



GR-303

This chapter describes GR-303 and explains how to configure it. The chapter includes the following sections:

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How GR-303 Works

GR-303 is a standard interface for integrated digital loop carrier systems. Information in this chapter pertains to the Cisco 6732, which uses GR-303 to handle call processing and operations when connected to a Class 5 switch.

Interface Groups

The Cisco 6732 supports up to four GR-303 interface groups. Each interface group consists of at least two DS1 lines from the Cisco 6732 to the Class 5 switch. The primary DS1 line carries the embedded operations channel (EOC) and timeslot management channel (TMC), and the secondary DS1 line offers protection in case of loss of service on the primary DS1 line.

Each interface group can contain a maximum of 28 DS1 lines. You can combine DS1 lines from multiple line cards for a single interface group.

Call Reference Values

GR-303 uses dynamic cross connects for concentration of DS0 channels, allowing one DS1 to serve more than 24 subscribers. GR-303 assigns call reference values (CRV) to analog lines. CRVs are used to build translation tables on the Class 5 switch that map remote analog connections to internal circuits at the switch. A single interface group can support up to 2,016 CRVs.

Local CRVs

Local CRVs are assigned for analog circuits directly connected to the GR-303 processing node (the Cisco 6732). Lines used for local CRVs are assigned an interface group and CRV numbers. The EOC places the analog lines in service when needed. Local CRV provisioning allows the switch to decide if the line is ground start or loop start.

External CRVs

External CRVs are assigned to separate DS0s on the DS1s located in the Cisco 6732. The DS1s/DS0s that are assigned CRVs are not the same as those connected to the IDT. The CRV DS1s/DS0s physically connect to DS0s/DS1s in an external node. In the external nodes, the DS1s are cross connected to analog lines that correlate to the assigned CRVs. External CRV provisioning allows the switch to decide if the line is in ground start or loop start mode.

Remote CRVs

Remote CRVs are assigned to analog circuits connected to a remote node, such as a Cisco 6705 or Cisco IAD1101. The CRVs are assigned through an inter node data link from the Cisco 6732 to the remote node. For more information about inter node data links, see Chapter 8, "Inter Node Links."

After a CRV is assigned to a line, the EOC puts that line in service when it is needed. If you provision the line in service, there are conflicts between the Cisco 6732 database and the switch database.

Allocating Call Reference Values (CRVs) for a GR-303 Interface Group

- Step 1** From Cisco 6700 NodeView, select **Objects > Interface Group** from the menu bar. EMS launches the interface group provisioning window. (See Figure 10-1.)

Figure 10-1 Interface Group Provisioning Window

Interface Group Provision for 6732 node: node9

GR303 Interface Group

GR303 IDLC Profiles

TR008 Interface Group

Interface Group List

Exit

6732 Name: node9

Interface Group Type: GR303

Interface Group ID: 1

Allocated Number of CRVs: 0

Number of Assigned CRVs: 0

B51 List:

Card	Line	VT-D51 Num	Member ID

Interface Group Problem List:

GR303 Datalink ID: 1

GR303 Datalink Type: EOC

GR303 Datalink D51 Line:

GR303 Datalink D59 Channel: T2

GR303 Datalink Admin Status: InService

GR303 Datalink Operation Status: Down

GR303 Datalink Problems: GR303 data link is in init state

GR303 Datalink Protect Group ID: 1

GR303 Datalink Protect Unit Type: Protected

Apply Refresh

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- Step 2** Set the following GR-303 parameters:
- **Interface Group ID**—Select an interface group ID number (from 1 to 4) that matches the interface group provisioned on the Class 5 switch.
 - **Allocated Number of CRVs**—Use the slider to set the number of CRVs to be assigned to the interface group. The CRV range assigned to this interface group must match the CRVs of the Class 5 switch phone numbers.
- Step 3** Click **Apply** to provision CRVs for the interface group. Repeat Step 2 to provision additional interface groups.

About Provisioning DS1 Lines for GR-303

You can provision DS1 lines for GR-303 on the following line cards:

- DSX1/8
- STSX1-CHNL

At least two DS1 lines (primary and secondary) must be provisioned for each interface group.

Provisioning DS1 Lines on a DSX1/8 Line Card

- Step 1** From Cisco 6700 NodeView, double-click the LED for the DS1 line to be provisioned. EMS launches the line provisioning window. (See Figure 10-2.)


