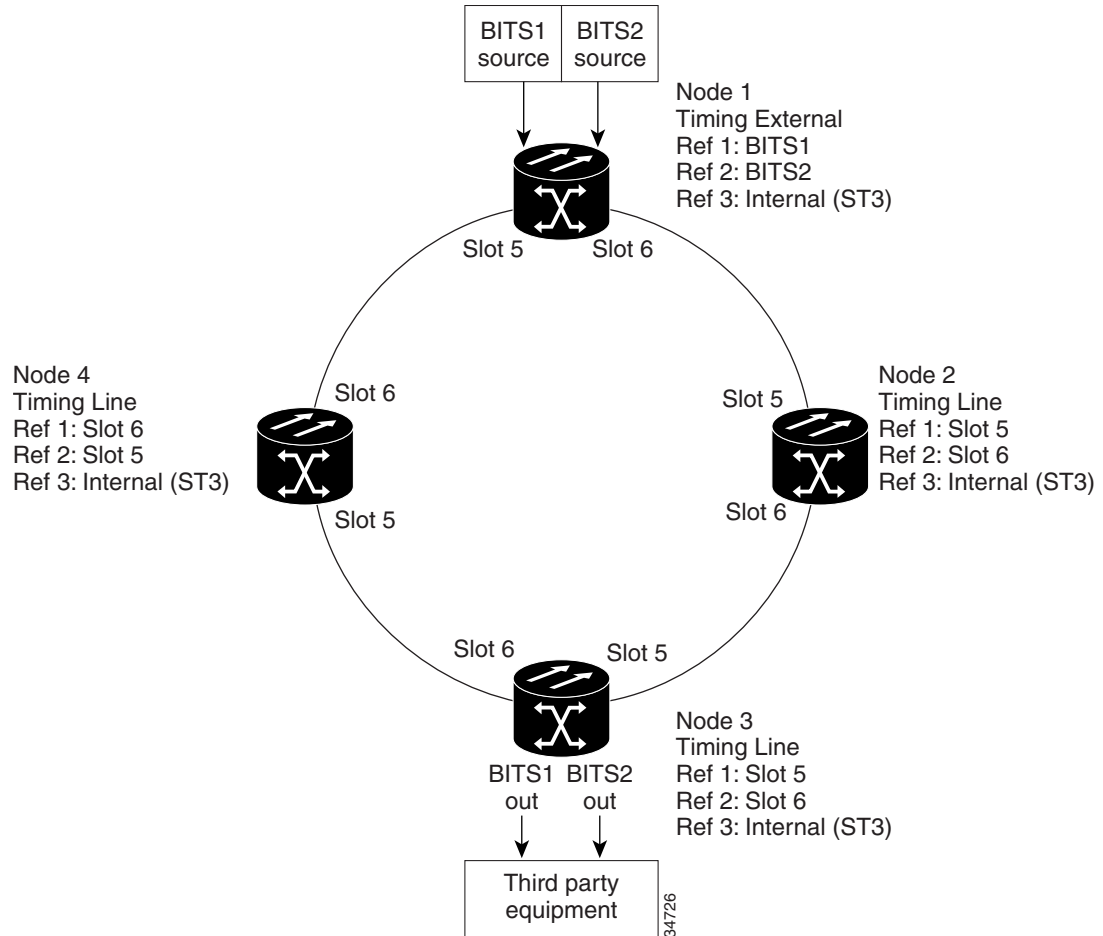
Mixed timing allows you to select both external and line timing sources. However, Cisco does not recommend its use because it can create timing loops. Use this mode with caution.

10.2 Network Timing

Figure 10-1 shows an ONS 15454 SDH network timing setup example. Node 1 is set to external timing. Two timing references are set to BITS. These are Stratum 1 timing sources wired to the BITS MIC-C/T/P coaxial connectors on Node 1. The third reference is set to internal clock. The BITS outputs on Node 3 provide timing to outside equipment, such as a digital access line access multiplexer.

In the example, Slots 5 and 6 contain the trunk (span) cards. Timing at Nodes 2, 3, and 4 is set to line, and the timing references are set to the trunk cards based on distance from the BITS source. Reference 1 is set to the trunk card closest to the BITS source. At Node 2, Reference 1 is Slot 5 because it is connected to Node 1. At Node 4, Reference 1 is set to Slot 6 because it is connected to Node 1. At Node 3, Reference 1 could be either trunk card because they are an equal distance from Node 1.

Figure 10-1 ONS 15454 SDH Timing Example



10.3 Synchronization Status Messaging

Synchronization status messaging (SSM) is an SDH protocol that communicates information about the quality of the timing source. SSM messages are carried on the S1 byte of the SDH section overhead. They enable SDH devices to automatically select the highest quality timing reference and to avoid timing loops.

SSM messages are either Generation 1 or Generation 2. Generation 1 is the first and most widely deployed SSM message set. Generation 2 is a newer version. If you enable SSM for the ONS 15454 SDH, consult your timing reference documentation to determine which message set to use. [Table 10-1](#) shows the SDH message set.

Table 10-1 SDH SSM Message Set

| Message | Quality | Description |
|---------|---------|---------------------------|
| G811 | 1 | Primary reference clock |
| STU | 2 | Sync traceability unknown |

Table 10-1 SDH SSM Message Set (continued)

| Message | Quality | Description |
|----------------|----------------|---------------------------------------|
| G812T | 3 | Transit node clock traceable |
| G812L | 4 | Local node clock traceable |
| SETS | 5 | Synchronous equipment |
| DUS | 6 | Do not use for timing synchronization |