NORTEL NETWORKS

Nortel Networks Multiservice Switch

7400/15000/20000

Operations: Call Redirection Server

NN10600-410

Nortel Networks Multiservice Switch 7400/15000/20000

Operations: Call Redirection Server

Publication: NN10600-410
Document status: Standard
Document version: 6.1S1
Document date: August 2004

Publication history

August 2004

August 2004 Standard
General availability. Contains information on Nortel Networks Multiservice Switch 7400, 15000, and 20000 for the PCR6.1 release.

Contents

List of figures

List of tables

About this document

This guide describes the call redirection server (CRS) for Dynamic Packet Routing System (DPRS) services.

The following topics are discussed in this section:

Who should read this document and why

This guide is for persons who perform the following tasks for a CRS:

- planning
- engineering
- installing and configuring
- provisioning
- operating and maintaining
- troubleshooting

What you need to know

This guide assumes that you understand the Nortel Networks Multiservice Switch network architecture. You can learn more about the products by reading NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/ 20000 Overview*.

What's new in this document

There were no new features added to this document.

Other changes made to this document include the following:

- The terms Passport and PVG have been rebranded in conjunction with the new Nortel Networks' brand simplified naming format. Passport is now referred to as the Nortel Networks Multiservice Switch, and PVG is now Media Gateway 7480/15000. For more information on the product rebranding, refer to NN10600-000 *Nortel Networks Multiservice Switch 7400/15000/20000 What's New in PCR6.1*.
- Changes made throughout the document to enhance compliance with Nortel Networks documentation standards (for example, Modular Task Based Information standards).

Structural changes

This document is undergoing restructuring into a modular, task-based format to improve the usability of the information. The following changes have been made to this document.

- Procedures were grouped into higher-level tasks.
- Task flow charts were added to improve navigation through tasks and procedures, to set tasks and procedures in context, and to provide a visual representation of prerequisites and configuration paths.
- Procedures were restructured into a modular format.
- Purpose statements were added to tasks and procedures to provide context.
- Prerequisites were divided into those applicable to an entire task. those applicable only to a specific procedure, and those applicable only to a specific procedure step. Prerequisites applicable to an entire task were placed in the appropriate task-level prerequisite section, prerequisites

applicable only to a specific procedure were placed in the perquisites section of the procedure, and prerequisites applicable only to a specific step were placed in the step.

- A ‘Procedure Job Aid’ section was added to procedures where appropriate. This consists of information that supports the procedure, such as a component hierarchy figure, a checklist, or a diagram.
- Conceptual and reference information were removed from procedures, placed in the appropriate conceptual or reference section, and cross-referenced from the procedure where appropriate. If no appropriate conceptual or reference section existed in which to place such information removed from the procedures, the information was placed in temporary sections called ‘Supporting information’ and ‘Additional information’ at the end of the affected chapter. Only supporting information is cross-referenced from the procedure. The supporting and additional information sections will be removed when an appropriate location for the information is created.

Text conventions

This document uses the following text conventions:

- `nonproportional spaced plain type`

  Nonproportional spaced plain type represents system generated text or text that appears on your screen.

- **`nonproportional spaced bold type`**

  Nonproportional spaced bold type represents words that you should type or that you should select on the screen.

- *italics*

  Statements that appear in italics in a procedure explain the results of a particular step and appear immediately following the step.

  Words that appear in italics in text are for naming.

- [optional_parameter]

  Words in square brackets represent optional parameters. The command can be entered with or without the words in the square brackets.

- <general_term>

  Words in angle brackets represent variables which are to be replaced with specific values.

- UPPERCASE, lowercase

  Nortel Networks Multiservice Switch node commands are not case-sensitive and do not have to match commands and parameters exactly as shown in this document, with the exception of string options values (for example, file and directory names) and string attribute values.

- |

  This symbol separates items from which you may select one; for example, ON|OFF indicates that you may specify ON or OFF. If you do not make a choice, a default ON is assumed.

- ...

  Three dots in a command indicate that the parameter may be repeated more than once in succession.

The term absolute pathname refers to the full specification of a path starting from the root directory. Absolute pathnames always begin with the slash (/) symbol. A relative pathname takes the current directory as its starting point, and starts with any alphanumeric character (other than /).

Procedure conventions

This document uses the following procedure conventions:

- You can enter commands using full component and attribute names, or you can abbreviate them. The commands used in the procedures contain the full component and attribute names in the first instance. In the second instance, the component and attribute names are abbreviated. For more information on abbreviating component and attribute names, see

NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*. All component and attribute names are formatted in italics.

- The introduction of every procedure states whether you must perform the procedure in operational mode or provisioning mode. For more information on these modes, see "Operational mode" (page 15) or "Provisioning mode" (page 15).
- When you complete a procedure, you can verify your changes and then activate them as the new node configuration. For more information on completing configuration changes and exiting provisioning mode, see "Activating configuration changes" (page 16).

Operational mode

Procedures contained within this document can either be performed in operational mode or provisioning mode. When you initially log into a Nortel Networks Multiservice Switch node, you are in operational mode. Nodes use the following command prompt when you are in operational mode:

```
#>
```

where:
is the current command number

In operational mode, you work with operational components and attributes. In operational mode, you can

- list operational components and display operational attributes to determine the current operating parameters for the node
- control the state of parts of the node by locking and unlocking components
- set certain operational attributes and enter commands to perform diagnostic tests

Provisioning mode

To change from operational mode to provisioning mode, type the following command at the operator prompt:

```
start Prov
```

Only one user can be in provisioning mode at a time. Nortel Networks Multiservice Switch nodes use the following command prompt whenever you are in provisioning mode:

```
PROV #>
```

where:

is the current command number

In provisioning mode, you work with the provisionable components and attributes that contain the current and future configurations of the node. You can add and delete components, and display and set provisionable attributes. For information on completing the configuration changes, exiting provisioning mode, and returning to operational mode see “Activating configuration changes” (page 16).

For information on operational and provisionable attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

Activating configuration changes

Activate configuration changes when prompted to complete the configuration changes by procedures elsewhere in this document. When you complete the configuration changes, you are activating those configuration changes, confirming that you want to activate them, and saving the changes. You are instructed to complete the configuration changes only at the end of procedures that you perform in provisioning mode.