Figure 10-2 DSX1/8 Line Provisioning Window

DSX1,8 Line Provision for 6732 node: node1

DSX1,8 Basic Provisioning	6732 Name: node1
15-Min PM Threshold	DSX1,8 Card Number: 8
1-Day PM Threshold	DSX1,8 Line Number: 1
15-Min PM Data	Admin Status: InService
1-Day PM Data	Operation Status: Down
Far End 15-Min PM Data	Interface Group: None
Far End 1-Day PM Data	Interface Group ID: 1
Exit	Interface Group Member ID: 0
	Line Coding: B8ZS
	Line Frame Type: ESF
	DS0 Mapping: D4
	Protect Group ID: 3
	Protect Unit Type: Protected
	Line Buildout: 534-655 Feet
	Loopback: Off
	Reset PM Count: No
	Line Test: Off
	DSX1,8 Problem List:

Buttons: Apply, Refresh, DS0 Signaling

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- Step 2** In the line provisioning window, set the following parameters:
- **DSX1/8 Line Number**—Select the DS1 line to be provisioned.
 - **Interface Group**—Select **GR-303**.
 - **Interface Group ID**—Select the interface group ID number (from 1 to 4) that was assigned previously in the “Allocating Call Reference Values (CRVs) for a GR-303 Interface Group” procedure. (See page 10-3.)
 - **Interface Group Member ID**—Select an ID for the DS1 line.
 - Select **1** for the primary DS1 line.
 - Select **2** for the secondary DS1 line.
 - Assign a unique member ID (up to 28) for each additional DS1 line in the interface group.
- Step 3** Click **Apply** to provision the DS1 line.
-  **Note** To reassign an incorrect interface group ID or member ID, first set the ID to **0** and click **Apply**, then select the correct ID number and click **Apply**.
- Step 4** Repeat this procedure until all DS1 lines are assigned to the GR-303 interface group. You must provision at least two DS1 lines (primary and secondary) for each interface group.
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Provisioning DS1 Lines on an STSX1-CHNL Line Card

- Step 1** From Cisco 6700 NodeView, double-click the LED of the STSX1 line icon. EMS launches the line provisioning window.
- Step 2** Click **VT-DS1 Basic Provision** in the function bar. EMS displays the VT-DS1 line provisioning window. (See Figure 10-3.)

Figure 10-3 STSX1-CHNL VT-DS1 Basic Provisioning Window

SONET Provision for 6732 node: node1

Basic Provision	SONET Card Number: 17
VT-DS1 Basic Provision	SONET Line Number: 1
Maintenance Provision	VT-DS1 Number: 1
Section PM Threshold	Interface Group Type: GR303
Line PM Threshold	Interface Group ID: 0
Path PM Threshold	Interface Group Member ID: 0
Section 15-Min PM Data	Problem List:
Section 1-Day PM Data	
Line 15-Min PM Data	
Line 1-Day PM Data	
Path 15-Min PM Data	Admin Status: InService
Path 1-Day PM Data	Operation Status: Down
Far End Line 15-Min PM Data	Loopback: Off
Far End Line 1-Day PM Data	Reset PM Count: No
Far End Path 15-Min PM Data	Force Bip2: No
Far End Path 1-Day PM Data	Frame Format: ESF
Exit	Apply Refresh DSO Signaling

- Step 3** In the VT-DS1 line provisioning window, set the following parameters:
- **VT-DS1 Number**—Select the DS1 line to be provisioned.
 - **Interface Group ID**—Select the interface group ID number (from 1 to 4) that was assigned previously with the “Allocating Call Reference Values (CRVs) for a GR-303 Interface Group” procedure (see page 10-3).
 - **Interface Group Member ID**—Select an ID for the DS1 line.
 - Select **1** for the primary DS1 line.
 - Select **2** for the secondary DS1 line.
 - Assign a unique member ID for each additional DS1 line in the interface group.

- Step 4** Click **Apply** to provision the DS1 line.
- Step 5** Repeat this procedure until all DS1 lines are assigned to the GR-303 interface group.
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Note You must provision at least two DS1 lines (primary and secondary) for each interface group.



Note To reassign an incorrect interface group ID or member ID, first set the ID to **0** and click **Apply**, then select the correct ID number and click **Apply**.

