Redundancy Option
NetPerformer® System Reference

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Installation Requirements

1.1 Functions of NetPerformer Redundancy Options

The Redundancy Option allows a *secondary set* of NetPerformer units to take over all operations of the *primary set* in case of:

- Unit failure in the primary set
- Failure of a redundant PVCR link
- Power supply failure
- Fan failure
- User-configurable SNMP traps
- Loss of modem signals or data on a serial port
- Manual switching to backup mode.

A redundant system is ideal for applications that require:

- High availability at all nodes
- Voice transport to a backup unit
- Reliable communications to remote areas that are difficult to access
- Full redundancy in satellite applications (requires the SkyPerformer licensed software option).

1.2 Types of Redundancy Switching Scenarios

The NetPerformer supports the following Redundancy switching scenarios:

- Communication via SNMP to one or more Redundancy Switches (up to 10 supported). See the next section for details.
- Communication via the Redundancy Switching Protocol (RSP) to a Redundancy Controller (see page 4).
- **On the SDM-9210:** Automatic switching using the digital link *Bypass* or *1:1 Redundancy* feature, available only when the unit is installed with specially designed E1/T1 interfaces for these features. **This scenario is discussed in the chapter SDM-9210 Digital Link Bypass and 1:1 Redundancy on page 1.**
- **On the SDM-9620:** Automatic switching using 1:1 Redundancy, available on blades specially designed for this feature, installed in the SDM-9600 chassis with a redundant RTM. **This scenario is discussed in the chapter SDM-9620 1:1 Redundancy on page 1.**

1.2.1 Redundancy Switch and SNMP

In this scenario, the switching from primary to secondary set is performed by a Redundancy Switch. The NetPerformer communicates with the Redundancy Switch using SNMP.

NOTE: **This scenario is *not* used in GSM applications with 1:1 Redundancy on SDM-9620 blades and redundant RTM. See SDM-9620 1:1 Redundancy on page 1 for information.**

Redundancy Switch

The Redundancy Switch is a high-end electromechanical A/B or A/B/C switch that can manually or automatically switch a range of interfaces. Any NetPerformer in the network can be used to control the current operating mode of the switch, and monitor the switch for the current operating mode of the primary and secondary set of NetPerformer units in the redundant system.

SNMP Access

The Secondary Master monitors the Redundancy Switch by polling it at regular intervals and comparing its status to the expected status. If there is a difference, the Secondary Master sends a command to the Redundancy Switch to change its state.

The SNMP console may be part of:

- The local LAN attached to the Secondary Master, ***or***
- A remote LAN whose data is transmitted to the Secondary Master through a WAN connection.

NOTE: To reach the Redundancy Switch or another NetPerformer using the SNMP agent, the Secondary Master must first be configured with a unique IP address:

- Define an IP address on the Ethernet LAN port (**ETH**, **ETH1** or **ETH2**) with the *IP address #1* or *IP address #2* parameter.

  For details, refer to the *LAN Connection and IP Networks* module of this document series.

If there is a failure on the Secondary Master that prevents it from carrying out its surveillance tasks:

- The Redundancy Switch continues to operate in **NORMAL** mode, since the problem is with the backup set
- The Primary Master logs the alarm **PROBLEM WITH SECONDARY SET**.

1.2.2 Redundancy Controller and RSP

In this scenario, the switching from primary to secondary set is performed by a Redundancy Controller. The NetPerformer communicates with the Redundancy Controller using a serial port set to the *Redundancy Switching Protocol* (RSP).

> **NOTE:** **This scenario is *not* used in GSM applications with 1:1 Redundancy on SDM-9620 blades and redundant RTM. See SDM-9620 1:1 Redundancy on page 1 for information.**

Redundancy Controller

The switching mechanism for changing from one operating mode to another is controlled by a third-party Redundancy Controller, which may be a switch, microprocessor, programmable logic controller (PLC) or programmable automaton.

The Redundancy Controller acts as the interface between the NetPerformer and the T1/E1 channel or serial port switches, which in turn connect to the PBX, modem, satellite demodulator or other user equipment. See "Typical Equipment Setup for Redundancy Controller" on page 1-5 for an example installation.

RSP Port Characteristics

The RSP port has the following characteristics, depending on the type of cable used.

> **NOTE:** To see which type of cable is connected to the RSP port, execute the **PORT** option of the Display Parameters (**DP**) command.

- If a **DTE cable** is connected to the serial port, the RSP protocol uses:
  - **DTR:** Toggles at a rate of 1/2 Hz when the processor is running (Watchdog status)
  - **RTS:** Toggles at a rate of 1/2 Hz when a fault has been detected in the peer unit
  - **CTS:** High if the primary set is operating, low if the secondary set is operating.
- If a **DCE cable** is connected to the serial port, the RSP protocol uses:
  - **DSR:** Toggles at a rate of 1/2 Hz when the processor is running (Watchdog status)
  - **CTS:** Toggles at a rate of 1/2 Hz when a fault has been detected in the peer unit
  - **RTS:** High if the primary set is operating, low if the secondary set is operating.

NOTE: No other modem signals are required for the RSP port.

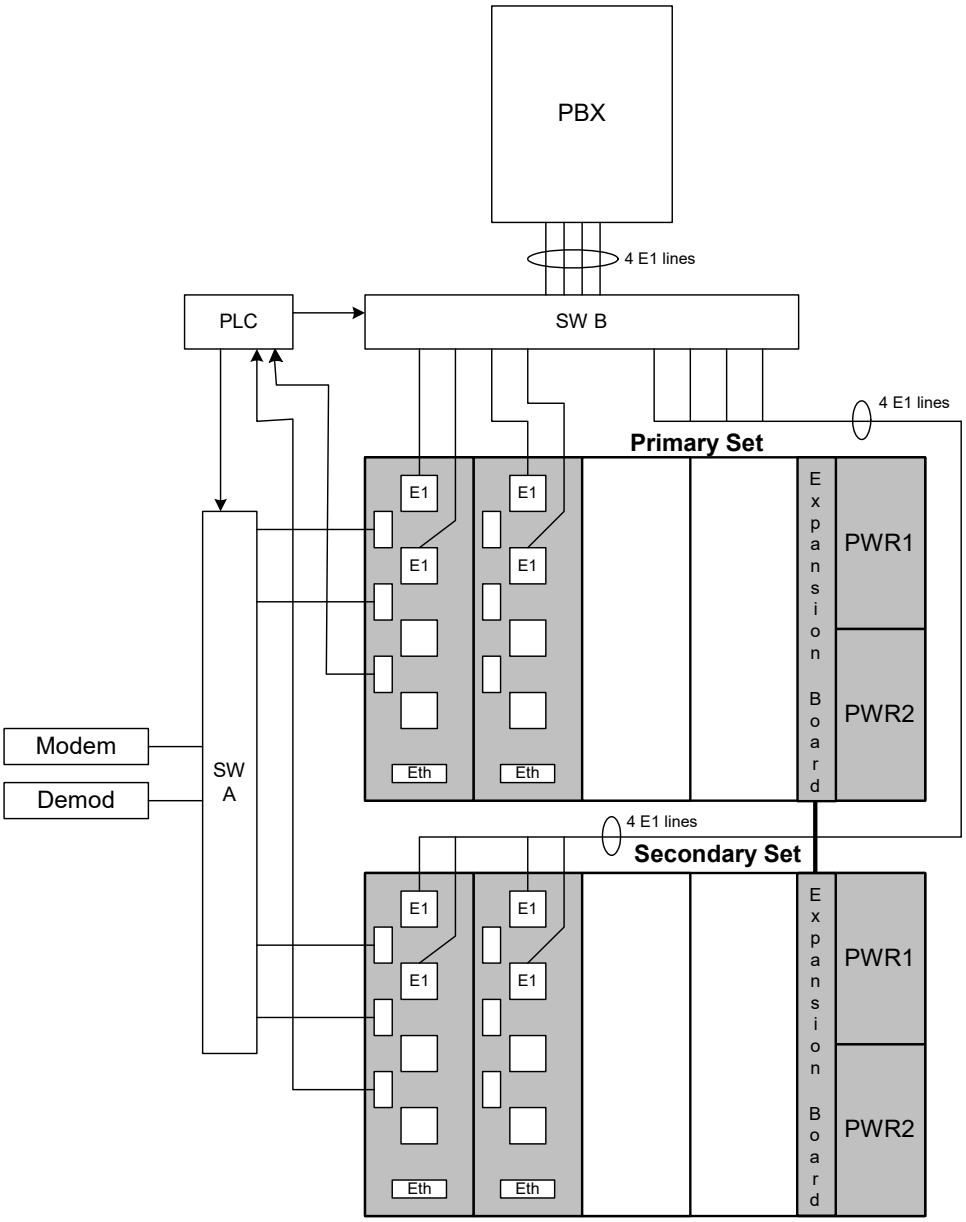


Figure 1-1: Typical Equipment Setup for Redundancy Controller

NOTE: A Y-cable may be used instead of a switch on the SkyPerformer **DEMODULATOR** ports. A switch is required on all **MODULATOR** ports.

1.3 Types of Installations

A redundant system can be installed at each node in the network, or at critical nodes only. At each backup node, you must install two fully redundant sets of units with identical hardware, using **one** of the following setups:

- **Shelf Installation**: **1:1 Redundancy application on the SDM-9600 chassis using 2 specially designed SDM-9620 blades with a redundant RTM. Turn to Installation Requirements on page 8 for complete information on this setup.**
- **Legacy Rackmount Installation** (see Figure 1-1-2): Requires 2 SDM-9500 chassis with identical sets of SDM-9585 cards, interconnected via:
  - FireWire bus and cabling between an SDM-9500 expansion card on both chassis, ***or***
  - A PVCR link on a serial port.

NOTE: In a legacy rackmount scenario the cards can be installed in any slot. Typically, the master unit is the first card on the left, but **there is no absolute requirement that you choose this location**.

- **Standalone Installation** (see Figure 1-1-3): Requires 2 or more standalone units that can communicate via a PVCR link, using either
  - A serial port, ***or***
  - A PVC, using PowerCell over IP.

NOTE: **The PowerCell over IP scenario is the preferred method for linking standalone units**, as it requires less cabling and frees up the serial ports for other uses.