CAUTION

Activating a provisioning view can affect service

Activating a provisioning view can result in a CP reload or restart, causing all services on the Nortel Networks Multiservice Switch node to fail. See NN10600-050 *Nortel Networks Multiservice Switch 7400/15000/20000 Command Reference*, for more information.

1 Verify that the provisioning changes you have made are acceptable.

```
check Prov
```

Correct any errors and then verify the provisioning changes again.

2 If you want to store the provisioning changes in a file, save the provisioning view.

```
save Prov
```

3 If you want these changes as well as other changes made in the edit view to take effect immediately, activate, confirm, and commit the provisioning changes.

```
activate Prov

confirm Prov

commit Prov
```

4 End the provisioning session.

```
end Prov
```

5 Continue the task that you were performing prior to activation.

Related documents

For the complete list of documents contained in the Nortel Networks Multiservice Switch documentation library, see NN10600-001 *Nortel Networks Multiservice Switch 7400/15000/20000 Basics: Customer Documentation*.

See the following documents for information related to the call redirection server:

- NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures*
- NN10600-425 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: Dynamic Packet Routing System*
- NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*
- NN10600-500 *Nortel Networks Multiservice Switch 6400/7400/15000/20000 Alarms Reference*

For information on creating the CRS database, see 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

How to get more help

For information on training, problem reporting, and technical support, see the "Nortel Networks support services" section in the product overview document.

Chapter 1
CRS configuration

Configure call redirection server (CRS) to install CRS on a single node, deploy CRS across a network, or migrate to CRS from CSRM call redirection.

Prerequisites to CRS configuration

- For each node that will be configured with a CRS, use the procedures in NN10600-270 *Nortel Networks Multiservice Switch 7400/15000/20000 Software Installation* to install the following software:
  - — the base and networking software
  - — CRS software
- When deploying CRS across your network, determine the number and placement of CRS components for each RID subnet.

  Base the requirements on the anticipated number of requests from the client applications, and the fact that each node uses the closest CRS.

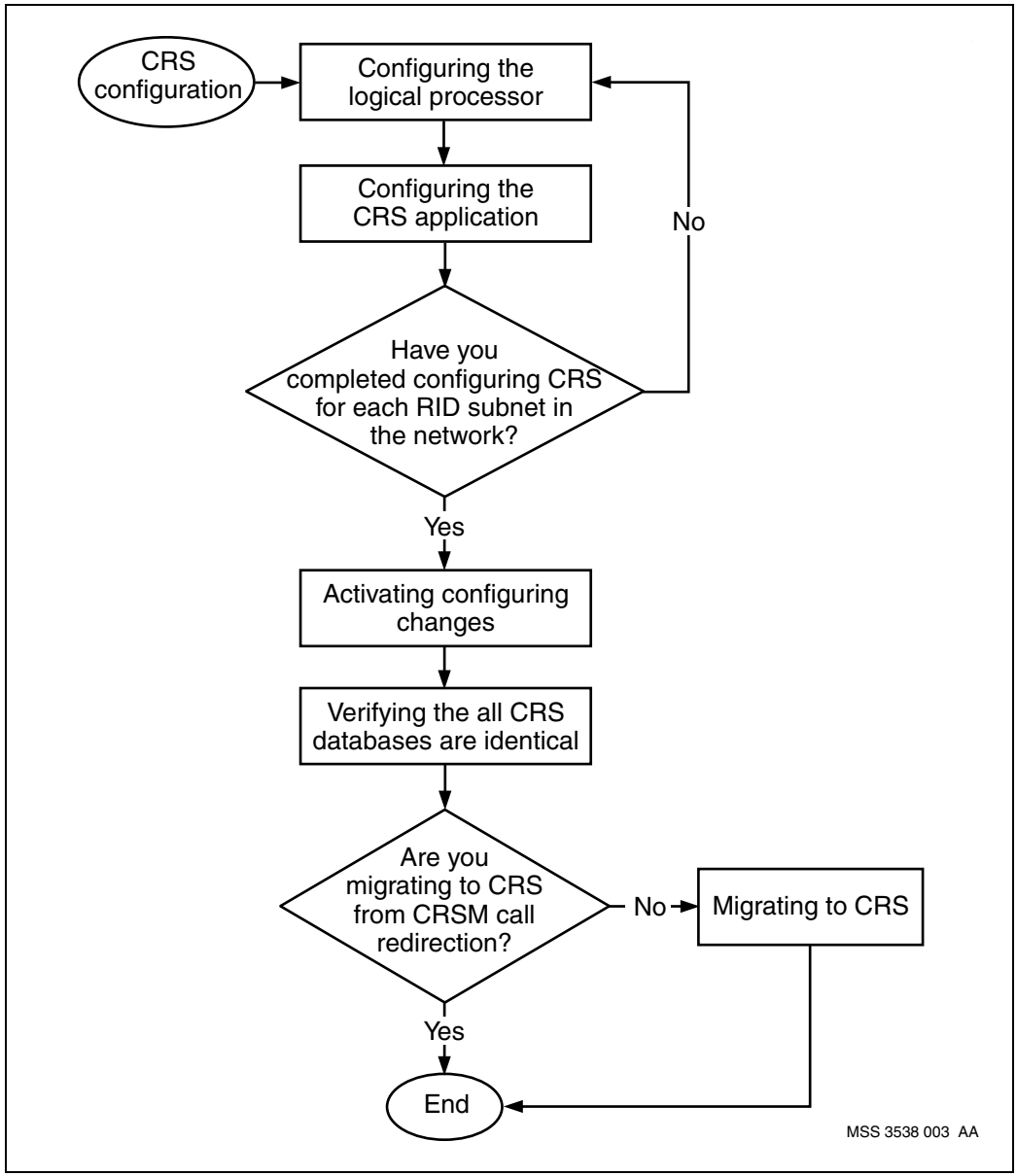
  Because the service forwards redirection attempts to the call router on the CP of the node containing the CRS, locate the CRSs on nodes in which the call router (or CP) is not heavily used.

- For information on how to split a RID using the RID redirection capability, see NN10600-425 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: Dynamic Packet Routing System*.