Provisioning Local and External CRVs



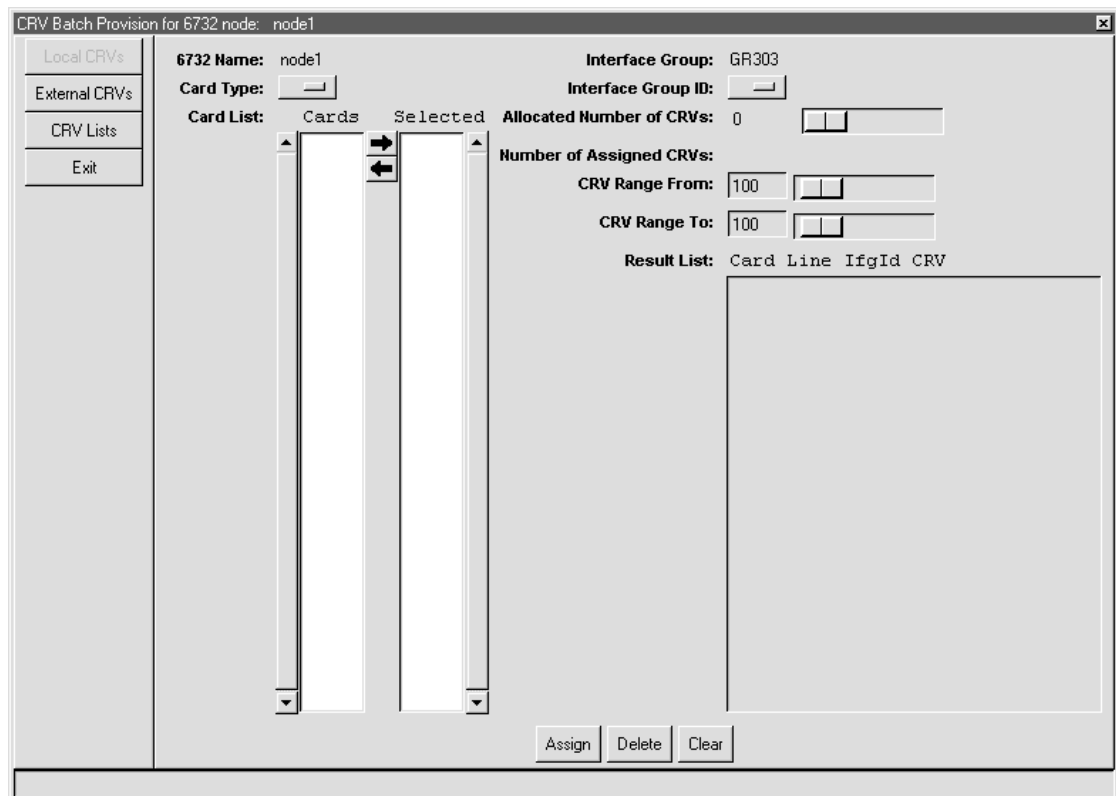
Caution

In a network using a Cisco 6732 and a Class 5 switch, always assign CRVs on the Cisco 6732 (either local or remote) *before* assigning them on the Class 5 switch. When assigning CRVs on a Class 5 switch, always use their respective directory number. The Class 5 switch provisions the CRV (through the EOC channel) on the Cisco 6732 in an inservice state. Following this sequence prevents mismatched provisioning states in the CRV tables, which can cause loss of dialtone on those CRVs.

You cannot use a CRV number twice. The range for the CRVs allocated must be equal to or greater than the actual number of CRVs provisioned.

- Step 1** From Cisco 6700 NodeView of the node you intend to provision, select **Objects > CRV Batch Provisioning**. (See Figure 10-4.) The window opens at the local CRV provisioning window.

Figure 10-4 CRV Batch Provisioning



- Step 2** From the CRV batch provisioning window, select the **Card Type** to be provisioned:
- **DSX1/T1 External CRV Provisioning** to provision DSX-1 cards
 - **DSX3/STXSX1 External CRV Provisioning** to provision either a DSX3 card or an STSX1 card.
- EMS displays the applicable card numbers in the **Card List** display, and the EOC provisions the lines in service.
- Step 3** In the **Card List** display, highlight the cards to be provisioned. Click the right arrow icon to move the selected cards to the **Selected** list.
- Step 4** Select the appropriate **Interface Group ID** (from 1 to 4). To assign CRVs, enter starting and ending values in the **CRV Range From** and **CRV Range To** fields.
- Step 5** Highlight the lines to be provisioned in the **Result** list.
- Step 6** Click **Assign** to assign CRVs to the highlighted lines. EMS displays the assigned CRVs in the **Result** list and indicates the number of assigned CRVs in the Number of Assigned CRVs field. (See Figure 10-5.)