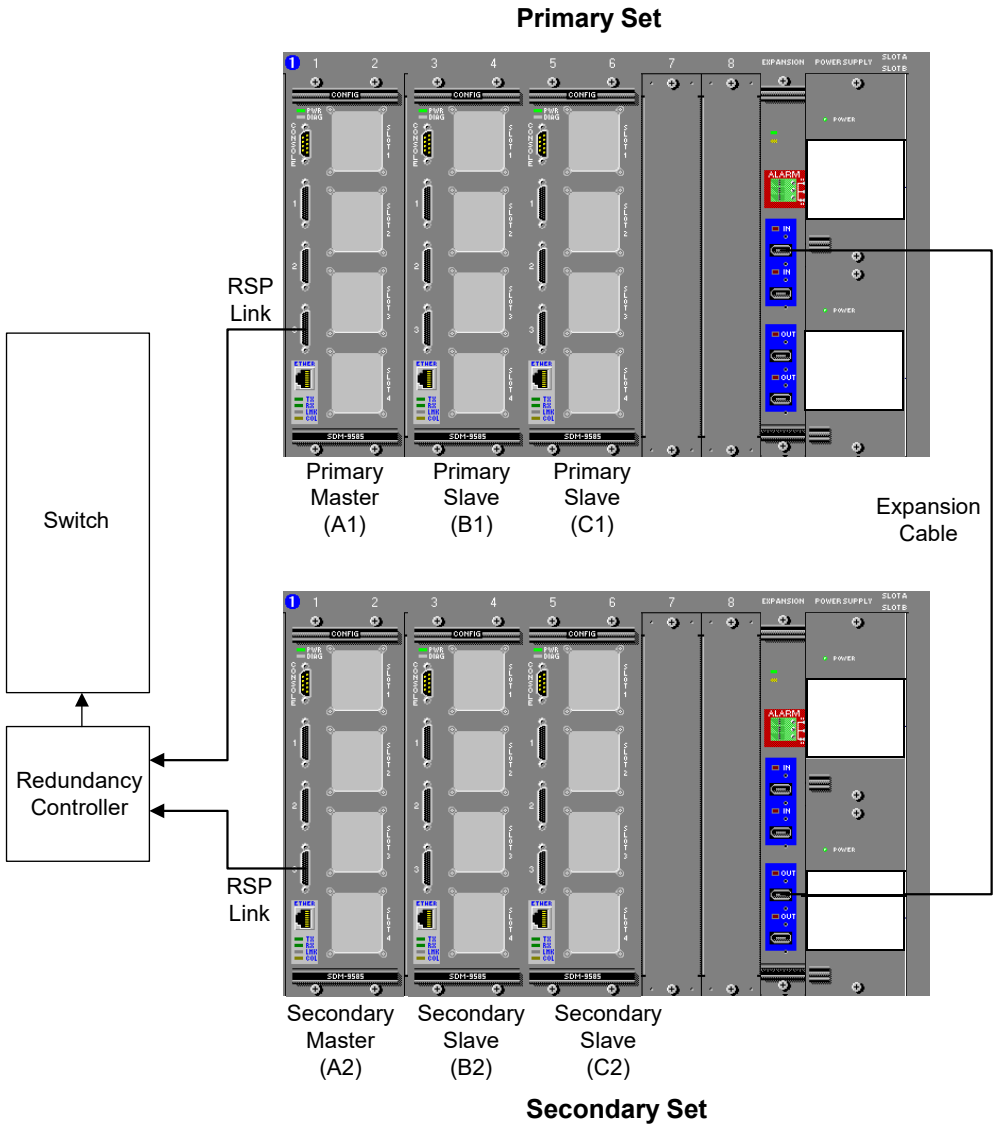


Figure 1-2: Redundant System using SDM-9500 Chassis

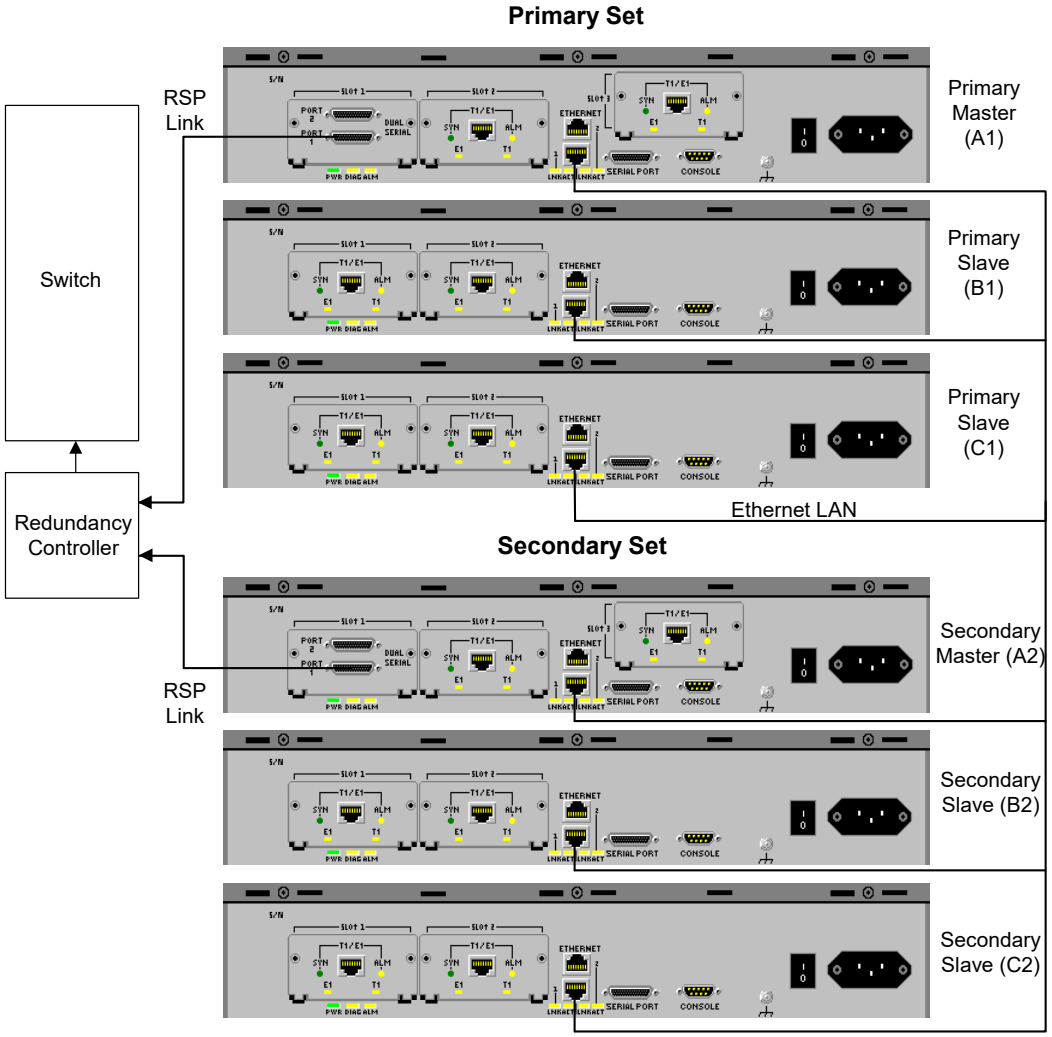


Figure 1-3: Redundant System using Standalone Units

Once installed, each unit must be able to detect all other units in the application through WAN connectivity.

- This is accomplished via the FireWire in a system that uses SDM-9500 chassis
- In a system with standalone units, you must configure the serial ports and/or the PVCs to create a WAN (PVCR) connection.

1.3.1 Testing WAN Connectivity

Use the Display Destination Table (**DD**) command to test WAN connectivity in your system:

- Enter **DD** at the main command prompt.

- The unit displays a table that shows all destinations that can be reached via ports, channels and PVCs configured with the **PVCR** protocol.

NOTE: All remote units required for the redundant system must appear under the **DESTINATION** column of this table.

DD example: testing WAN connectivity on a redundant system

```
A1>DD
DISPLAY DESTINATION TABLE

The destination table has 4 entry(ies)

DESTINATION       VAL  COST    INTRF   NEXT HOP          AGE

A2                Y    0       FW   21   A1                0   s
A3                Y    0       PVC   1   A1                0   s
B1                Y    0       FW   13   A1                0   s
B2                Y    0       FW   23   A1                0   s
```

Caution: To detect and resolve name conflicts, a direct PVCR link (with no hops) must be available between the primary and secondary sets of units.

1.4 Unit Roles

Each unit of a redundant system plays a particular role with respect to the other units at the same network node. The role is defined with the *Role* parameter using the **REDUNDANCY/CRITERIA** submenu of the **SETUP** command (see page 13), and can be:

- **Primary Master:**
  - Operates when the redundant system is in **NORMAL** mode
  - Connects to the Redundancy Controller, if used. Acts as the SNMP console in a Redundancy Switch scenario
  - Polls the Primary Slaves for redundancy status information.
- **Primary Slave:**
  - Operates when the redundant system is in **NORMAL** mode
  - Provides additional T1/E1, satellite or other connections to user equipment
- **Secondary Master:**
  - Operates when the redundant system is in **BACKUP** mode
  - Connects to the Redundancy Controller, if used. Acts as the SNMP console in a Redundancy Switch scenario
  - Controls a switch to **BACKUP** mode

NOTE: T1/E1 and serial connections are switched based on the current status of this unit.

  - Polls the Secondary Slaves for redundancy status information
  - Has the same software as the Primary Master.
  - Has almost the same configuration as the Primary Master. The **REDUNDANCY** parameters are different, and the IP addresses can be different if required for your application.
- **Secondary Slave:**
  - Operates when the redundant system is in **BACKUP** mode
  - Has the same software as the corresponding Primary Slave.
  - Has almost the same configuration as the corresponding Primary Slave. The **REDUNDANCY** parameters are different, and the IP addresses can be different if required for your application.

Refer to "Redundant System using SDM-9500 Chassis" on page 1-7 and "Redundant System using Standalone Units" on page 1-8 for examples.

A redundant system has, at minimum, one Primary Master and one Secondary Master. **The slave units are optional, but if one or more Primary Slaves are used you must**

install the same number of Secondary Slaves. A maximum of 10 Primary Slaves and 10 Secondary Slaves are supported.

Operations

2.1 Startup Operating Mode

At startup, each NetPerformer unit in the redundant system establishes its operating mode as follows:

- If the unit is a Primary Master or Primary Slave, and the *Force unit to restart in backup mode* parameter is set to **YES** (see "Force unit to restart in backup mode" on page 7-4), then the unit will start up in **BACKUP** mode.
- Otherwise, the unit will reestablish the same operating mode it used the last time it was up and running, based on the current value of the *Unit operating mode* parameter (see "Unit operating mode" on page 7-3).

2.2 Monitoring the Operating Mode

2.2.1 Configurable Criteria

The operating status of each unit is monitored according to the following configurable criteria:

- **PVCs:** UP or DOWN. A fault is declared if one or more *redundant PVCR PVC links* are down longer than a configured length of time. You can select monitoring of:
  - **ANY** PVC: The fault is declared when one redundant PVCR PVC link goes down
  - **ALL** PVCs: All redundant PVCR PVC links must be down for a configurable length of time before the fault is declared.

  A *redundant PVCR PVC link* is a PVC that has its *Protocol* parameter set to **PVCR** and its *Redundant link* parameter set to **YES**.
- **Primary Master:** Reachable or lost. A fault is declared if any unit in the primary set is down longer than a configured length of time.

  The Secondary Master watches the whole primary set, but by interrogating the Primary Master, it can determine the status of all units in the primary set. The same is true of the Primary Master, which has only to interrogate the Secondary Master to get the status of the entire secondary set.
- **Power supply:** UP or DOWN. A fault is declared if one or more power supplies are down
- **Fan:** UP or DOWN. A fault is declared if one or more fans are down.
- **SNMP trap:** A fault is declared on reception of any SNMP trap identified in a list of up to 20 trap filters, each permitting validation of the Community, Enterprise, Agent Address, generic trap type, specific trap type, and up to 15 objects with their specific values

- **Modem signal:** A fault is declared if the modem signal is lost for a configurable length of time on a redundant serial port set to a Frame Relay or transparent data protocol: **FR-NET**, **FR-USER**, **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**

  A redundant port has its *Redundant link* parameter set to **YES**. Modem signal fault detection is also configured on the port, using *Delay before declaring a signal down (s)* and parameters that control the monitoring of specific modem signals:

  - **DTR**, **RTS**, **DSR**, **CTS** and **DCD** on V.35/V.11, TIA-232 (V.24), TIA-449 (V.36) and TIA-530 connections
  - **Control** and **Indication** on X.21 and X.21 EU connections.

- **Loss of data:** A fault is declared if data is lost (non-DATA state) for a configurable length of time on a redundant serial port set to a Frame Relay protocol (**FR-NET**, **FR-USER**)

  Data loss detection is configured on the port, using the *Watch the port state* and *Delay before declaring a signal down (s)* parameters.

