



# CHAPTER 1

## Overview

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This chapter describes the Cisco Cable Clock Card and contains the following sections:

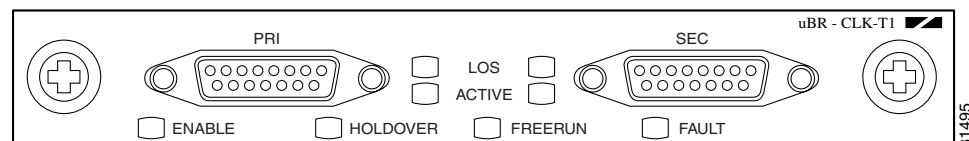
- [Clock Card Overview, page 1-1](#)
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## Clock Card Overview

The Cisco Cable Clock Card (see [Figure 1-1](#)) is a dual-port field-replaceable component that is designed to provide a reliable national clock signal to your Cisco uBR7246 VXR universal broadband router. The primary and secondary DB-15 interfaces on the front of the clock card connect to external T1 clock signal sources.

When installed in the Cisco uBR7246 VXR chassis, the clock card can propagate a national clock signal throughout the router's midplane by locking onto an external T1 signal originating over the PSTN, locking onto a T1 clock signal originating from a port adapter installed in the same chassis, or by connecting to a Global Positioning System (GPS) receiver generating a T1 clock signal.

**Figure 1-1** Clock Card—Faceplate View



**Caution**

Do not attempt to remove or install the clock card unless you have first powered off the Cisco uBR7246 VXR.



**Note**

The Cisco Cable Clock Card does not support an E1 interface.

# Clock Source Overview

There are three methods used to acquire and distribute both the primary and secondary national clock sources on the Cisco uBR7246 VXR. Using one of these three methods, the clock card can propagate a national clock signal throughout the chassis midplane to a supported cable interface line card, thus synchronizing communications over all cable interfaces in the Cisco uBR7246 VXR to other routers.

To use a national clock source, the cable interface line card must be one of the following models:

- Cisco uBR-MC16S
- Cisco uBR-MC16E
- Cisco uBR-MC28C
- Cisco uBR-MC28U/X

The three methods used to acquire a national clock signal are:

- Connecting to external T1 source signals from the Public Switched Telephone Network (PSTN)
- Propagating the clock signal from an active T1 connection originating on a port adapter installed in the same Cisco uBR7246 VXR
- Connecting to an external GPS receiver generating the appropriate T1 clock signal

External clock sources must conform to the following minimum specifications:

- Traceable to Stratum 1 clock signal

**Note**

A Stratum 1 clock has a long-term accuracy of  $10^{-11}$ . Stratum 1 clocks are generally used for synchronizing a few master sites in a digital telecommunications network. The synchronized signals propagate the time standard throughout the network.

- Wander on the reference input must not exceed ANSI T1.101 section 7.2.2, time deviation for Type III DS1 reference signals
- Jitter must not exceed the maximum allowable specified in GR-499-CORE section 7.2 for DS1 rates

**Note**

When installed in a Cisco uBR7246 VXR chassis, the clock card operates with a Cisco uBR-MC16S or Cisco uBR-MC16E cable modem card using Cisco IOS Release 12.1(1a)T1 or later, as well as Cisco IOS Release 12.1(2)EC1 or later. The clock card also operates with a Cisco uBR-MC28C cable modem card using Cisco IOS Release 12.1(3a)EC1 or later. You can use other cable interface cards, such as the Cisco uBR-MC16C, with the clock card, but these other cable interfaces will not synchronize their downstream SYNC messages with the external clock source.

## Modes of Operation

The clock card can provide timing reference to the Cisco uBR7246 VXR in a number of ways:

- Locked to either primary or secondary signal—The clock card remains in continuous contact with the primary and/or secondary external Stratum 1 clock source until a loss of service occurs, at which time the clock card assumes either holdover or freerun operation. This is the normal mode of operation for the clock card.

- Holdover mode (crystal stabilized)—The clock card enters holdover mode when a loss of service to the current primary and/or secondary external Stratum 1 clock source has occurred, providing that a connection to the external clock source was active and stable for at least 25 seconds. Holdover mode provides a reliable Stratum 3 clock to the Cisco uBR7246 VXR for up to 72 hours after a loss of external service.



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**Note** Holdover mode features 1 ppm maximum drift per day accuracy. A Stratum 3 clock has a long-term accuracy of  $10^{-9}$ .

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- Free running crystal source—The clock card enters freerun mode when it is unable to establish reliable service with either the primary or secondary external clock source when the Cisco uBR7246 VXR is powered on. This is the least stable of all operating modes.



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**Note** The clock card features a minimum freerun frequency accuracy of 4.6 ppm.

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- Locked to midplane TDM bus clock—If no connection to an external clock source can be established, the clock card can lock on to a T1 clock signal originating from a T1 port adapter installed in the same Cisco uBR7246 VXR and drive the TDM bus, which can then be used by cable modem cards in the Cisco uBR7246 VXR transporting traffic using the TDM bus.