Figure 10-5 CRV Batch Assignment Confirmed

CRV Batch Provision for 6732 node: node1

Local CRVs
External CRVs
CRV Lists
Exit

6732 Name: node1
Card Type: FXS.16
Interface Group: GR303
Interface Group ID:
Allocated Number of CRVs: 0
Number of Assigned CRVs:
CRV Range From: 101
CRV Range To: 200

Card List: Cards Selected

Card	Line	IfgId	CRV
8	1	1	0
8	2	1	0
8	3	1	0
8	4	1	0
8	5	1	0
8	6	1	0
8	7	1	0
8	8	1	0
8	9	1	0
8	10	1	0
8	11	1	0
8	12	1	0
8	13	1	0
8	14	1	0
8	15	1	0
8	16	1	0

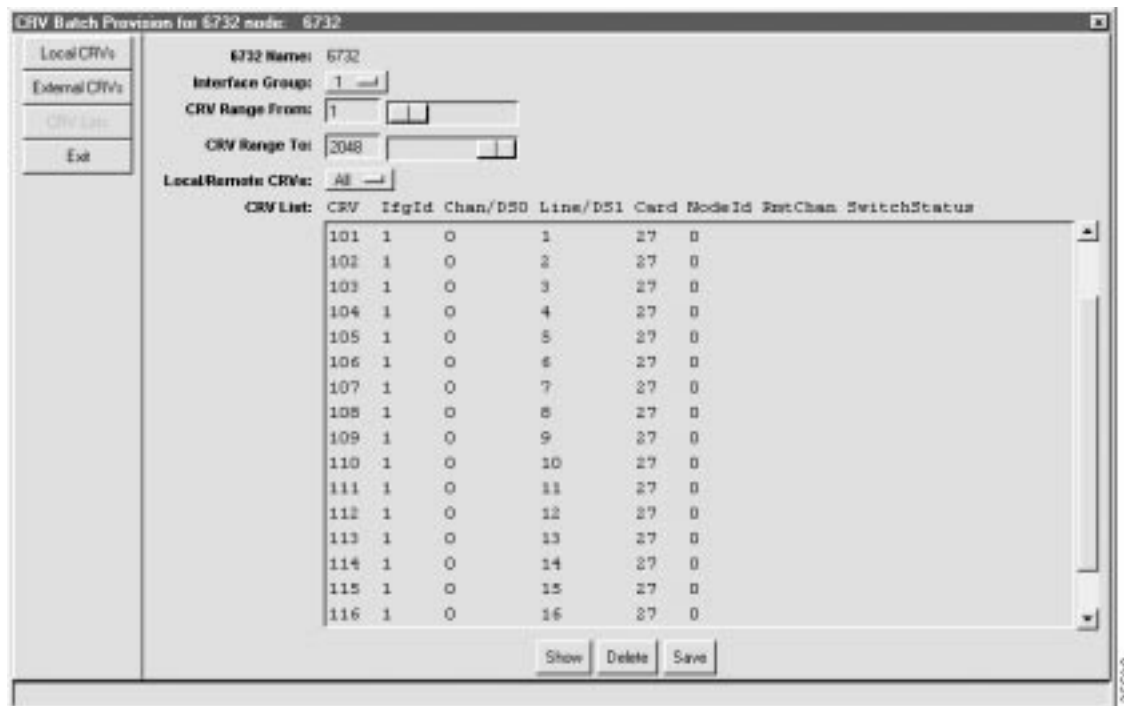
Assign Delete Clear

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Viewing CRVs

- Step 1** From Cisco 6700 NodeView, select **Objects > CRV Batch Provisioning** from the NodeView of the node to be provisioned. EMS launches the CRV batch provision window.
- Step 2** Click the **CRV Lists** tab to launch the CRV list window. (See Figure 10-6.)

Figure 10-6 CRV List Window

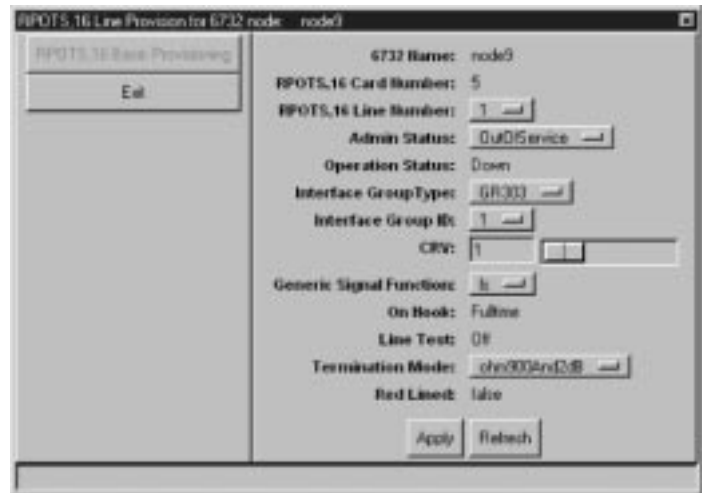


- Step 3** Set the following parameters in the CRV list window:
- **Interface Group**—Set to **All** to view all interface groups, or select an interface group (from 1 to 4).
 - **CRV Type**—Set to **All** to view all CRV types, or select **Local**, **Remote**, or **External** to view different CRV types.
- Step 4** Click **Show** to view the CRV information, including card and line numbers, in the CRV list.