- **Errors on analog interface** (available on the SDM-9220 and SDM-9230 only): A fault is declared if an analog interface (FXO, FXS or E&M) fails a periodic test for interface type errors, read CODEC errors, write/read FPGA errors, DSP not in ready state and DSP allocation errors.

The two redundant systems regularly exchange information about their current operating condition. The Secondary Master sends a request to the Redundancy Controller to switch to backup mode when:

- It does not get a suitable response from the primary set concerning any of the configured criteria, ***or***
- It receives an alarm that indicates a unit in the primary set is no longer fully operational.

NOTE: **To switch back to normal mode, two actions are required within a brief time period**, one on the Secondary Master and the other on the Redundancy Controller. The required action depends on the type of Redundancy Controller used, and may be executed remotely if both devices are accessible via telecommunication (Telnet and/or an SNMP agent). Refer to "Switching from Backup to Normal Mode" on page 2-8.

2.2.2 Primary Master Polling

The Primary Master polls the Primary Slaves, the Secondary Master and the Secondary Slaves once every 10 seconds:

- It uses the current operating status of the Secondary Master to determine whether there is a problem with the secondary set.

- It polls the other units to update its configuration of **REDUNDANCY** remote unit names and backup names.

The criteria for monitoring the secondary set are configured using the **SE/REDUNDANCY/CRITERIA** menu, and include:

- Whether the unit can be reached as a valid destination. Use the *Delay before declaring unit lost (s)* parameter to configure the amount of time that the unit must be unreachable before a fault is declared.
- Redundant PVCR PVC link status:

  A *redundant PVCR PVC link* is a PVC that has its *Protocol* parameter set to **PVCR** and its *Redundant link* parameter set to **YES**.

  - Use the *Monitor redundant PVCR PVC links* parameter to select whether **ANY** or **ALL** redundant PVCR PVC links are monitored
  - Use the *Delay before declaring PVCR PVC link down (s)* parameter to configure the amount of time that **ANY** or **ALL** redundant PVCR PVC links must be down before a fault is declared.
- Power supply status. Use the *Monitor power supplies* parameter to enable monitoring. If a power supply is detected down, a fault is immediately declared.
- Fan status. Use the *Monitor fans* parameter to enable monitoring. If a fan is detected down, a fault is immediately declared.
- SNMP trap status. Specify the *SNMP trap filters to trigger BACKUP* to select which traps should be used. Trap filters are defined using the **IP/SNMP/TRAP FILTER** submenu of the SETUP (**SE**) command.
- Analog interface status. Use the *Monitor analog interfaces* parameter to enable monitoring, and the *Interface polling interval (min)* to regulate the frequency of tests on analog interfaces.

The Primary Master keeps all status information in memory, for use when responding to polls from the Secondary Master.

2.2.3 Secondary Master Polling

The Secondary Master polls the Secondary Slaves, the Primary Master and the Primary Slaves once every 10 seconds.

- It uses the current operating status of the Primary Master to determine whether there is a problem with the primary set.
- It polls the other units to update its configuration of **REDUNDANCY** remote unit names and backup names.

The Primary Master returns the current status of the entire primary set, including:

- Number of units not reachable
- Number of redundant PVCR PVC links down
- Number of fans not operating

- Number of power supplies not operating
- Number of units with an SNMP trap identified in the trap filters
- Number of Frame Relay or transparent serial ports with loss of modem signal
- Number of Frame Relay serial ports with loss of data
- Number of analog interfaces with errors.

Depending on the status report from the primary set, the Secondary Master determines whether a switch to backup mode is required:

- The Secondary Master starts the switch to backup mode within a minimum delay in the case of a power supply or fan fault, SNMP traps and analog interface errors.

  Since the polling rate is once every 10 seconds, it can take up to 10 seconds to detect a fault on the Primary Master. Furthermore, since the Primary Master polls the Primary Slaves once every 10 seconds, it can take up to 20 seconds for the Secondary Master to detect a fault that has occurred on a Primary Slave.

- The Secondary Master starts a counter within a minimum delay in cases where:
  - A unit is not reachable or no status report is received from the Primary Master. The counter is controlled by the *Delay before declaring unit lost (s)* parameter.
  - Redundant PVCR PVC links are down. This counter is controlled by the *Delay before declaring PVCR PVC link down (s)* parameter.
  - A modem signal is lost on a Frame Relay or transparent serial port, or data is lost on a Frame Relay port. This counter is controlled by the *Delay before declaring a signal down (s)* parameter.

NOTE: By default, all of these counters run for a maximum of 60 seconds before the Secondary Master starts the switch to backup mode. In calculating an appropriate delay for your application, you should consider that it can take up to 20 seconds for the Secondary Master to detect a fault, as explained in the note above.

2.3 Switching Operating Modes

2.3.1 Automatic Switching from Normal to Backup Mode

Once a fault has been declared:

- The Secondary Master requests the Primary Master, Primary Slaves and Secondary Slaves to switch to **BACKUP** mode.
- When the Primary Master receives this request, it forwards it to the Primary Slaves.

  This ensures that all Primary Slaves receive the request, even if the Secondary Master is unable to communicate with the Primary Slaves directly
- The entire process takes 10 seconds to execute. Once completed, all backup units (the secondary set) have:
  - Changed their *Unit name* to the value of their *Backup name*, and
  - Changed their *Operating mode* to **BACKUP**.

2.3.2 Manual Switching from Normal to Backup Mode

You can force a redundant system to switch from **NORMAL** mode (using the primary set of units) to **BACKUP** mode (using the secondary set). This may be useful for testing the redundancy function on a system that is operating normally with no faults.

Manual switching is executed from either the Primary Master or Secondary Master, using the **REDUNDANCY** console command. It can also be executed by changing the value of the *Node operating mode* parameter to **BACKUP** (SNMP: *redundancyCriteriaNodeOperating-Mode*). Refer to "Configuring the Unit Role and Fault Criteria" on page 3-13.

NOTE: **A third option is available in a 1:1 Redundancy application on the SDM-9600 chassis using 2 SDM-9620 blades with a redundant RTM.** If you eject the blade from the lower slot (the Primary Master), the redundant system will go into **BACKUP** mode, and the blade in the upper slot (the Secondary Master) will take over control of all digital spans on the redundant RTM.

For manual switching using software commands, the command paths on the Command

Line Interface (CLI) tree hierarchy are shown in Figure 2-2-1.

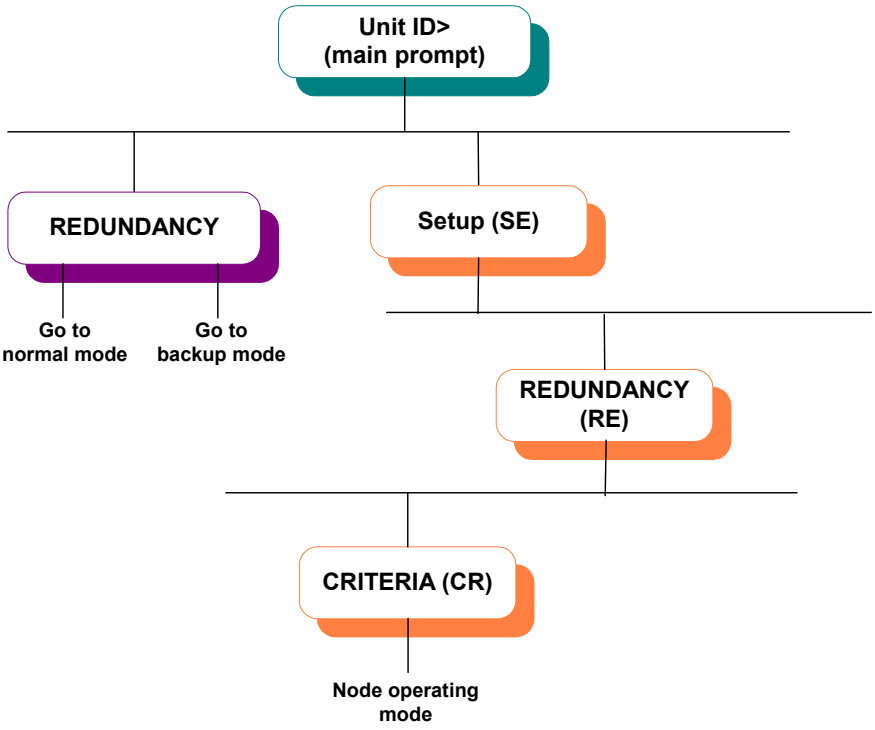


Figure 2-1: Command Paths in the CLI Tree for Switching the Mode of a Redundant System

To switch from NORMAL to BACKUP mode manually:

1. At the Primary Master or Secondary Master command line prompt, enter: **REDUNDANCY**
2. Enter **YES** at the *Go to backup mode* prompt
3. Enter **YES** again to confirm the switch to **BACKUP** mode.

REDUNDANCY Command example: switching to BACKUP mode

```
A1>REDUNDANCY
REDUNDANCY COMMAND
Go to backup mode (NO/YES,def:NO) ? YES
Go to backup mode, please confirm (NO/YES,def:YES) ? YES
Beginning switch to backup mode
```

NOTE: In a redundant system based on a Redundancy Switch under SNMP control, manual switching from **NORMAL** to **BACKUP** mode can also be accomplished using the SNMP variable on the third party equipment that toggles the output position, e.g. *A/B position*.

How It Works

For a manual switch to **BACKUP** mode using RSP:

- The process begins immediately, with the Primary Master or Secondary Master sending a command to all other units to change their operating mode to **BACKUP**
- The Secondary Master starts toggling the RTS modem signal (on a DTE cable) or CTS modem signal (on a DCE cable)
- No confirmation is required from the Redundancy Controller before the switch can take place.

For a manual switch to **BACKUP** mode using SNMP:

- The process begins immediately, with the Primary Master or Secondary Master sending a command to all other units to change their operating mode to **BACKUP**
- The Primary Master or Secondary Master sends the current value of the *Value for Secondary active* parameter to the Redundancy Switch via SNMP

  This parameter is configured using the **REDUNDANCY/SWITCH** submenu of the **SETUP** (**SE**) command. Refer to "Configuring the Redundancy Switches" on page 3-5
- The Redundancy Switch then changes its state to **BACKUP** mode.

2.3.3 Switching from Backup to Normal Mode

There are three ways to instigate a switch from **BACKUP** to **NORMAL** mode (four ways on the SDM-9620):

- Execute the Reset Redundancy Mode (**RRM**) command, available from the Secondary Master only (see "Using the Reset Redundancy Mode (RRM) Command" on page 2-9). **All faults in the primary set must be fixed before the switch can take place.**

NOTE: The redundant PVCR link status is not verified, since in **BACKUP** mode all redundant PVCR links are down in the primary set and up in the secondary set.

Caution: When using the RRM command in a redundant system using RSP, a switch from BACKUP mode (using the secondary set of units) to NORMAL mode (using the primary set) requires two actions within a brief time period: a command executed from the Secondary Master, followed by a local or remote intervention on the Redundancy Controller.

- Execute the **REDUNDANCY** command, with the *Go to normal mode* parameter set to **YES**. This method can be executed from either the Primary Master or Secondary Master. **The mode switch will take place whether or not the fault situ-**

ation has been corrected. Refer to "Command Paths in the CLI Tree for Switching the Mode of a Redundant System" on page 2-7.