CRS configuration procedures

This task flow shows you the sequence of procedures you perform to configure CRS. To link to any procedure go to “CRS configuration procedure navigation” (page 22).

Figure 1
CRS configuration procedures



CRS configuration procedure navigation

- “Configuring the logical processor” (page 23)
- “Configuring the CRS application” (page 24)
- “Activating configuration changes” (page 16)
- “Verifying that all CRS databases are identical” (page 26)
- “Migrating to CRS” (page 27)

Configuring the logical processor

Configure the logical processor to set the LPT and LP and link the LP and card.

Procedure steps

1. Add a *logicalProcessorType* component.

   set sw lpt/<lpt_name>

2. Set the LPT feature list to include the CRS feature callRedirection.

   set sw lpt/<lpt_name> fl callRedirection

3. Add a *logicalProcessor* component.

   add lp/<n>

4. Add a shelf card for the CRS application.

   add shelf card/<m>

5. Set the *cardType* attribute to V.11 or V.35.

   set shelf card/<m> cardType <type>

6. Link the logical processor to the card.

   set lp/<n> mainCard shelf card/<m>

7. Link the LPT to the logical processor.

   set lp/<n> lpt sw lpt/<lpt_name>

Variable definitions

Variable	Value
<lpt_name>	is any mnemonic (for example, crs_lp).
<m>	is the number of the card.
<n>	is the number of the LP being provisioned.
<type>	is the card type, which can either be v11 or v35.

Configuring the CRS application

Configure the CRS application to add and set the *Crs component.* In addition to setting the primary address of the application that subscribes to the CRS service, you can add alternative address information for this primary address. Optionally, you can define an alternative RID.

> ***Note:*** The *SecondaryAddress* and *SecondaryRidMid* components are mutually exclusive. For a primary address, you can define either an *SecondaryAddress* component or an *SecondaryRidMid* component, but not both.

Procedure steps

1. Add a *Crs* component.

   ```
   add crs
   ```

2. Link the server to the logical processor.

   ```
   set crs logicalProcessor lp/<p>
   ```

3. Define the primary address of the application that subscribes to the CRS service.

   ```
   add crs PrimaryAddress/<npi>.<addr>
   ```

4. Add up to seven secondary address subcomponents for this primary address.

   ```
   add crs PrimaryAddress/<npi>.<addr> SecondaryAddress/
   <n>
   ```

5. Define the secondary address for each subcomponent.

   ```
   set crs PrimaryAddress/<npi>.<addr> SecondaryAddress/
   <n> address <npi>.<addr>
   ```

6. Add the alternative RID/MID subcomponent for this primary address.

   ```
   add crs PrimaryAddress/<npi>.<addr> SecondaryRidMid
   ```

7. Define the RID information for the subcomponent.

   ```
   set crs PrimaryAddress/<npi>.<addr> SecondaryRidMid
   rid <rid>
   ```

8 Define the MID information for the subcomponent.

```
set crs PrimaryAddress/<npi>.<addr> SecondaryRidMid
mid <mid>
```

9 Optionally, add the *AlternateRid* component.

```
add crs AlternateRid
```

10 Define the RID information for the alternative RID.

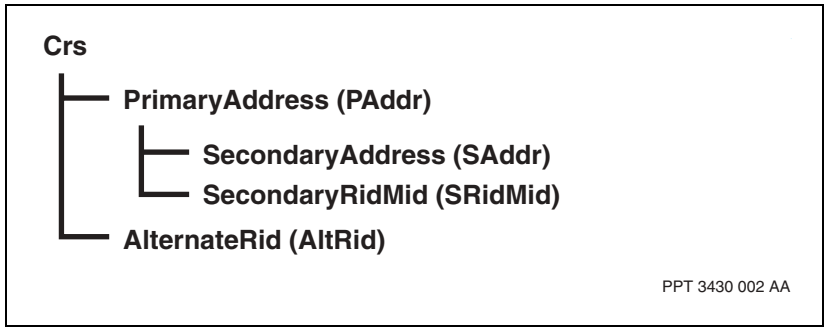
```
set crs AlternateRid rid <rid>
```

Variable definitions

Variable	Value
<addr>	is an X.121 or E.164 address.
<mid>	is the module identifier.
<n>	is the instance number of the secondary address (1 through 7).
<npi>	is the numbering plan indicator, either x for X.121 addresses or e for E.164 addresses.
<p>	is the number of the LP being provisioned.
<rid>	is the routing identifier.

Procedure job aid

Figure 2
Configuring the CRS application component hierarchy



Verifying that all CRS databases are identical

Verify that all CRS databases are identical for each Nortel Networks Multiservice Switch node's RID. To ensure that the databases are uniform, see 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

Migrating to CRS

Migrate to CRS from CSRM call redirection to enable call redirection for Nortel Networks Multiservice Switch node-only networks.

Note: CRS migration applies to Nortel Networks Multiservice Switch 7400 nodes only.

Prerequisites

- When migrating to CRS from CSRM call redirection, consider the following:
  - — At least one CRS must be provisioned in each RID subnet so that all clients in the subnet can access the service.
  - — Multiple CRSs may be configured in a RID subnet as needed for redundancy and for distribution of request processing.
  - — Only one CRS can be configured on each Nortel Networks Multiservice Switch node.
  - — Migration can only be completed on Nortel Networks Multiservice Switch 7400 nodes.
- The call redirection database must be identical for all CRSs provisioned in the network. Use the Global Data Manager to ensure that the database is uniform. See 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

Procedure steps

1 Lock the *CRS* component.

```
lock crs
```

2 Verify that all the provisioned CRS databases match the CSRM database to manually ensure that all Nortel Networks Multiservice Switch nodes in the RID subnet have exactly the same routing information as previously existed on the CSRMs.

If required, Nortel Networks engineering can assist with this process and determine the requirements of a specific network.

3 Remove the CSRMs from the RID subnet by either physically disconnecting the cable, locking the DPN Gateway, or disabling the DPN PE that is running the CSRM

   If required, Nortel Networks engineering can assist with this process and determine the requirements of a specific network.