Provisioning Individual Local CRVs

- Step 1** From Cisco 6700 NodeView, double-click a specific analog line icon. EMS launches the line provisioning window. (See Figure 10-7.)

Figure 10-7 Individual CRV Provisioning



- Step 2** In the line provisioning window, set the following parameters:
- **Interface Group Type**—Select **GR-303**.
 - **Interface Group ID**—Select the GR-303 interface group ID number (from 1 to 4).
 - **CRV**—Select a CRV for this line. Each GR-303 line must be provisioned with a unique CRV.
- Step 3** Click **Apply** to complete GR-303 provisioning for the line.
- Step 4** Repeat this procedure to provision additional GR-303 lines.

Changing or Resetting Individual Local CRVs

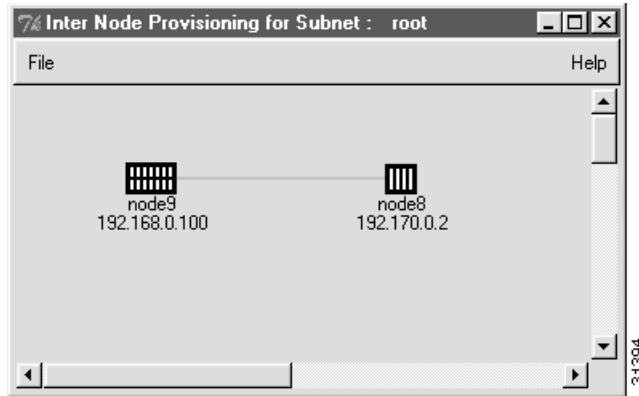
- Step 1** From Cisco 6700 NodeView, double-click on a specific analog line icon. EMS launches the line provisioning window. (See Figure 10-7.)
- Step 2** Change the **Interface Group Type** of each analog line to be reset to **TR-008**.
- Step 3** Click **Apply** to complete the change.
- Step 4** Change the **Interface Group Type** of the line back to **GR-303**, and reassign the **CRV** as desired. You must also specify the appropriate **Interface Group ID**.
- Step 5** Click **Apply** to complete the change.

Provisioning Remote CRVs

Before provisioning remote CRVs, you must provision an inter node link between the local and remote nodes. See Chapter 8, “Inter Node Links,” for inter node link provisioning procedures.

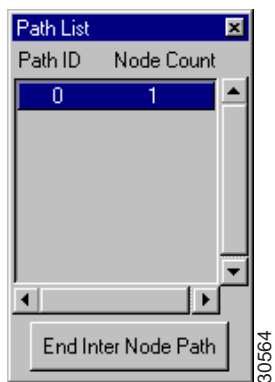
- Step 1** From Cisco 6700 NetView, select **Applications > Inter Node Provisioning** from the menu bar. EMS launches the inter node provision window. (See Figure 10-8.)

Figure 10-8 Inter Node Provisioning Window



- Step 2** If there is no inter node link between the local and remote nodes, click and drag a line from the local node to the remote node. The line appears as a red arrow pointing to the remote node.
- EMS displays a path list window, indicating the path that will be used to communicate between the two nodes (Path ID) and the number of nodes that are included in the path (Node Count). (See Figure 10-9.)

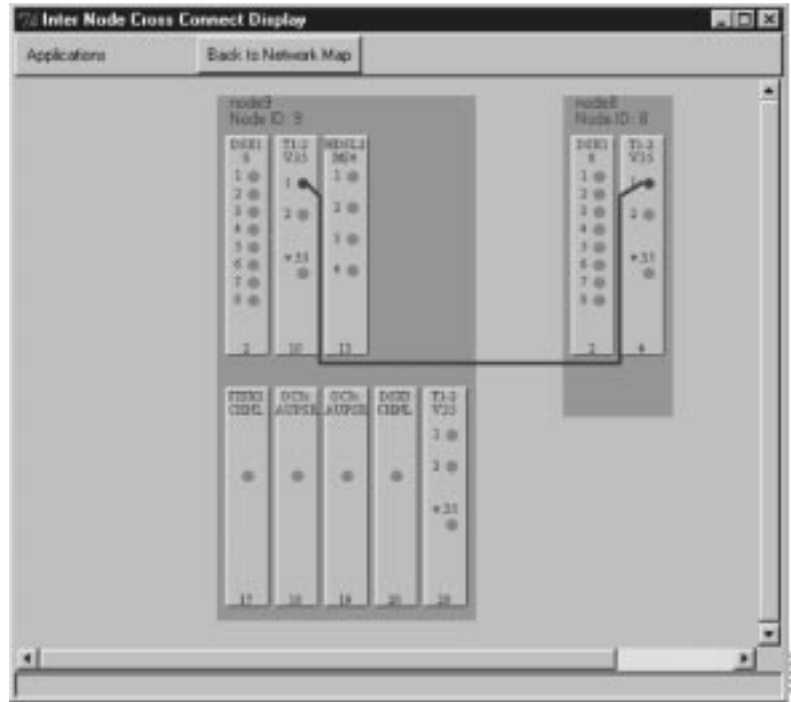
Figure 10-9 Inter Node Provisioning Path List



- Step 3** If more than one path ID appears in the path list, select the desired path between the local and remote node. Click each path ID to show the path (red arrow) in the inter node provisioning window.