- Change the value of the *Node operating mode* parameter to **NORMAL** (SNMP: *redundancyCriteriaNodeOperatingMode*). **The mode switch will take place whether or not the fault situation has been corrected.** Refer to "Configuring the Unit Role and Fault Criteria" on page 3-13.
- **For the SDM-9620 only:** In a 1:1 Redundancy application on the SDM-9600 chassis using 2 SDM-9620 blades with a redundant RTM, if the redundant system is in **BACKUP** mode because you ejected the blade from the lower slot (see the Note in "Manual Switching from Normal to Backup Mode" on page 2-6), you can force a return to **NORMAL** mode by reinstalling the lower blade and closing its handles. The Secondary Master (upper blade) will relinquish control of all digital spans on the redundant RTM, and the Primary Master (lower blade) will take over.

Using the Reset Redundancy Mode (RRM) Command

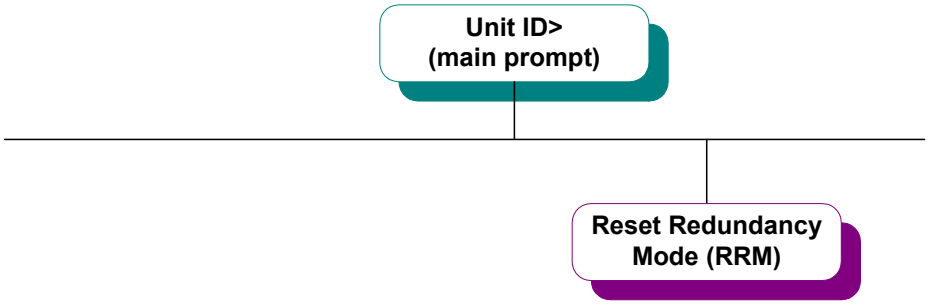


Figure 2-2: RRM Command in the CLI Tree

To switch from BACKUP mode (using the secondary set of units) to NORMAL mode (using the primary set) using the RRM command:

1. Ensure that the problem which caused the fault on the primary set has been corrected:
   - To determine the cause, access the Secondary Master console and execute the Display States (**DS**) command by entering the menu sequence: **DS** ↵ **REDUNDANCY** ↵ **LOCAL**. Refer to "Local Unit Status" on page 6-6 for details.
   - The *Reason for the last fault* statistic indicates the problem.

   This statistic is also available via SNMP using the *statRedundancyLocalFaultReason* variable.
2. Execute the Reset Redundancy Mode (**RRM**) command from the Primary Master (SNMP-based system only) or Secondary Master:
   - At the NetPerformer command line prompt, enter: **RRM**
   - Enter **YES** to confirm the **RRM** command.

   In an SNMP-based system, the unit you execute the **RRM** command from must have the *Switch active* parameter set to **YES**. This parameter is configured using the

REDUNDANCY/SWITCH submenu of the **SETUP** (**SE**) command. Refer to "Configuring the Redundancy Switches" on page 3-5.

3. For a redundant system based on RSP only:

   - Execute the operator action on the Redundancy Controller that is required to bring about a change of modem signal states.

   The required action depends on the type of Redundancy Controller used. It may be executed from a remote site if the Redundancy Controller is accessible via Telnet or an SNMP agent.

RRM example: from Secondary Master

```
(A2) A1>RRM
RESET REDUNDANCY MODE
Reset redundancy mode, please confirm (NO/YES,def:YES) ?
Reset started
Waiting for Primary Online Confirmation (timeout 60 s) ...
See alarms (DA) for details.
```

NOTE: In a redundant system based on a Redundancy Switch under SNMP control, manual switching from **BACKUP** to **NORMAL** mode is accomplished using the SNMP variable on the third party equipment that toggles the output position, e.g. *A/B position*.

How It Works

For a manual switch to **NORMAL** mode using RSP:

- The Secondary Master determines whether the primary set is fault-free and ready to continue the switching process
- If a switch to **NORMAL** mode is feasible, the Secondary Master stops toggling the RTS modem signal (on a DTE cable) or CTS modem signal (on a DCE cable)
- The Secondary Master then waits for a maximum of 60 seconds for confirmation from the Redundancy Controller. The confirmation is signalled by a change of state of the CTS modem signal (on a DTE cable) or RTS modem signal (on a DCE cable).

  An operator action on the Redundancy Controller is required to bring about this change of modem signal states (see step 3, above).

- **If confirmation from the Redundancy Controller is received on time,** the Secondary Master begins the switch to **NORMAL** mode, which takes 10 seconds to execute.

  You can execute the Display Alarms (**DA**) command immediately to view details about the execution of **RRM**. See "Displaying the Alarms" on page 6-13.

- **If no confirmation is received within 60 seconds,** the Secondary Master starts to toggle the modem RTS signal (on a DTE cable) or CTS modem signal (on a DCE cable) again, at a rate of 1/2 Hz. **No switch to NORMAL mode takes place in this case.**

For a manual switch to **NORMAL** mode using SNMP:

- The Secondary Master determines whether the primary set is fault-free and ready to continue the switching process
- No operator action is required before the switch can take place
- The Primary Master or Secondary Master sends the current value of the *Value for Primary active* parameter to the Redundancy Switch via SNMP

  This parameter is configured using the **REDUNDANCY/SWITCH** submenu of the **SETUP** (**SE**) command. Refer to "Configuring the Redundancy Switches" on page 3-5
- The Redundancy Switch then changes its state to **NORMAL** mode.

Using the REDUNDANCY Command

NOTE: Refer to "Command Paths in the CLI Tree for Switching the Mode of a Redundant System" on page 2-7.

To switch from BACKUP mode (using the secondary set of units) to NORMAL mode (using the primary set) using the REDUNDANCY command:

1. Ensure that the problem which caused the fault on the primary set has been corrected:
   - To determine the cause, access the Secondary Master console and execute the Display States (**DS**) command by entering the menu sequence: **DS** ↵ **REDUNDANCY** ↵ **LOCAL**. Refer to "Local Unit Status" on page 6-6 for details.
   - The *Reason for the last fault* statistic indicates the problem.

   This statistic is also available via SNMP using the *statRedundancyLocalFaultReason* variable.
2. At the Primary Master or Secondary Master command line prompt, enter: **REDUNDANCY**
3. Enter **YES** at the *Go to normal mode* prompt
4. Enter **YES** again to confirm the switch to **NORMAL** mode.

REDUNDANCY Command example: switching to NORMAL mode

```
AX>REDUNDANCY
REDUNDANCY COMMAND
Go to normal mode (NO/YES,def:NO) ? YES
Go to normal mode, please confirm (NO/YES,def:YES) ? YES
Beginning switch to normal mode
```

NOTE: In a redundant system based on a Redundancy Switch under SNMP control, manual switching from **BACKUP** to **NORMAL** mode is accomplished using the SNMP variable on the third party equipment that toggles the output position, e.g. *A/B position*.

How It Works

For a manual switch to **NORMAL** mode using RSP:

- The process begins immediately, with the Primary Master or Secondary Master sending a command to all other units to change their operating mode to **NORMAL**
- The Secondary Master stops toggling the RTS modem signal (on a DTE cable) or CTS modem signal (on a DCE cable)
- No confirmation is required from the Redundancy Controller before the switch can take place.
- The switch to **NORMAL** mode takes 10 seconds to execute.

For a manual switch to **NORMAL** mode using SNMP:

- The process begins immediately, with the Primary Master or Secondary Master sending a command to all other units to change their operating mode to **NORMAL**
- The Primary Master or Secondary Master sends the current value of the *Value for Primary active* parameter to the Redundancy Switch via SNMP

  This parameter is configured using the **REDUNDANCY/SWITCH** submenu of the **SETUP** (**SE**) command. Refer to "Configuring the Redundancy Switches" on page 3-5
- The Redundancy Switch then changes its state to **NORMAL** mode.

2.3.4 Traffic Limitations when Switching Modes

When a primary unit goes down, the redundant system attempts to preserve all communications without interruption during a switch to another operating mode. By default:

- All active voice calls are rerouted over the secondary system
- All PVCs remain active for 8 seconds, even if the physical link has lost the modem signals.

Caution: These default settings can cause delays and problems in reestablishing full communications between the redundant system and another network node. In particular, voice calls cannot be rerouted successfully.

To permit a switch from one operating mode to another in the most efficient way possible, you must configure the NetPerformer unit to **immediately hang all voice calls** when the

unit receives a request to switch to another operating mode.

- To do this on the remote NetPerformer, set its global *Voice call rerouting* parameter to **DISABLE** using the **SE/GLOBAL** console menu (or the *npsysVoiceCallRerouting* SNMP variable).
- If the system is redundant remotely, but not locally, the *Voice call rerouting* parameter should be set to **DISABLE** on all units at the local location only.
- If both local and remote locations are redundant, this parameter must be set to **DISABLE** on all local and remote units.

NOTE: The default value of the *Voice call rerouting* parameter is **ENABLE**.

Configuration

3.1 About NetPerformer Configuration

To configure a NetPerformer unit for participation in a redundant system:

- Configure the global parameters that affect the redundant system, as described in the next section
- If you are using one or more Redundancy Switches with SNMP, configure the Switch criteria (see "Configuring the Redundancy Switches" on page 3-5)
- **On the SDM-9210 only:** If you are using the NetPerformer digital link *Bypass* or *1:1 Redundancy* feature instead of a gang switch, configure the digital link *Interface operating mode*. Refer to the chapter "SDM-9210 Digital Link Bypass and 1:1 Redundancy" on page 4-1.

  For the SDM-9210, Digital link Bypass and 1:1 Redundancy are available only when the unit is installed with E1/T1 interfaces specially designed for these features.
- **On the SDM-9620 only:** For 1:1 Redundancy, only the Primary Master and Secondary Master need to be configured, including their slot numbers in the SDM-9600 chassis. Refer to "Configuring the SDM-9620 for 1:1 Redundancy" on page 5-10.

  For the SDM-9620, 1:1 Redundancy is available only when the SDM-9600 chassis is installed with 2 specially designed SDM-9620 blades and a redundant RTM.
- If you are using a Redundancy Controller with RSP, configure the RSP port (see "Configuring the Physical Links" on page 3-8)
- Configure the unit *Role* and fault criteria (see "Configuring the Unit Role and Fault Criteria" on page 3-13)
- Configure the *Backup name* and remote unit identification (see "Configuring the Backup Name and Remote Unit Identification" on page 3-16)
- If you want to use SNMP traps to trigger unit backup, define the SNMP trap filters (see "Configuring the SNMP Trap Filters" on page 3-20)
- If you want **BACKUP** mode on loss of modem signals, define the required port parameters (serial port set to Frame Relay or transparent protocol only; see "Monitoring Loss of Modem Signals" on page 3-24)
- If you want **BACKUP** mode on loss of data, define the required port parameters (serial port set to Frame Relay only; see "Monitoring Loss of Data on a Frame Relay Port" on page 3-27).

3.2 Configuring the Global Parameters

The **GLOBAL** submenu of the **SETUP** command includes all global parameters that affect the Redundancy Option.

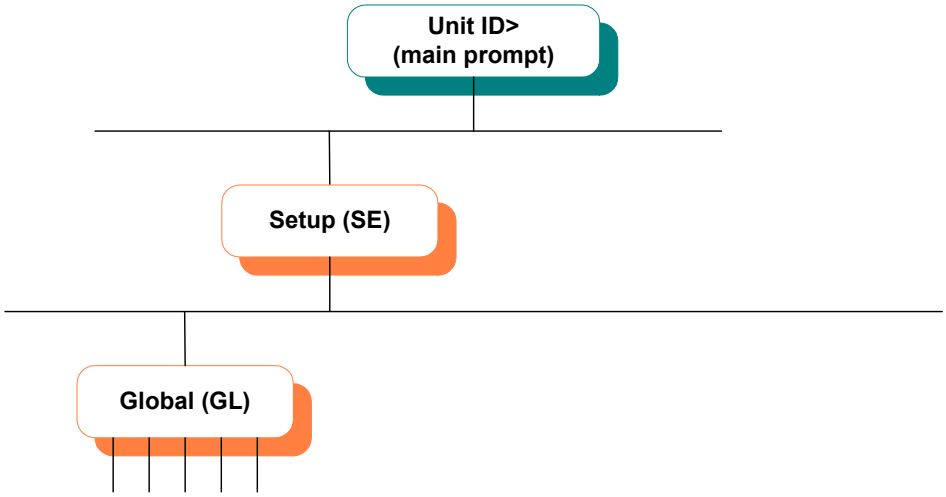


Figure 3-1: SETUP/GLOBAL Path in the CLI Tree

To configure the global parameters:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **GLOBAL**
2. Change a parameter value by entering the new value after the parameter prompt.