4 Unlock the *CRS* component.

   unlock crs

Chapter 2
Maintenance

See the following sections for information to maintain CRS and solve problems that occur after installation. This section includes the following topics:

For more information about maintenance procedures, see NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

Monitoring the CRS

Monitor the CRS in order to ensure that call redirection is operating normally.

Procedure steps

1. Display the OSI state and statistics of the CRS.

   ```
   display crs
   ```

2. List all primary addresses.

   ```
   list crs paddr/*
   ```

3. Display secondary rid/mid information for all primary addresses.

   ```
   display -p crs paddr/* sridmid
   ```

4 Display secondary address information for all primary addresses.

```
display -p crs paddr/* saddr/*
```

5 Display a provisioned alternative RID.

```
display -p crs altrid
```

Common problems and corrective actions

Table 1, "Common problems and corrective actions summary table," (page 30) provides guidelines on how to respond to problems that can occur when you are using CRS. The table lists the problem, the probable cause (if applicable), and the corrective action to take.

Table 1
Common problems and corrective actions summary table

Problem	Probable cause	Corrective action
I cannot add the *crs* component.	The callRedirection feature is not provisioned on one or more LPTs that have been assigned to an LP.	Ensure that the feature is provisioned and that the provisioning has been activated.
The *crs* component remains in the unlocked, disabled, idle state.	The callRedirection server has failed to activate due to a lack of resources.	Provision the *crs* component on an another LP that has more memory available.
(Sheet 1 of 3)		

Table 1 (continued)
Common problems and corrective actions summary table

Problem	Probable cause	Corrective action
The CRS does not redirect a call to an unavailable destination to an available secondary destination.	No *crs* component is visible from the module on which the original destination failure is detected.	Verify that a *crs* component is visible on the module on which the failure should have been detected (potentially on any module between the source of the call attempt and the location of the destination). Use the operator command `display routing dpn cs/*` to list all the call servers visible from the module. This list must include an entry for *crd* to indicate that a call redirection server is accessible. (If two CRSs are at equal distances from the module, there may be two *crd* entries.) If you find a module for which no *crs* component is visible, you must establish connectivity to a module with a *crs* component provisioned in the same RID. You can do this by provisioning a new *crs* component or restoring connectivity to an existing module with a *crs* component.
	The original destination address of the call is not provisioned as a *paddr* component under the *crs* component.	Add a *paddr* component and corresponding *saddr* components to provide the relevant redirection provisioning.
(Sheet 2 of 3)		

Table 1 (continued)
Common problems and corrective actions summary table

Problem	Probable cause	Corrective action
	The call is redirected elsewhere because you are relying on the best-match quality of the *crs* component, and there is a better match than the *paddr* component you have identified.	Examine the *crs paddr* components to identify the best match and determine the resulting secondary addresses. If you provision a *paddr* component that exactly matches the address you want to back up, you can be sure the *Crs* component will chose this as the best match.
	The *saddr* component exceeds the maximum valid address length (15 digits) when the suffix digits are added. In such a case, the *crs* component skips this *saddr* component and tries the next *SAddr* component. The *Crs* component also increments the *maxAddrLenExceeded* attribute.	To correct this problem, take one of the following actions: • Change the destination in the original call attempt to reduce the number of suffix digits. • Change the *crs* component provisioning to an appropriate *paddr* and *saddr* component combination.
(Sheet 3 of 3)		

Operational attributes

Table 2, "CRS component operational attributes," (page 32) lists the operational attributes for the *Crs* component.

Table 2
CRS component operational attributes

Attribute	Description
adminState	The OSI administration state of the CRS.
operationalState	The OSI operational state of the CRS.
(Sheet 1 of 2)	

Table 2 (continued)
CRS component operational attributes

Attribute	Description
usageState	The OSI usage state of the CRS.
totalAddresses	The number of primary addresses associated with the CRS.
requestsReceived	The number of redirection requests received by the CRS.
ridRedirected	The number of RID-redirection requests performed.
ridMidRedirected	The number of RID/MID-redirection requests performed.
addressRedirected	The number of address-redirection requests performed.
primaryMatches	The number of successful matching attempts.
secAddressListExhausted	The number of redirection attempts that result in the exhaustion of the secondary address list.
maxAddrLenExceeded	The number of times the concatenation of the secondary address and the suffix digits from the original called address have exceeded the maximum of 15 digits.
secRidMidUnsuccessful	The number of redirection attempts that result in the RID/MID redirection failing to reach the destination address.
secAddrUnsuccessful	The number of redirection attempts that result in secondary address redirection failing to reach the destination address.
altRidUnsuccessful	The number of redirection attempts that result in RID redirection failing to reach the destination address.

(Sheet 2 of 2)

OSI states

Table 3, “CRS component state combinations,” (page 34) describes the OSI states for the *Crs* component.

Table 3
CRS component state combinations

Combination (administrative, operational, usage)	Details
Unlocked, disabled, idle	The CRS has failed to activate due to a lack of resources.
Unlocked, enabled, idle	This state combination is typically valid when the CRS is receiving provisioning data. The state can also occur when the CRS database is built or updated. The state is normally transient.
Unlocked, enabled, active	This state is the normal operational state for the CRS. In this state, the server is ready to receive a call redirection request, query the corresponding database, and forward the modified packet.
Locked, disabled, idle	A lock operator command is in effect.
Locked, enabled, idle	A lock operator command is in effect. In this state, the CRS does not perform the task of redirecting calls.

Chapter 3
Overview

For an overview of the call redirection server (CRS), see the following sections:

- “What is a CRS?” (page 35)
- “Why use a CRS?” (page 35)
- “Applications for CRS” (page 39)

What is a CRS?

A CRS provides call redirection for DPRS services on Nortel Networks Multiservice Switch node-only networks. A CRS improves an application’s availability by redirecting a call attempt that will fail if it cannot reach its destination.

Call redirection servers are located on function processors spread throughout the routing identifier (RID) subnet in the DPRS network.

Why use a CRS?

The CRS improves the resiliency of DPRS services such as frame relay. Call redirection servers direct failed call attempts to alternative destinations.