- Step 4** In the inter node provisioning window, double-click the red arrow. EMS launches the inter node cross connect display, showing the broadband line cards installed in each node. (See Figure 10-10.)

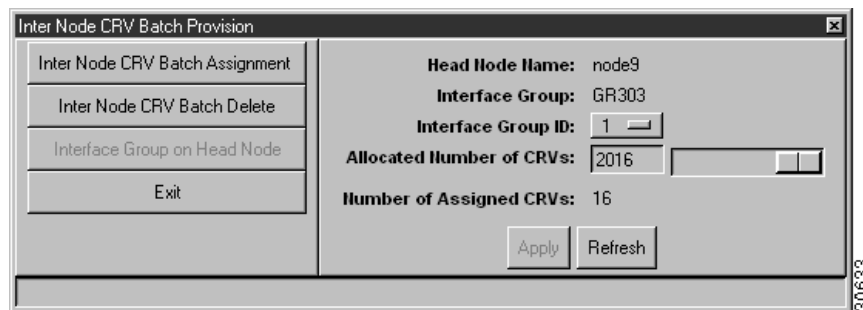
Figure 10-10 Inter Node Cross Connect



The blue line linking the two nodes is the inter node link. See Chapter 8, “Inter Node Links” for more information on provisioning inter node links.

- Step 5** Select **Applications > CRV Batch Provisioning** from the inter node cross connect display menu. EMS launches the inter node CRV batch provisioning window. (See Figure 10-11.)

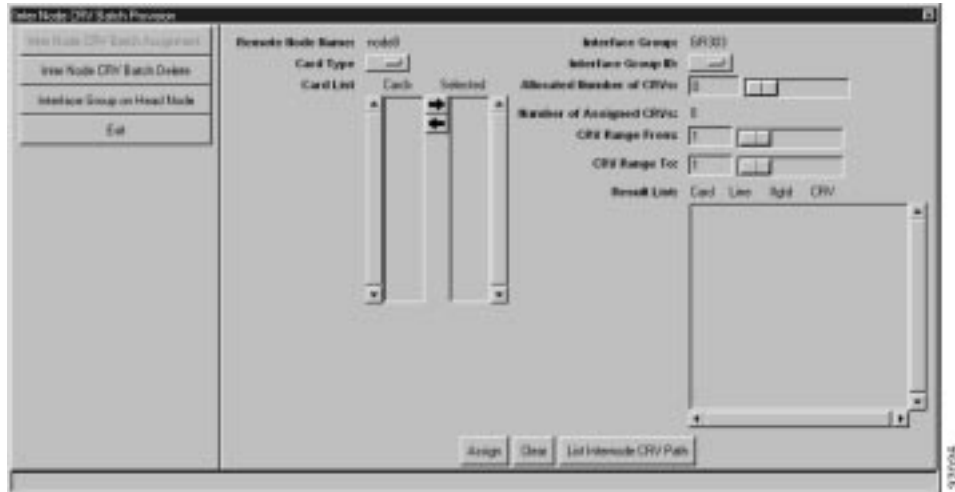
Figure 10-11 Inter Node CRV Batch Provisioning Window



- Step 6** Select an **Interface Group ID** to be assigned (from 1 to 4).
Step 7 Set the **Allocated Number of CRVs** to the number of CRVs for the selected interface group.
Step 8 Click **Apply** to provision the interface group.

- Step 9** Select **Inter Node CRV Batch Assignment** in the function bar. EMS displays the inter node CRV batch assignment window. (See Figure 10-12.)

Figure 10-12 Inter Node GR-303: Initiate Batch CRV Provisioning



- Step 10** From the inter node CRV batch provision window, define the following parameters:
- **Card Type**—Set to the desired analog card. The options are:
 - RPOTS,8
 - RPOTS,16
 - RUVG,8
 - FXS,16
 - CUVG/8
 - ISDN,BRI,8
 - **Card List**—Highlight the card or cards from the **Card List** to be provisioned. Click the right arrow button to move the selected cards to the **Selected** list.
 - **Interface Group ID**—Select the interface group ID being provisioned (from 1 to 4).