   Important parameters for the Redundancy Option include:

   - *Unit name* (SNMP: *npsysName*)
   - *Watch power supplies and fans* (SNMP: *npsysPsAndFansMonitoring*)

     Caution: This parameter must be set to **PS** or **BOTH** to permit monitoring of the power supplies. It must be set to **FANS** or **BOTH** to permit monitoring of the fans. **No power supply or fan faults will be detected by the unit if this parameter is left at its default value: NONE.**

   - *Voice call rerouting* (SNMP: *npsysVoiceCallRerouting*)

     Caution: This parameter must be set to **DISABLE** to ensure an efficient switch from one operating mode to another.

SE/GLOBAL example

```
B457376>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? GLOBAL
GLOBAL> Unit name (def:B457376) ? A2
GLOBAL> Unit routing version (1-2,def:1) ?
GLOBAL> Contact name (def:Memotec) ?
GLOBAL> Unit location (def:Unknown) ?
GLOBAL> Loopback (def:NO) ?
GLOBAL> Link timeout delay (0-1000,def:0) ?
GLOBAL> Transit delay (s) (1-20,def:4) ?
```

```
GLOBAL> Daylight saving time (def:YES) ?
GLOBAL> Default IP address (def:000.000.000.000) ?
GLOBAL> Default IP mask (number of bits) (0-24,def:0) ?  {000.000.000.000}
GLOBAL> Default gateway (def:000.000.000.000) ?
GLOBAL> SNMP trap: IP address 1 (def:000.000.000.000) ?
GLOBAL> SNMP trap: IP address 2 (def:000.000.000.000) ?
GLOBAL> SNMP trap: IP address 3 (def:000.000.000.000) ?
GLOBAL> SNMP trap: IP address 4 (def:000.000.000.000) ?
GLOBAL> Frame relay status change trap (def:DISABLE) ?
GLOBAL> Rack id (0-4,def:2) ?
GLOBAL> Watch power supplies and fans (def:NONE) ? BOTH
GLOBAL> RIP version for backplane links (def:V1) ?
GLOBAL> IPX RIP for backplane links (def:ENABLE) ?
GLOBAL> IPX SAP for backplane links (def:ENABLE) ?
GLOBAL> OSPF for backplane links (def:ENABLE) ?
GLOBAL> Local unit DLCI address (0-1022,def:0) ?
GLOBAL> Extension number (no. of digits) (2-4,def:3) ?
GLOBAL> Country code (0-9999,def:1) ?
GLOBAL> Jitter buffer (ms) (0-200,inc:10,def:170) ?
GLOBAL> Enable voice/fax log (def:YES) ?
GLOBAL> Dial timer (s) (0-10,def:4) ?
GLOBAL> High priority voice class (def:YES) ?
GLOBAL> Global CIR for FR over IP (1-100000000,def:64000) ?
GLOBAL> Timer in ms for FR over IP (1-1000,def:50) ?
GLOBAL> Max number of voice channels over IP (0-10000,def:10000) ?
GLOBAL> Delay generated by a comma (ms) (250-4000,inc:250,def:250) ?
GLOBAL> ISDN G4 Fax PCM switching enable (def:NO) ?
GLOBAL> Auto save configuration delay (s)  (0-255,def:10) ?
GLOBAL> Enable VTR (Voice Traffic Routing) (def:NO) ?
GLOBAL> Enable Domain Dialing (def:YES) ?
GLOBAL> Enable hunt forwarding (def:YES) ?
GLOBAL> Enable user access logging (def:NO) ?
GLOBAL> Exclusive access to console (def:DISABLE) ?
GLOBAL> Voice call rerouting (def:ENABLE) ? DISABLE
```

3.3 Configuring the Redundancy Switches

NOTE: **This configuration is *not required*** in applications using the SDM-9210 or redundant SDM-9620, or **in a scenario that uses a Redundancy Controller and the RSP protocol.**

The **REDUNDANCY/SWITCH** submenu of the **SETUP** console command includes all parameters required to control all Redundancy Switches from the Primary Master. Up to 10 Redundancy Switches can be supported at the same time.

Caution: The Secondary Master is typically used to monitor the Redundancy Switches. However, the Primary Master may also be used. If you want to monitor the Redundancy Switches with both masters, take care to configure the same values on each master unit. Otherwise, an endless change of state could occur on one or more Redundancy Switches.

If you are using SNMP, all Redundancy configuration variables are grouped under the *redundancySwitch* category. For text-based configuration the *[RedundancySwitch #]* heading is used.

Console	SNMP	Text-based Config
SE/REDUNDANCY/ SWITCH	*redundancySwitch* (category)	[RedundancySwitch #] (heading)

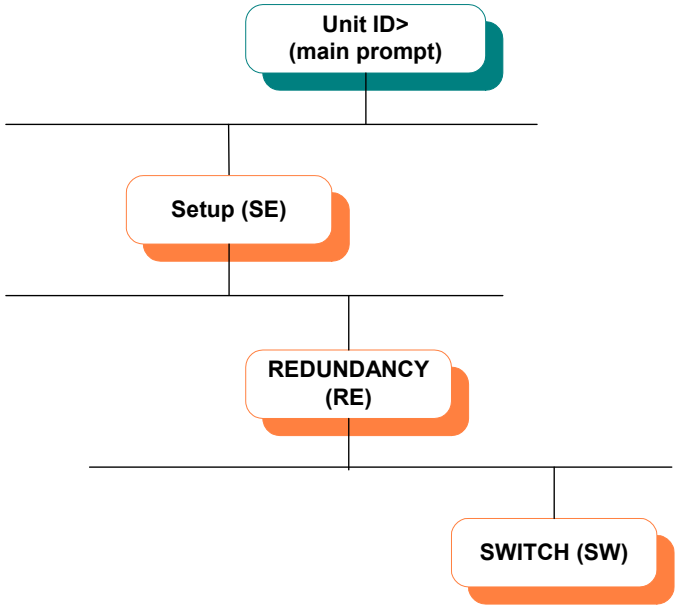


Figure 3-2: SETUP/REDUNDANCY/SWITCH Path in the CLI Tree

To configure the NetPerformer unit to control the Redundancy Switch:

1. At the NetPerformer command line prompt, enter the menu sequence:

   SE ↵ REDUNDANCY ↵ SWITCH

   or

   SE ↵ REDUNDANCY ↵ ALL

   If you select the **ALL** option, the **CRITERIA** and **REMOTE** parameters will be presented first. Refer to "Configuring the Unit Role and Fault Criteria" on page 3-13 and "Configuring the Backup Name and Remote Unit Identification" on page 3-16.

2. Select the *REDUNDANCY SWITCH number*

   Up to 10 Redundancy Switches are supported. Configure each one separately.

3. Set *Switch active* to **YES**

4. Set *IP address* to the IP address of the Redundancy Switch

5. Define the SNMP coordinates of the Redundancy Switch:

   - *Get community*
   - *Set community*
   - *Variable type* (**PATH** or **NUMBER**)
   - *Variable path* or *Variable number (1.3.6.1...)*
   - *Indexes*

6. Define the values that this unit will send to the Redundancy Switch:

   - *Value type* (**INTEGER** or **STRING**)
   - *Value for Primary active*
   - *Value for Secondary active*

7. Define how this unit will poll other units in the redundant system:

   - *Polling active*
   - *Polling delay (s)*
   - *Maximum OID per GET frame*
   - *Maximum OID per SET frame*
   - *Mode of sending* (**SEQUENTIALLY** or **SIMULTANEOUSLY**)
   - *Timeout (ms)*

8. Select whether you would like to *Log errors in the journal*

9. Define the *SNMP trap filters to trigger BACKUP*. Enter the numbers of all trap filters that will generate a fault if the corresponding SNMP trap is received at this unit. Refer to "Configuring the SNMP Trap Filters" on page 3-20

10. At the prompt *Configure another Redundancy Switch ?* enter **YES** to define parameters for controlling another Redundancy Switch, or enter **NO** to return to the NetPerformer command line prompt.

For details on these parameters, consult the section "SWITCH Parameters" on page 7-21.

SE/ REDUNDANCY /SWITCH example

```
SEC.MASTER>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? SWITCH
REDUNDANCY SWITCH number (1-10,def:1) ? 1
SWITCH 1> Switch active (def:NO) ? YES
SWITCH 1> IP address (def:000.000.000.000) ? 168.0.2.41
SWITCH 1> Get community (def:public) ? GetCommunity
SWITCH 1> Set community (def:public) ? SetCommunity
SWITCH 1> Variable type (def:PATH) ? NUMBER
SWITCH 1> Variable number (1.3.6.1...) (def:) ? 4.1.727.7.2.10.2.1.2
SWITCH 1> Indexes ((def:) ? 1,3-5,10
SWITCH 1> Value type (def:INTEGER) ?
SWITCH 1> Value for Primary active (def:1) ? 2
SWITCH 1> Value for Secondary active (def:2) ? 5
SWITCH 1> Polling active (def:YES) ?
SWITCH 1> Polling delay (s) (60-1000,def:120) ?
SWITCH 1> Maximum OID per GET frame (1-20,def:20) ?
SWITCH 1> Maximum OID per SET frame (1-20,def:20) ?
SWITCH 1> Mode of sending (def:SEQUENTIALLY) ?
SWITCH 1> Timeout (ms) (100-10000,def:1000) ?
SWITCH 1> Log errors in the journal (def:YES) ?
SWITCH 1> SNMP trap filters to trigger BACKUP (def:) ? 1-5,8,10

Configure another Redundancy Switch (NO/YES,def:YES) ? NO
```

3.4 Configuring the Physical Links

The **PORT** and **SLOT** submenus of the **SETUP** command include all serial port parameters that affect the Redundancy Option.

- A serial port provides the physical link to the Redundancy Controller, using the **RSP** protocol.

  This is not required on the SDM-9620 or in a scenario that uses a Redundancy Switch and SNMP.

- In a redundant system that uses standalone units, serial ports may be configured with the **PVCR** protocol to provide WAN connectivity between units.

  This is not required on the SDM-9600, which uses IPMC for connectivity between SDM-9620 blades. On the SDM-9210, a WAN connection can be achieved through an E1/T1 channel or Ethernet port (PVCRoIP) instead of the serial port. A gang switch is required if the serial port is used.

NOTE: Frame Relay and transparent ports can be monitored for loss of modem signals and loss of data. For the required configuration of monitoring criteria on these ports, refer to "Monitoring Loss of Modem Signals" on page 3-24, and "Monitoring Loss of Data on a Frame Relay Port" on page 3-27.

On an SDM-9210 installed with specially designed E1/T1 interfaces, the digital link *Interface operating mode* parameter determines whether Bypass or 1:1 Redundancy will be used. This application is described in the chapter "SDM-9210 Digital Link Bypass and 1:1 Redundancy" on page 4-1.