The following sections describe the supported types of call redirection:

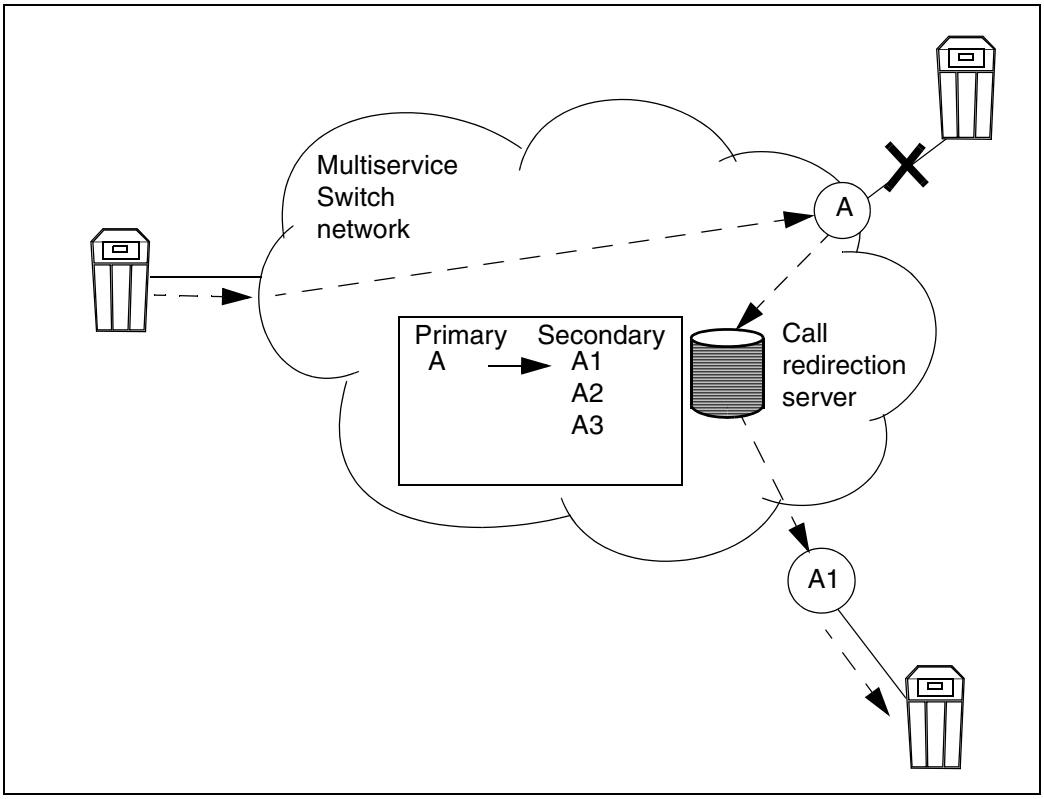
- “Address redirection” (page 36)
- “RID/MID redirection” (page 37)
- “RID redirection” (page 38)

Address redirection

In address redirection, a provisioned list of backup, secondary addresses supports a destination. When the original destination cannot be reached, the CRS attempts to send the call to the secondary addresses.

Figure 3, "Address redirection," (page 36) shows an example of address redirection. In the illustration, a call setup originates with the destination address set to A, but the link to the destination is down. At the call redirection server, primary address A maps to the first secondary address, A1, and the call goes to the alternative destination.

Figure 3
Address redirection

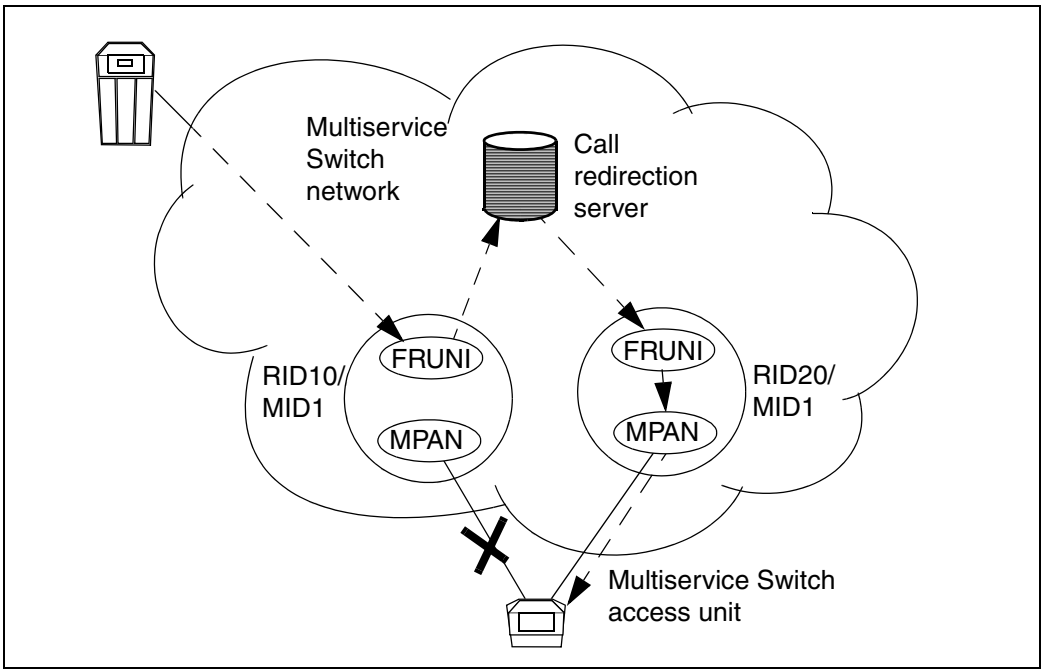


RID/MID redirection

In RID/MID redirection, the CRS overrides the original destination module identified by the call routing system and forwards the call to a different module. In DPRS routing, the RID/MID pair identifies the destination module in which the address is located. In this type of redirection, the server maps the primary address to a RID/MID pair instead of a list of secondary addresses. RID/MID redirection is most useful for Passport 4400-series access units linked to the network by MPANL links.

Figure 4, "RID/MID redirection," (page 37) shows an example of RID/MID call redirection. In the illustration, the frame relay call intended for the Nortel Networks Multiservice Switch network access unit goes to the destination node in RID1. However, the MPANL link from that node to the access unit is down. At the call redirection server, the original destination address maps to a new RID/MID pair, and the call goes to the backup MPANL link.