After the appropriate cards have been moved to the **Selected** list, the card and line information appear in the result list. (See Figure 10-13.)

Figure 10-13 Inter Node GR-303: Complete CRV Batch Provisioning



Step 11 Set the following fields for remote CRV batch provisioning:

- **Interface Group ID**—Select the interface group being provisioned.
- **Allocated Number of CRVs**—Enter the number of CRVs to be allocated for the interface group.



Note Ignore this field if you already allocated the CRVs in Step 6 through Step 8.

- **CRV Range From** and **CRV Range To**—Enter starting and ending values for the CRVs to be allocated.

Step 12 Click **Assign** to provision the CRVs.

ISDN CRV DS0 Channel Requirements

Each call reference value (CRV) provisioned on an ISDN-BRI/8 module occupies three DS0 channels (one DS0 each for the B1, B2, and D channels) over the transport between the Cisco 6732 and the remote node. When provisioning CRVs for ISDN, make sure that the interface group uses enough transport lines to accommodate three DS0s for each CRV.

For example, a DS1 transport between a Cisco 6705 remote node and a Cisco 6732 local node can carry up to 8 ISDN lines (24 divided by 3) over an FDL INDL. A DS1 transport using a DS0 INDL can carry up to 7 ISDN lines, because one DS0 is used as the INDL (leaving 23 available DS0s).

Deleting CRVs



Caution

The Class 5 switch GR-303 interface serves as the master controller of the Cisco 6732 GR-303 database. When deleting CRVs in a network with a Cisco 6732 and a Class 5 switch, always remove the CRV on the Class 5 switch *first*. The Class 5 switch provisions the CRV (through the EOC channel) on the Cisco 6732 in an out of service state. Then remove the CRV from the Cisco 6732. Otherwise, the Cisco 6732 database can lose synchronization with the Class 5 switch, resulting in mismatched provisioning states in the CRV tables and possible loss of dialtone on those CRVs.

When deleting an ISDN CRV, you must delete the CRV from the switch before deleting it in EMS. Monitor the facility service state through EMS to ensure that the CRV has been deleted from the switch side. A transition from in service to out of service indicates that the switch has deleted the CRV from its database. After confirming its deletion from the switch side, delete the CRV in EMS.

Under heavy traffic conditions, when deleting an ISDN CRV from the Class 5 switch and the Cisco 6732, the switch may not delete the quarter DS0 carrying the D channel from the Cisco 6732 database. This issue depends on the switch scheduler for deleting CRVs; excessive traffic can delay or prohibit the removal of the quarter DS0.

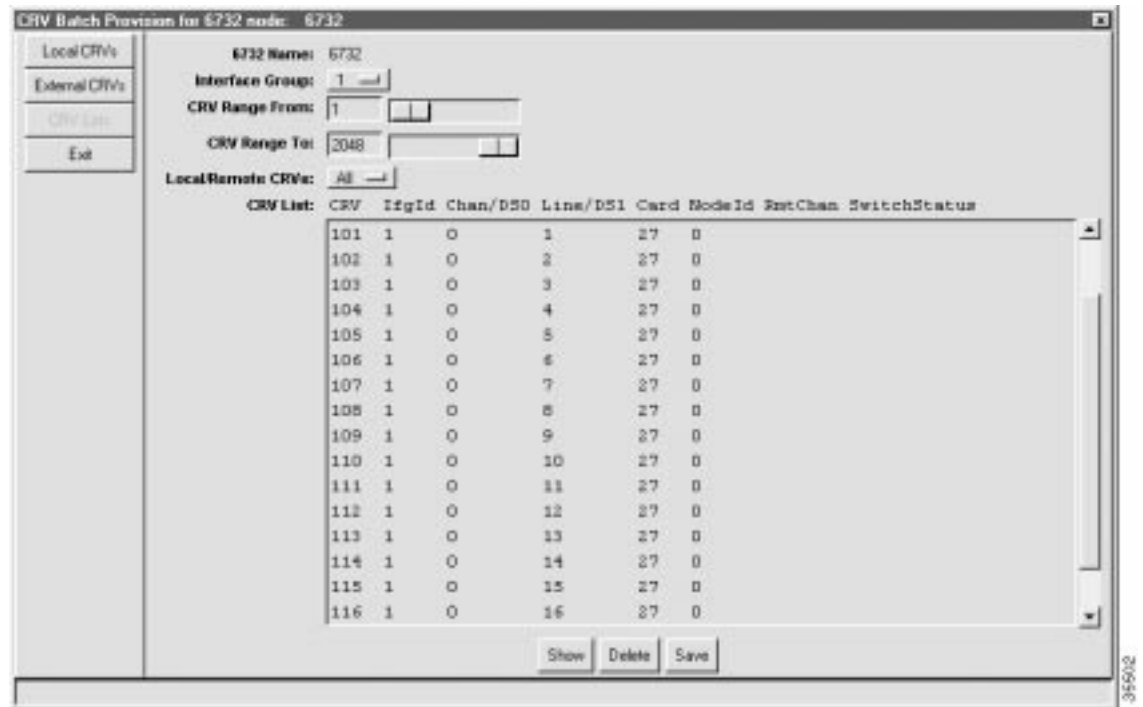
When viewing the expanded line view of a cross-connected GR-303 facility, the channel with a quarter DS0 appears with a small black hashmark next to the channel (see Figure 10-15 on page 10-18). In this case, use EMS to delete the quarter DS0. Refer to the sections “Deleting a Quarter DS0 Cross Connect” and “Deleting a Quarter DS0” for detailed procedures.