3.4.1 RSP Link

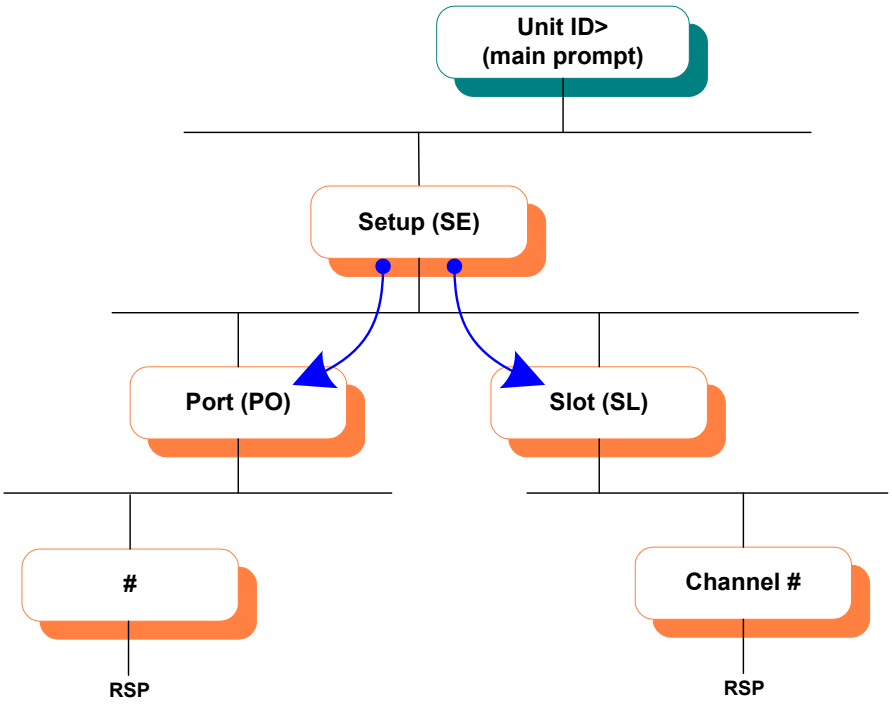


Figure 3-3: SETUP/PORT and SETUP/SLOT Paths in the CLI Tree

An RSP port must be configured on the Primary Master and Secondary Master to connect these units to the Redundancy Controller.

> **NOTE:** This configuration is **not required** in a scenario that uses a Redundancy Switch and communication via SNMP.

To configure a built-in serial port as an RSP link:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **PORT**
2. Select the *Port number*
3. Set the *Protocol* to **RSP**
4. Set the *Clocking mode*, if required.

To configure a serial port on the Dual Serial interface card as an RSP link:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Channel number*

4. Set the *Protocol* to **RSP**
5. Set the *Clocking mode*, if required.

Caution: The **RSP** protocol can be configured on any serial port. However, **only one port per unit can use this protocol at one time.** If you define more than one RSP link:

- Only one RSP link will be used. The unit picks one at its own discretion, and ignores the others.
- An alarm is raised to indicate the conflict. Execute the Display Alarms (**DA**) command to view the alarms.
- To fix the problem, change the *Protocol* of the conflicting port to **OFF** or another protocol. The unit will ensure a smooth transition to the correct RSP link.

SE/PORT/#/ RSP example: for Primary and Secondary Master

```
A1>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 3
PORT 3> Protocol (def:OFF) ? RSP
PORT 3> Interface.............................DTE-RS449
PORT 3> Clocking mode (def:EXTERNAL) ? INTERNAL
```

3.4.2 PVCR (WAN) Link

A PVCR link is not required on a redundant system that uses rackmount units (SDM-9500 or SDM-9600), as all cards/spans can communicate via the FireWire (on the SDM-9500) or IPMC (on the SDM-9600).

If you are building a redundant system at a network node using standalone units, you must configure a WAN link between each pair of participating units to provide full WAN connectivity. A dedicated WAN link is configured with the **PORT** or **SLOT** submenu of the **SETUP** command.

You can use a PVCR PVC, ATMPVCR PVC or ATMPVCR SVC instead of a PVCR port to provide WAN connectivity between two standalone units, using PowerCell over IP for redundancy communication. Refer to the description of PVC configuration in the *WAN/Frame Relay* module of this document series.

To configure a built-in serial port as a WAN link in a redundant system:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **PORT**
2. Select the *Port number*
3. Set the *Protocol* to **PVCR**
4. Set the *Mode* to **DEDICATED**
5. Set the *Redundant link* parameter to **YES**
6. Change the other port parameters from their default values, if desired. Important parameters include:

- *Compression*
- *Remote unit name*
- *Cell Packetization*.

To configure a serial port on the Dual Serial interface card as a WAN link in a redundant system:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Channel number*
4. Set the *Protocol* to **PVCR**
5. Set the *Mode* to **DEDICATED**
6. Set the *Redundant link* parameter to **YES**
7. Change the other port parameters from their default values, if desired. Important parameters are as for a built-in serial port.

To configure a T1/E1 channel as a WAN link in a redundant system:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **CHANNEL** at the *Item* prompt
4. Select the *Channel number*, e.g. **102**, where the first digit indicates the slot and the last two digits indicate the channel
5. Set the *Protocol* to **PVCR**
6. Set the *Mode* to **DEDICATED**
7. Set the *Redundant link* parameter to **YES**

   A channel is considered a data link when its *Protocol* is set to **PVCR**, **BSC**, **COP**, **DDCMP**, **HDLC**, **PASSTHRU**, **R-ASYNC**, **SS7** or **T-ASYNC** and the *Redundant link* parameter appears for all of these protocols. When the channel *Protocol* is set to **ACELP-CN**, **G723**, **G726 16K**, **G726 24K**, **G726 32K**, **G726 40K**, **G729**, **G729A**, **PCM64K** or **TRANSPARENT**, the *Redundant channel* parameter appears instead of *Redundant link*.
8. Change the other port parameters from their default values, if desired. Important parameters are as for a built-in serial port.

SE/PORT/#/ PVCR example: for standalone units

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def:PVCR) ? PVCR
PORT 1> Interface.............................DCE-V35
PORT 1> Clocking mode (def:INTERNAL) ?
PORT 1> Port speed (bps) (1200-6144000,def:56000) ?
```

```
PORT 1> Mode (def:DEDICATED) ?
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:8) ?
{000.000.000.000}
PORT 1> IP RIP (def:V1) ?
PORT 1> IP RIP TX/RX (def:DUPLEX) ?
PORT 1> OSPF (def:DISABLE) ?
PORT 1> IP multicast active (def:NO) ?
PORT 1> NAT enable (def:NO) ?
PORT 1> IPX RIP (def:DISABLE) ?
PORT 1> IPX SAP (def:DISABLE) ?
PORT 1> IPX network number (def:00000000) ?
PORT 1> Compression (def:YES) ?
PORT 1> Remote unit name (def:) ? CHICAGO-9230
PORT 1> Timeout (ms) (1000-30000,def:1000) ?
PORT 1> Number of retransmission retries (1-1000,def:100) ?
PORT 1> Maximum number of voice channels (0-10000,def:10000) ?
PORT 1> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT 1> Cell Packetization (def:YES) ?
PORT 1> Filter (def:ALL) ?
PORT 1> Redundant link (def:NO) ? YES
```

3.5 Configuring the Unit Role and Fault Criteria

The **REDUNDANCY/CRITERIA** submenu of the **SETUP** console command includes all parameters required to configure the unit role and redundancy fault criteria on a unit that is participating in a redundant system.

- If you are using SNMP, all Redundancy configuration variables are grouped under the *redundancyCriteria* category.
- For text-based configuration the *[Redundancy]* heading is used.

Console	SNMP	Text-based Config
SE/REDUNDANCY/CRITE-RIA SE/REDUNDANCY/ REMOTE	*redundancyCriteria* (category)	[Redundancy] (heading)

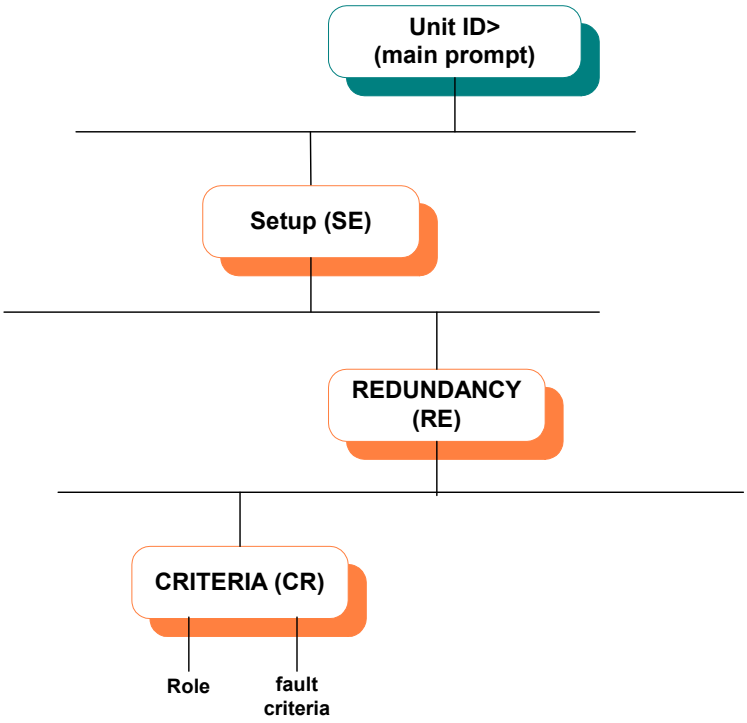


Figure 3-4: SETUP/REDUNDANCY/CRITERIA Path in the CLI Tree

To configure the unit *Role* and fault criteria:

1. At the NetPerformer command line prompt, enter the menu sequence:

   SE ↵ REDUNDANCY ↵ CRITERIA

   or

   SE ↵ REDUNDANCY ↵ ALL

If you select the **ALL** option, the **CRITERIA** parameters are presented before the **REMOTE** and **SWITCH** parameters. Refer to "Configuring the Backup Name and Remote Unit Identification" on page 3-16 and "Configuring the Redundancy Switches" on page 3-5.

2. Set the *Role* of this unit. Refer to "Unit Roles" on page 1-10.
3. Set the *Unit operating mode* (all unit roles) and *Node operating mode* (Master units only)
4. Set the *Startup delay (s)* and *Transition delay (s)*
5. Change the other parameters from their default values, if desired. The fault criteria are configured on Master units only, with:
   - *Delay before declaring unit lost (s)*
   - *Monitor redundant PVCR PVC links*
   - *Delay before declaring PVCR PVC link down (s)*
   - *Monitor power supplies*
   - *Monitor fans*
   - *Monitor analog interfaces* (SDM-9220 and SDM-9230 units only)
   - *Interface polling interval (min).*
6. On a Secondary Master, select whether the unit should *Test switches and secondary set before backup* (default **YES**).

For details on these parameters, consult the section "CRITERIA Parameters" on page 7-2.

SE/ REDUNDANCY /CRITERIA example: on a Primary Master

```
A1>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? PRIMARY MASTER
CRITERIA> Unit operating mode (def:NORMAL) ?
CRITERIA> Node operating mode (def:NORMAL) ?
CRITERIA> Detect name conflict (def:YES) ?
CRITERIA> Force unit to restart in backup mode (def:NO) ?
CRITERIA> Startup delay (s) (0-1000,def:60) ?
CRITERIA> Transition delay (s) (0-1000,def:60) ?
CRITERIA> Delay before declaring unit lost (s) (30-1000,def:60) ?
CRITERIA> Monitor redundant PVCR PVC links (def:ALL) ?
CRITERIA> Delay before declaring PVCR PVC link down (s) (0-
1000,def:60) ?
CRITERIA> Monitor power supplies (def:YES) ?
CRITERIA> Monitor fans (def:YES) ?
CRITERIA> Monitor analog interfaces (def:NO) ? YES
CRITERIA> Interface polling interval (min) (1-1440,def:5) ?
```

SE/ REDUNDANCY /CRITERIA example: on a Primary Slave