If the primary external clock source experiences a loss of service, the clock card enters holdover mode. After a few seconds of running in holdover mode, the clock card will switch to the secondary external clock source, if one has been connected. The clock card will switch back to the primary external clock source at its first opportunity to restore a reliable connection.

## Interface Specifications and Pinouts

The interfaces on the front of the clock card are receive-only DB-15 connectors that enable you to connect your Cisco uBR7246 VXR to external T1 national clock sources originating over the PSTN or a GPS receiver. After you have successfully connected to a primary and or secondary external clock source, you can synchronize data, voice over IP (VoIP) and video communications to other routers around the corner, around the country, and around the world.

The primary and secondary DB-15 interfaces on the front of the clock card connect to external clock signal sources via standard DB-15 T1 interface cables.



**Warning**

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**To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.**

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**Figure 1-2 DB-15 T1 Clock Card Interface**

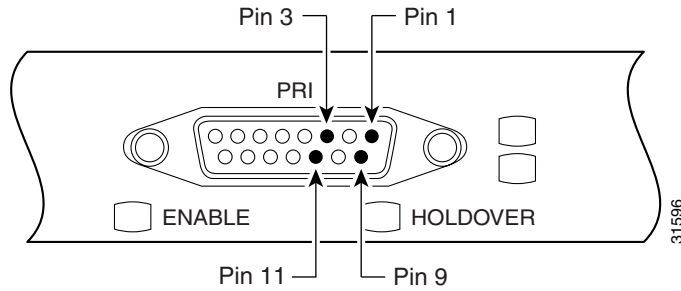


Table 1-1 lists connector pinouts for the DB-15 T1 clock card interface.

**Table 1-1 DB-15 T1 Clock Card Interface**

Clock Card End		External Clock Source End	
Pin <sup>1</sup>	Signal	Pin	Signal
1	Transmit Tip	3	Receive Tip
3	Receive Tip	1	Transmit Tip
9	Transmit Ring	11	Receive Ring
11	Receive Ring	9	Transmit Ring

1. Any pins not described in this table are not connected.



Cisco provides DSU/CSU cables. You can use a DA-15 female to pigtail cable, 24.6 feet (7.5 m), CAB-SDS6 cable, COM-T1Product Number. For pinouts, refer to: <http://www.cisco.com/univercd/cc/td/doc/product/core/cis7505/ipicg/>

## LEDs

The clock card features “ACTIVE” and Loss of Service (“LOS”) status indicators for both the primary and secondary clock source connectors. In addition, the clock card features single “ENABLE,” “HOLDOVER,” “FREERUN,” and “FAULT” LEDs. (These LEDs are shown in Figure 1-3.)

**Figure 1-3 LEDs on the Clock Card—Faceplate View**

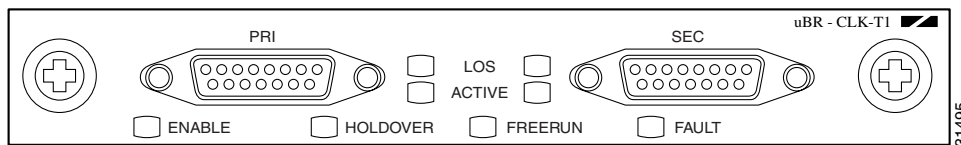


Table 1-2 describes the purpose and behavior of each LED on the clock card.

**Table 1-2** Clock Card LED Descriptions

LED	Color	Description
LOS (Primary)	Yellow	Indicates that the clock card has lost contact with the primary external clock source.
LOS (Secondary)	Yellow	Indicates that the clock card has lost contact with the secondary external clock source.
ACTIVE (Primary)	Green	Indicates that the clock card is currently locked to the primary external clock source signal.
ACTIVE (Secondary)	Green	Indicates that the clock card is currently locked to the secondary external clock source signal.
ENABLE	Green	Indicates that the clock card is correctly installed in and recognized by the Cisco uBR7246 VXR chassis.
HOLDOVER	Yellow	Indicates that the clock card has lost contact with the current primary and/or secondary external clock source(s) and has entered holdover mode. This means that the clock card was locked to an external clock signal for at least 25 seconds before losing contact and has temporarily become the clock source for the Cisco uBR7246 VXR.
FREERUN	Yellow	Indicates that the clock card has lost contact with both the primary and secondary external clock sources and has inadequate storage from prior connection to enter holdover mode. Unlike holdover mode, entering freerun mode means that the clock card was initially unable to lock on to either a primary or secondary external clock signal.  <b>Note</b> Freerun mode is most commonly encountered at startup when the clock card is unable to recognize an external clock source.
FAULT	Amber	Indicates a hardware failure with the clock card circuitry.

## Clock Card Location in the Cisco uBR7246 VXR Chassis

The chassis slot of the Cisco uBR7246 VXR chassis into which the clock card can be installed is on the left side of the chassis immediately below port adapter slot 1. [Figure 1-4](#) shows a Cisco uBR7246 VXR with the clock card installed.

**Figure 1-4** Clock Card Location in the Cisco uBR7246 VXR