To delete CRV provisioning at the Cisco 6732, following these steps in sequence:

-
- Step 1 Use the appropriate GR-303 embedded operations channel (EOC) command on the Class 5 switch.
 - Step 2 From Cisco 6700 NodeView, select **Objects > CRV Batch Provisioning** from the NodeView of the node to be provisioned. EMS launches the CRV batch provision window.

Step 3 Click the **CRV Lists** tab to launch the CRV list window. (See Figure 10-6.)

Figure 10-14 CRV List Window



Step 4 Set the following parameters in the CRV list window:

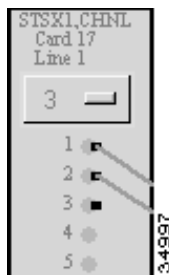
- **Interface Group**—Set to **All** to view all interface groups, or select an interface group (from 1 to 4).
- **CRV Type**—Set to **All** to view all CRV types, or select **Local**, **Remote**, or **External** to view different CRV types.

Step 5 To delete a range of assigned CRVs, highlight the CRVs to be deleted in the CRV list and click **Delete**. EMS confirms the deletion by removing the selected CRVs from the CRV list.

Deleting a Quarter DS0 Cross Connect

-
- Step 1 In node view, right-click the cross-connected GR-303 port and select **Start TDM Cross Connect**. EMS displays an expanded view of the cross-connected card.
 - Step 2 Select the line that is provisioned with the cross connect. EMS displays the internal cross-connects.
 - Step 3 Look for a channel with a small black hashmark to the right. This channel carries the quarter DS0. In Figure 10-15, channel 3 of an STS1 transport carries a quarter DS0.

Figure 10-15 Expanded Card View with Quarter DS0



- Step 4 Right-click the quarter DS0 channel and select **Display Quarter DS0**. EMS starts the cross connect display.
 - Step 5 Double-click a cross connect line to start the cross connect provisioning window.
 - Step 6 Click **Delete**.
 - Step 7 EMS displays a warning, recommending that this operation be performed from the switch. To proceed, Click **Yes**.
If EMS is unable to delete the cross connect, an error message will appear.
 - Step 8 After deleting the cross connect, you must close and restart the cross connect display to reflect the changes made.
-

Deleting a Quarter DS0

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- Step 1 Right-click the quarter DS0 channel and select **Quarter DS0 Provision**. The quarter DS0 provisioning screen appears.
 - Step 2 Select the appropriate QDS0 from the pull-down menu.
 - Step 3 Click **Delete**.
 - Step 4 A warning appears recommending that this operation be performed from the switch. Click **Yes** to proceed.
-



Note EMS displays an error message if you attempt to delete a cross connected QDS0. You must delete the cross connect before deleting the QS0.

The cross connect box is refreshed with the current QDS0 status when the you exit from the QDS0 provisioning screen. For instance, if all QDS0s on a DS0 have been deleted, a black hash mark no longer appears on the DS0.

Batch Deleting Inter Node CRVs

The following procedure describes how to batch delete the CRVs of analog lines.

- Step 1** From the CRV batch provisioning window (see Figure 10-4 on page 10-8), select **CRV Batch Delete** in the function bar. EMS displays the CRV batch delete window. (See Figure 10-16.)

Figure 10-16 Initiate Inter Node CRV Batch Delete



- Step 2** Set the following parameters:
- **Card Type**—Select the desired analog card (FXS/16, RPOTS/16, or RUVG/8).
 - **Card List**—Highlight the desired card(s) with CRVs to be deleted from the **Card List**. Click the right arrow button to move the selected cards to the **Selected** list.
 - **Delete**—Click **Delete** to reset the CRV assignments of the selected analog lines to 0 (unassigned).