```
B1>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? PRIMARY SLAVE
CRITERIA> Unit operating mode (def:NORMAL) ?
CRITERIA> Detect name conflict (def:YES) ?
CRITERIA> Force unit to restart in backup mode (def:NO) ?
```

SE/ REDUNDANCY /CRITERIA example: on a Secondary Master

```
A2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? SECONDARY MASTER
CRITERIA> Unit operating mode (def:NORMAL) ?
CRITERIA> Node operating mode (def:NORMAL) ?
CRITERIA> Startup delay (s) (0-1000,def:60) ?
CRITERIA> Transition delay (s) (0-1000,def:60) ?
CRITERIA> Delay before declaring unit lost (s) (30-1000,def:60) ?
CRITERIA> Monitor redundant PVCR PVC links (def:ALL) ?
CRITERIA> Delay before declaring PVCR PVC link down (s) (0-
1000,def:60) ?
CRITERIA> Monitor power supplies (def:YES) ?
CRITERIA> Monitor fans (def:YES) ?
CRITERIA> Monitor analog interfaces (def:NO) ?
CRITERIA> Test switches and secondary set before backup (def:YES) ?
```

SE/ REDUNDANCY /CRITERIA example: on a Secondary Slave

```
B2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? SECONDARY SLAVE
CRITERIA> Unit operating mode (def:NORMAL) ?
```

3.6 Configuring the Backup Name and Remote Unit Identification

The **REDUNDANCY/REMOTE** submenu of the **SETUP** console command includes all parameters required to configure the backup name of a NetPerformer unit, and the names of the remote units with which this unit exchanges information for redundancy monitoring purposes.

- If you are using SNMP, all Redundancy configuration variables are grouped under the *redundancyRemote* category.
- For text-based configuration the *[redundancy]* heading is used.

Console	SNMP	Text-based Config
SE/REDUNDANCY/ REMOTE	*redundancyRemote* (category)	[redundancy] (heading)

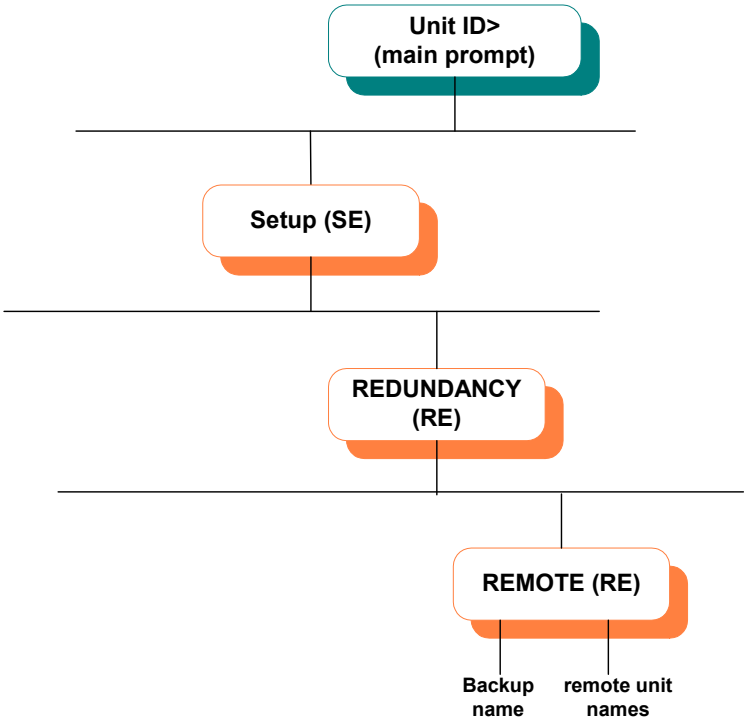


Figure 3-5: SETUP/REDUNDANCY/REMOTE Path in the CLI Tree

To configure the unit *Backup name* and all remote unit names used in BACKUP and NORMAL modes:

1. At the NetPerformer command line prompt, enter the menu sequence:

   SE ↵ REDUNDANCY ↵ REMOTE

   or

SE ↵ REDUNDANCY ↵ ALL

If you select the **ALL** option, the **CRITERIA** parameters are presented before the **REMOTE** parameters. Refer to "Configuring the Unit Role and Fault Criteria" on page 3-13.

2. Define the *Backup name* for this unit.

   If you have executed the **SE ↵ REDUNDANCY ↵ ALL** menu sequence, this parameter appears after all the **CRITERIA** parameters. Enter carriage returns to reach it.

3. Define the names of the other units when the system is operating in **NORMAL** mode. Specific parameters are explained in detail in the section "REMOTE Parameters" on page 7-10.

   - On a Slave unit, only the *Unit name of Primary Master* and *Unit name of Secondary Master* need to be defined
   - A Master unit requires the names of all other units in the system, unless it is a redundant SDM-9620
   - **If the Master unit is an SDM-9620, the Slave units do not need to be defined.** Configure only the Primary Master and Secondary Master including their slot numbers. Refer to "Primary Master and Secondary Master" on page 5-3.

Caution: Exercise great care when assigning these names. The Redundancy Option will not work if they are configured incorrectly.

4. Define the names of the other units when the system is operating in **BACKUP** mode.

NOTE: This step is optional. The backup names of all other units are learned automatically when the system is operating in **NORMAL** mode.

SE/ REDUNDANCY /REMOTE example: on a Primary Master

```
A1>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:BRIDGE) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? REMOTE
REMOTE> Backup name (def:) ? AX
REMOTE> Unit name of Secondary Master (def:) ? A2
REMOTE> Unit name of Primary Slave #1 (def:) ? B1
REMOTE> Unit name of Primary Slave #2 (def:) ? C1
REMOTE> Unit name of Primary Slave #3 (def:) ?
REMOTE> Unit name of Primary Slave #4 (def:) ?
REMOTE> Unit name of Primary Slave #5 (def:) ?
REMOTE> Unit name of Primary Slave #6 (def:) ?
REMOTE> Unit name of Primary Slave #7 (def:) ?
REMOTE> Unit name of Primary Slave #8 (def:) ?
REMOTE> Unit name of Primary Slave #9 (def:) ?
REMOTE> Unit name of Primary Slave #10 (def:) ?
```

```
REMOTE> Unit name of Secondary Slave #1 (def:) ? B2
REMOTE> Unit name of Secondary Slave #2 (def:) ? C2
REMOTE> Unit name of Secondary Slave #3 (def:) ?
REMOTE> Unit name of Secondary Slave #4 (def:) ?
REMOTE> Unit name of Secondary Slave #5 (def:) ?
REMOTE> Unit name of Secondary Slave #6 (def:) ?
REMOTE> Unit name of Secondary Slave #7 (def:) ?
REMOTE> Unit name of Secondary Slave #8 (def:) ?
REMOTE> Unit name of Secondary Slave #9 (def:) ?
REMOTE> Unit name of Secondary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Master (def:) ? A1
REMOTE> Backup name of Primary Slave #1 (def:) ? BX
REMOTE> Backup name of Primary Slave #2 (def:) ? CX
REMOTE> Backup name of Primary Slave #3 (def:) ?
REMOTE> Backup name of Primary Slave #4 (def:) ?
REMOTE> Backup name of Primary Slave #5 (def:) ?
REMOTE> Backup name of Primary Slave #6 (def:) ?
REMOTE> Backup name of Primary Slave #7 (def:) ?
REMOTE> Backup name of Primary Slave #8 (def:) ?
REMOTE> Backup name of Primary Slave #9 (def:) ?
REMOTE> Backup name of Primary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Slave #1 (def:) ? B1
REMOTE> Backup name of Secondary Slave #2 (def:) ? C1
REMOTE> Backup name of Secondary Slave #3 (def:) ?
REMOTE> Backup name of Secondary Slave #4 (def:) ?
REMOTE> Backup name of Secondary Slave #5 (def:) ?
REMOTE> Backup name of Secondary Slave #6 (def:) ?
REMOTE> Backup name of Secondary Slave #7 (def:) ?
REMOTE> Backup name of Secondary Slave #8 (def:) ?
REMOTE> Backup name of Secondary Slave #9 (def:) ?
REMOTE> Backup name of Secondary Slave #10 (def:) ?
```

SE/ REDUNDANCY /REMOTE example: on a Primary Slave

```
B1>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? REMOTE
REMOTE> Backup name (def:) ? BX
REMOTE> Unit name of Primary Master (def:) ? A1
REMOTE> Unit name of Secondary Master (def:) ? A2
REMOTE> Backup name of Primary Master (def:) ? AX
REMOTE> Backup name of Secondary Master (def:) ? A1
```

SE/ REDUNDANCY /REMOTE example: on a Secondary Master

```
A2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? REMOTE
REMOTE> Backup name (def:) ? A1
REMOTE> Unit name of Primary Master (def:) ? A1
REMOTE> Unit name of Primary Slave #1 (def:) ? B1
REMOTE> Unit name of Primary Slave #2 (def:) ? C1
REMOTE> Unit name of Primary Slave #3 (def:) ?
REMOTE> Unit name of Primary Slave #4 (def:) ?
```

```
REMOTE> Unit name of Primary Slave #5 (def:) ?
REMOTE> Unit name of Primary Slave #6 (def:) ?
REMOTE> Unit name of Primary Slave #7 (def:) ?
REMOTE> Unit name of Primary Slave #8 (def:) ?
REMOTE> Unit name of Primary Slave #9 (def:) ?
REMOTE> Unit name of Primary Slave #10 (def:) ?
REMOTE> Unit name of Secondary Slave #1 (def:) ? B2
REMOTE> Unit name of Secondary Slave #2 (def:) ? C2
REMOTE> Unit name of Secondary Slave #3 (def:) ?
REMOTE> Unit name of Secondary Slave #4 (def:) ?
REMOTE> Unit name of Secondary Slave #5 (def:) ?
REMOTE> Unit name of Secondary Slave #6 (def:) ?
REMOTE> Unit name of Secondary Slave #7 (def:) ?
REMOTE> Unit name of Secondary Slave #8 (def:) ?
REMOTE> Unit name of Secondary Slave #9 (def:) ?
REMOTE> Unit name of Secondary Slave #10 (def:) ?
REMOTE> Backup name of Primary Master (def:) ? AX
REMOTE> Backup name of Primary Slave #1 (def:) ? BX
REMOTE> Backup name of Primary Slave #2 (def:) ? CX
REMOTE> Backup name of Primary Slave #3 (def:) ?
REMOTE> Backup name of Primary Slave #4 (def:) ?
REMOTE> Backup name of Primary Slave #5 (def:) ?
REMOTE> Backup name of Primary Slave #6 (def:) ?
REMOTE> Backup name of Primary Slave #7 (def:) ?
REMOTE> Backup name of Primary Slave #8 (def:) ?
REMOTE> Backup name of Primary Slave #9 (def:) ?
REMOTE> Backup name of Primary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Slave #1 (def:) ? B1
REMOTE> Backup name of Secondary Slave #2 (def:) ? C1
REMOTE> Backup name of Secondary Slave #3 (def:) ?
REMOTE> Backup name of Secondary Slave #4 (def:) ?
REMOTE> Backup name of Secondary Slave #5 (def:) ?
REMOTE> Backup name of Secondary Slave #6 (def:) ?
REMOTE> Backup name of Secondary Slave #7 (def:) ?
REMOTE> Backup name of Secondary Slave #8 (def:) ?
REMOTE> Backup name of Secondary Slave #9 (def:) ?
REMOTE> Backup name of Secondary Slave #10 (def:) ?
```

SE/ REDUNDANCY /REMOTE example: on a Secondary Slave