Figure 4
RID/MID redirection



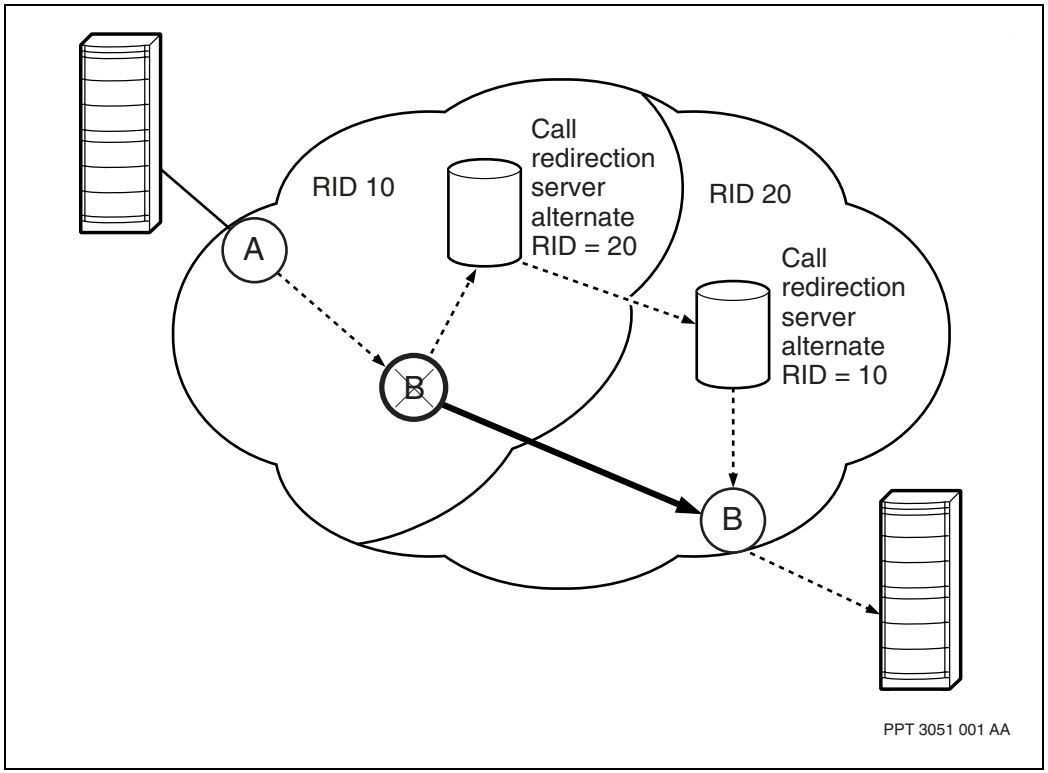
RID redirection

In RID redirection, the CRS forwards failed calls from the original RID to a specified alternative RID for another routing attempt on the same destination address. RID redirection is most useful as a temporary tool when some nodes in a RID are being redeployed to another RID. This process is known as RID splitting.

Figure 5, “RID redirection,” (page 39) shows an example of RID redirection. In the example, a call originates from Nortel Networks Multiservice Switch node A in RID 10, destined for Multiservice Switch node B. Node B has been redeployed to RID 20. The call is forwarded from node A to the CRS in RID 10. The CRS in RID 10 maps the call destination from RID 10 to RID 20, and directs the call to the CRS in RID 20. It is this CRS that locates, and directs the call to the destination node.

RID redirection is allowed only once for each address routing, to prevent loops within the network. RID redirection does not modify the destination address of the call.

Figure 5
RID redirection



Applications for CRS

Any DPRS service can benefit from the CRS. Typical DPRS services are frame relay user-to-network interface (UNI) and network-to-network interface (NNI).

Chapter 4
CRS description

For information on call redirection server (CRS) features and how the CRS redirects calls for DPRS services, see the following sections:

Role of CRS

The CRS provides a call redirection solution for Nortel Networks Multiservice Switch networks. Call redirection improves the resiliency of DPRS services by reducing failed call attempts. The servers also enhance the reliability of Passport 4400-series access units by allowing backup links to be located on separate nodes from the primary MPANL link. The routing identifier (RID) redirection capability of CRS allows RID splitting with minimal operational impact.

CRS features

Call redirection servers provide the following features:

- minimal impact on control processor (CP) resources, because the call redirection servers are located on function processors (FP)

- integrated operations, administration, and maintenance with Nortel Networks Multiservice Switch, because the redirection server is implemented on the Multiservice Switch node
- load sharing of CRS requests by the strategic configuration of multiple CRSs in the RID subnet
- CRS resiliency through multiple redirection servers in a subnet—as long as one server is reachable, the redirection service is available
- redundancy for permanent virtual circuits (PVCs) through address redirection from a PVC primary node to a configured PVC secondary (backup) node
- redundancy for switched permanent virtual circuits (SPVCs) through address redirection from an SPVC primary node to a configured SPVC secondary (backup) node

The CRS can be provisioned on a spared LP as a warm standby feature on Nortel Networks Multiservice Switch 15000 or Multiservice Switch 20000. A warm standby application or feature can operate together with a hot standby application or feature on the same FP without affecting the ability of the hot standby application or feature to provide hitless services.

See NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* for a description of hitless services and hot, warm and cold standby applications and features.

Call redirection

The following sections describe the functions involved in the call redirection process:

- "Detection of the call redirection request" (page 42)
- "Access to the call redirection server" (page 44)
- "Redirection of the call" (page 46)

Detection of the call redirection request

If the network detects a failure during call routing, there are three points at which a call redirection request can occur:

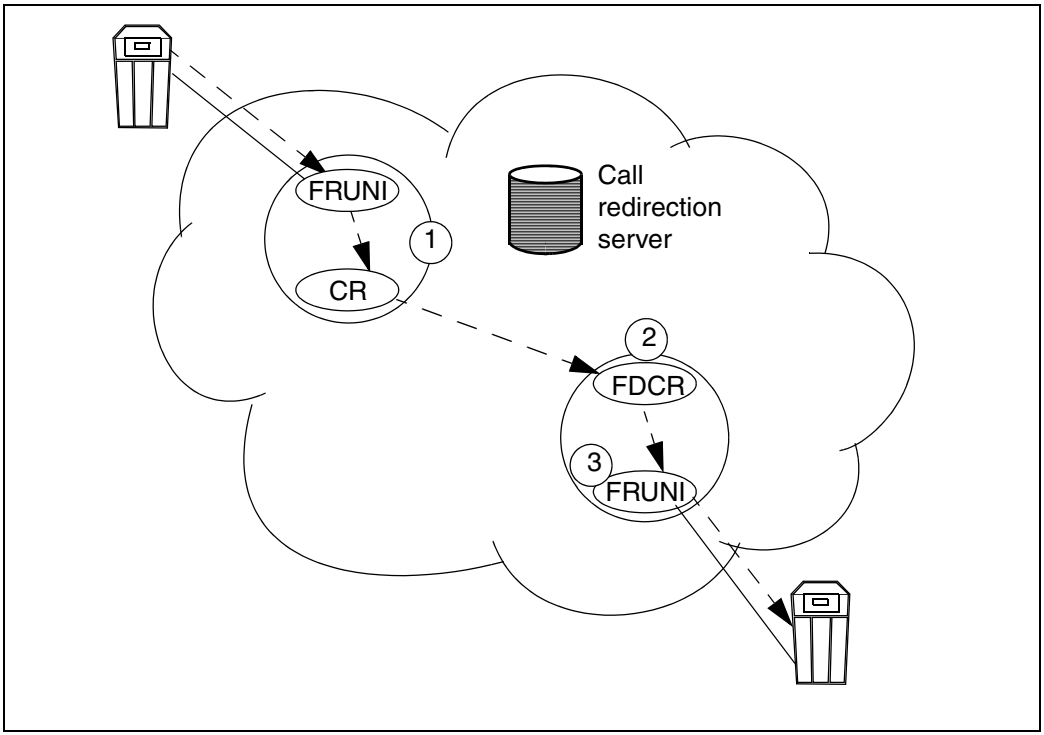
- packet forwarding at the source call router

- the final destination call router (FDCR)
- the service at the destination node

Figure 6, “Detection points,” (page 44) shows an example of the possible detection points along a normal call setup path between two frame relay user-to-network interface (UNI) services:

- At detection point 1, the packet forwarding systems find that there is no Nortel Networks Multiservice Switch trunk available to the destination node selected by the call router (CR). It is possible that a Multiservice Switch trunk is down, or that there is a failure at the destination node. Another possibility is that the destination node has moved to another RID.
- At detection point 2, the call arrives successfully at the FDCR determined by the call router, but the destination address is not registered. It is possible that the access service is disabled (the FP is down), or that the destination address is not provisioned on this node.
- At detection point 3, the network routes the call successfully to the destination port, but cannot forward it to the customer equipment. This situation can occur due to a disabled physical link, engineering or memory limitations, provisioning problems, or a locked interface.

Figure 6
Detection points



Access to the call redirection server

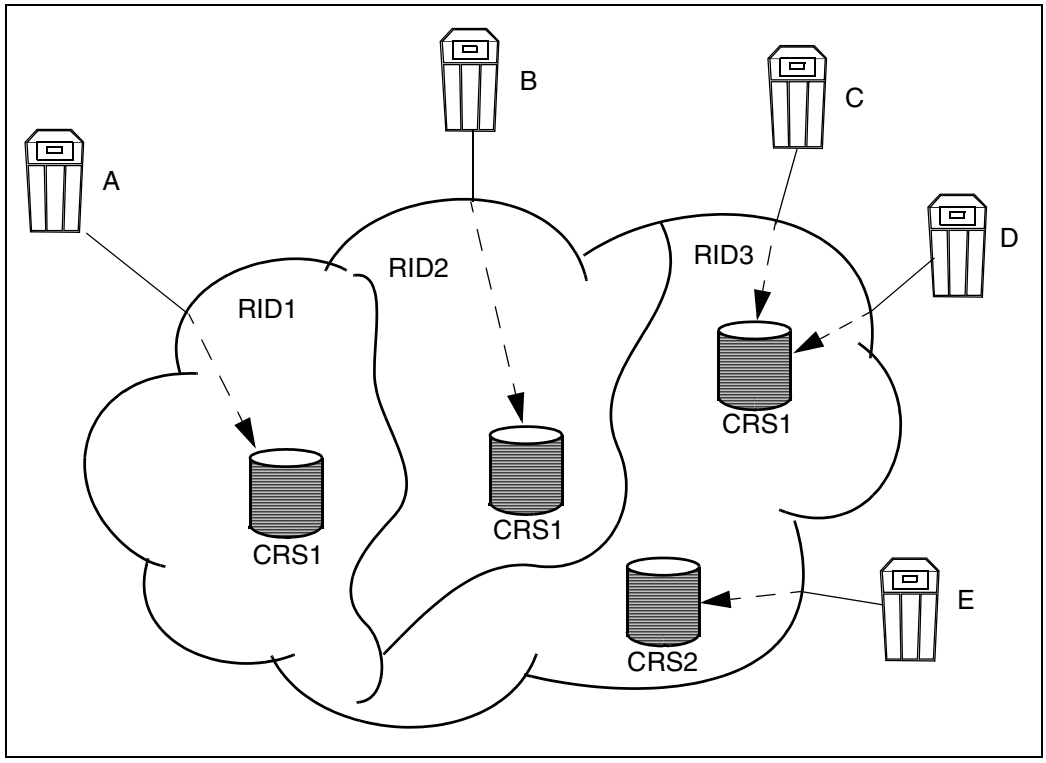
The CRS registers its internal address with the DPRS routing system. DPRS broadcasts the CRS location to neighboring nodes, which maintain the CRS internal address on their CPs.

The detection point, also known as the client, accesses the CRS by sending the request to the CRS internal address. DPRS automatically routes the request to the closest CRS in the RID subnet, based on routing metrics. A client can access only a CRS in the same RID subnet. Even if there is no CRS in the local subnet, the client cannot access a CRS in another subnet. Figure 7, "Accessing call redirection servers," (page 45) shows an example of CRS access. In RID3, the Nortel Networks Multiservice Switch nodes supporting addresses C and D access CRS1, but the node supporting address E is closer to CRS2.

Note 1: The internal address that identifies the CRS is identical to the address that identifies the call redirection server on a CSRM. For this reason, coexistence of both nodes CRSs and CSRM call redirection in a network is not supported.

Note 2: CSRM applies to Nortel Networks Multiservice Switch 7400 series nodes only.

Figure 7
Accessing call redirection servers



Redirection of the call

When the call redirection request arrives, the CRS tries RID redirection first. If there is no RID redirection provisioned, the CRS maps the address to a list of secondary addresses or an alternative RID/MID pair. For descriptions of the different types of redirection, see

- "Address redirection" (page 46)
- "RID/MID redirection" (page 47)
- "RID redirection" (page 48)

Address redirection

If the network cannot route a call to the primary address, the CRS tries the mapped list of secondary addresses, starting with the first one on the list. If one of the secondary addresses can accept the call, it connects to that address. If not, the call clears with a clear message containing the cause supplied by the last address tried.

In the redirection process, the CRS obtains a redirection list by finding the best match between the original destination address and all the provisioned primary redirection addresses. The addresses match if all the digits are identical and the primary address is shorter than or equal to the original destination in length. The best match is the longest matching primary address.

If the matching primary address is shorter than the original destination, the extra digits are suffix digits. The CRS keeps the suffix digits, and propagates them from member to member, regardless of changes in numbering plan, as the redirection attempts proceed through the secondary address list. If appending the suffix digits causes a secondary address to exceed 15 digits, the CRS skips that address and goes on to the next one in the list.

After the interface presents a call to the link, redirection is no longer possible. If the customer equipment clears the call after this stage, no redirection takes place, regardless of the clearing cause.

When the failed call is a member of a hunt group, the call normally returns to the hunt group. If an individual member of a hunt group is also a primary address for a redirection list, the call enters the redirection list only when it calls the primary address directly.

Addressing for Nortel Networks Multiservice Switch nodes' CRS is very flexible:

- You can define up to 5000 primary addresses for a CRS (subject to engineering limitations).
- You can place a secondary address in more than one redirection list.
- You can define a secondary address as a primary address for a different redirection list.

  Note: In this case, there is no relationship between the secondary address and its occurrence as a primary address. Redirection attempts continue only until the original list of secondary addresses is exhausted. To prevent call routing loops, there is no redirection to nested lists.

- The primary and secondary addresses can have different lengths.
- The numbering plan (X.121 or E.164) can be different between the primary and secondary addresses and between the members of the secondary address list.

RID/MID redirection

The call redirection server allows an address to be mapped to a RID/MID pair instead of a list of secondary addresses. The main candidate for this capability is the Passport 4400-series access units, which dynamically register their addresses. Using CRS, the access unit can back up its MPANL connection onto a different Multiservice Switch node from its primary MPANL connection.

Static provisioning data in the *CallRouter* component identifies the destination node in which a particular address can be found. This data maps the address, or address prefix, to a RID or MID. If a destination module is out of service or a primary MPANL link is down, a call for the access unit is forwarded to a CRS. If the CRS has a mapping for the address prefix of the access unit, it tries to forward the call to the backup Multiservice Switch node indicated by the mapped RID/MID pair. If the access unit has established its connection to the backup node and registered its address with the node's FDCR, the call connects.

The Passport 4400-series access units do not provide a local CRS. After a call reaches the destination access unit, further redirection attempts are not possible. Calls originating from the access unit over an MPANL link to a Multiservice Switch node have access to call redirection, because the destination service or FDCR is the CRS detection point.

RID redirection

Call redirection allows an alternative RID to back up a destination RID. This capability is part of the process known as RID splitting. In RID splitting, a number of Multiservice Switch nodes originally configured in one RID subnet relocate to another subnet. The CRS provides a method of temporarily redirecting calls from the original destination RID subnet to the new one. After the relocation is complete, the network operator updates the call router databases in both RIDs, and call redirection is no longer needed.

Provisioning data under the *CallRouting* component identifies the destination module in which a particular address can be found. This component maps an address (or address prefix) to a RID or MID. If the destination module is out of service due to nodal relocation, the network forwards a call destined for the node to a CRS. If the CRS has an alternative RID defined, it forwards the call to the backup RID.

Redirection interactions

The following rules control interaction between the different types of call redirection:

- If a call has previously been through RID redirection or RID/MID redirection, it cannot go through RID redirection again.
- If a call has been through address redirection, it can go through RID redirection afterwards.
- If a call has previously been through RID redirection, it can go through RID/MID redirection once.
- If a call has been through RID redirection and failed to reach its new destination, it can go through RID/MID redirection or address redirection.
- The RID/MID and address redirection capabilities are mutually exclusive. Primary address can map only to a RID/MID pair or a series of alternative addresses, but not both.

- If a call traverses through a hunt group server in which the destination address is modified, RID redirection is allowed again. This practice allows a hunt group to be fully active while some of its members are relocating to a new RID.

CRS database

The CRS database contains the call redirection data for the network. To ensure that the redirection service is consistent throughout the network, all CRSs in the network must be provisioned with identical data. It is possible for a call request to pass through a number of CRSs on different nodes and RID subnets, so each CRS must have the same provisioned list.

The Global Data Manager tool can propagate the CRS database to other CRSs in the network. For information on the Global Data Manager tool, see 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

Spared CRS on Multiservice Switch 15000 and Multiservice Switch 20000

A CRS can be provisioned on a spared LP as a warm standby feature on Nortel Networks Multiservice Switch 15000 and Multiservice Switch 20000. In this configuration, two instances of the CRS exist: an active instance on the active card and a standby instance on the standby card. The routing system cannot see the standby CRS instance. The standby CRS instance does not receive any calls to redirect. Only the active CRS instance redirect calls.

After an equipment protection or software migration switchover, the standby CRS instance becomes active and registers with the routing system to receive calls to redirect.

Nortel Networks Multiservice Switch 7400/15000/20000

Operations: Call Redirection Server

Release 6.1

Publication: NN10600-410
Document status: Standard
Document version: 6.1S1
Document date: August 2004
Printed in Canada

NORTEL NETWORKS