```
B2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? REMOTE
REMOTE> Backup name (def:) ? B1
REMOTE> Unit name of Primary Master (def:) ? A1
REMOTE> Unit name of Secondary Master (def:) ? A2
REMOTE> Backup name of Primary Master (def:) ? AX
REMOTE> Backup name of Secondary Master (def:) ? A1
```

3.7 Configuring the SNMP Trap Filters

The **IP/SNMP/TRAP FILTER** submenu of the **SETUP** console command includes all parameters required to configure the SNMP trap filters. Up to 20 trap filters can be defined.

- If you are using SNMP, all Trap Filter configuration variables are grouped under the *snmpTrapFilter* category.
- For text-based configuration the *SnmpTrapFilter #* heading is used.

Console	SNMP	Text-based Config
SE/IP/SNMP/TRAP FILTER	*snmpTrapFilter* (category)	[SnmpTrapFilter #] (heading)

The SNMP trap filters are used to determine whether a targeted event (an SNMP trap fault) has occurred on a Redundancy Switch. A fault is declared when:

- The unit receives an SNMP trap that has been identified in a trap filter, ***and***
- The filter number is specified in the value of the *SNMP trap filters to trigger BACKUP* parameter, defined using the **SE/REDUNDANCY/CRITERIA** menu (see "Configuring the Unit Role and Fault Criteria" on page 3-13).

When an SNMP trap fault occurs, the redundant system goes into **BACKUP** mode. This provides a way to trigger a backup from an external SNMP device (the Redundancy Switch).

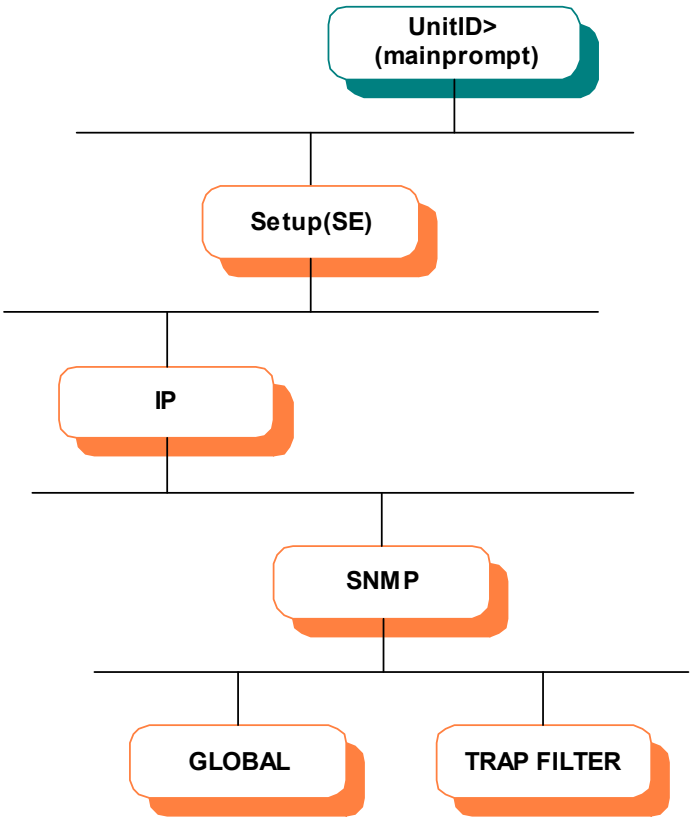


Figure 3-6: SETUP/IP/SNMP/TRAP FILTER Path in the CLI Tree

To configure one or more SNMP trap filters:

1. At the NetPerformer command line prompt, enter the menu sequence:

   SE ↵ IP ↵ SNMP ↵ TRAP FILTER

   or

   SE ↵ IP ↵ SNMP ↵ ALL

   If you select the **ALL** option, the global SNMP parameters will be presented first (**SE/IP/SNMP/GLOBAL**).

2. Select the *SNMP TRAP FILTER number*

   Up to 20 SNMP trap filters can be defined. Configure each one separately.

3. To activate this filter, set *Active* to **YES**

4. To validate the SNMP community, set *Validate community* to **YES**, and define the *Community*

5. To validate the enterprise:

   - Set *Validate enterprise* to **YES**
   - Set the *Enterprise type* to **PATH** and define the *Enterprise by its path*, ***or***

- Set the *Enterprise type* to **NUMBER** and define the *Enterprise by its number (1.3.6.1...)*

Do not enter the **1.3.6.1** prefix of this number. For example, if the enterprise OID is **1.3.6.1.4.1.727**, enter **4.1.727** as the value of the *Enterprise by its number (1.3.6.1…)* parameter.

6. To validate the agent address, set *Validate agent address* to **YES**, and define the *Agent address* (an IP address)

7. To validate the generic trap type, set *Validate generic trap type* to **YES**, and define the *Generic trap type*. Enter a question mark (**?**) for a list of valid values

8. To validate the specific trap type, set *Validate specific trap type* to **YES**, and define the *Specific trap type*, which is an integer from **0** to **1000000**

   These parameters are displayed only if *Validate generic trap type* has been set to **YES**.

9. Up to 15 objects can be defined, with or without verification of specific values (including the null value). Specify the following for each object:

   - To validate this object, set *Validate object* to **YES**
   - Set the *Type* to **PATH** and define the *Path*, ***or***
   - Set the *Type* to **NUMBER** and define the *Number (1.3.6.1...)*

   Do not enter the **1.3.6.1** prefix of this number.

   - Specify the *Indexes* of all cards in the Redundancy Switch that should be monitored for this object.

   These *Indexes* will be concatenated to the object, and can be up to fourth dimension. Use the comma (**,**) to separate a series of values, and the hyphen (**-**) to indicate a range of values. Refer to "Indexes" on page 7-26 for the description of a similar parameter used for Redundancy Switch controls.

   - To validate the value of this object, set *Validate value* to **YES**
   - Set the *Type* to **INTEGER**, **STRING** or **NULL** (default) and define the *Value* as an integer or character string.

Further information on SNMP parameters (both **TRAP FILTER** and **GLOBAL**) is available in the appendix *SE/IP Configuration Parameters* in the *LAN Connection and IP Networks* module of this document series.

SE/IP/SNMP/ TRAP FILTER example

```
A2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? IP
Item (BOOTP/DNS/FTP/GLOBAL/NAT/OSPF/RADIUS/SNMP/SOURCE-STATIC/STATIC/
TELNET/TIMEP,def:BOOTP) ? SNMP
Item (ALL/GLOBAL/TRAP FILTER,def:ALL) ? TRAP FILTER
SNMP TRAP FILTER number (1-20,def:1) ?
TRAP FILTER 1> Active (def:NO) ? YES
TRAP FILTER 1> Validate community (def:NO) ? YES
TRAP FILTER 1> Community (def:public) ?
```

```
TRAP FILTER 1> Validate enterprise (def:NO) ? YES
TRAP FILTER 1> Enterprise type (def:PATH) ?
TRAP FILTER 1> Enterprise by its path (def:) ? omnitronix.sl10
TRAP FILTER 1> Validate agent address (def:NO) ? YES
TRAP FILTER 1> Agent address (def:000.000.000.000) ? 169.48.2.1
TRAP FILTER 1> Validate generic trap type (def:NO) ? YES
TRAP FILTER 1> Generic trap type (def:enterpriseSpecific) ?
TRAP FILTER 1> Validate specific trap type (def:NO) ? YES
TRAP FILTER 1> Specific trap type (0-1000000,def:0) ? 20132
TRAP FILTER 1> OBJECT 1> Validate object (def:NO) ? YES
TRAP FILTER 1> OBJECT 1> Type (def:PATH) ?
TRAP FILTER 1> OBJECT 1> Path (def:none) ?
omnitronix.sl10.thisTrapText
TRAP FILTER 1> OBJECT 1> Indexes (def:) ? 1-99
TRAP FILTER 1> VALUE 1> Validate value (def:NO) ? YES
TRAP FILTER 1> VALUE 1> Type (def:NULL) ? STRING
TRAP FILTER 1> VALUE 1> Value (def:) ? thisTrapText
TRAP FILTER 1> OBJECT 2> Validate object (def:NO) ? YES
TRAP FILTER 1> OBJECT 2> Type (def:PATH) ? NUMBER
TRAP FILTER 1> OBJECT 2> Number (1.3.6.1...) (def:) ?
4.1.3052.40.10.1.1.6
TRAP FILTER 1> OBJECT 2> Indexes (def:) ? 1-99
TRAP FILTER 1> VALUE 2> Validate value (def:NO) ? YES
TRAP FILTER 1> VALUE 2> Type (def:NULL) ? INTEGER
TRAP FILTER 1> VALUE 2> Value (def:) ? 40
TRAP FILTER 1> OBJECT 3> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 4> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 5> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 6> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 7> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 8> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 9> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 10> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 11> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 12> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 13> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 14> Validate object (def:NO) ?
TRAP FILTER 1> OBJECT 15> Validate object (def:NO) ?

Configure another SNMP trap filter (NO/YES,def:YES) ? NO
```

3.8 Configuring a Serial Port to Monitor Modem Signal Loss or Data Loss

The **PORT** submenu of the **SETUP** console command includes all parameters required to configure the serial port criteria (see "Configurable Criteria" on page 2-2):

- Loss of modem signals on a Frame Relay or Transparent port (see next section)
- Loss of data on a Frame Relay port (see "Monitoring Loss of Data on a Frame Relay Port" on page 3-27).

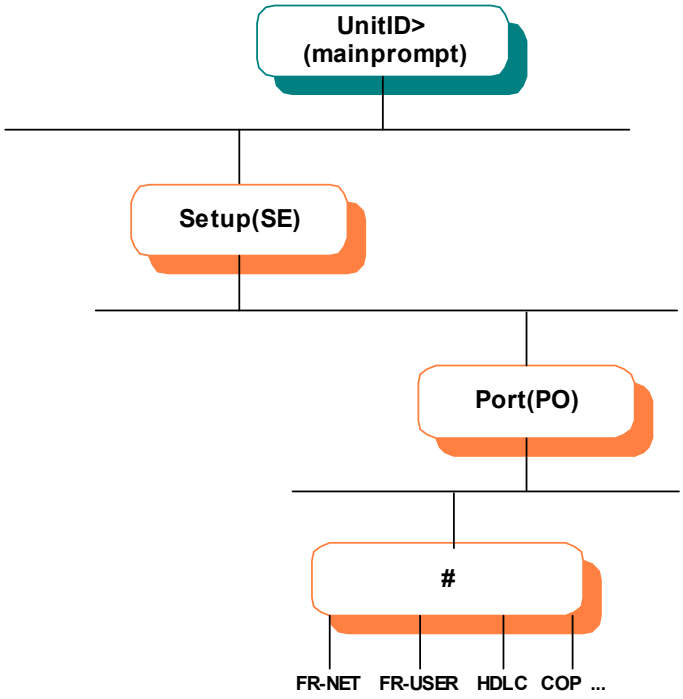


Figure 3-7: SETUP/PORT Path in the CLI Tree

NOTE: A serial port on the Dual Serial interface card can also be monitored for modem signal loss or data loss, using the **SLOT** submenu of the **SETUP** command.

3.8.1 Monitoring Loss of Modem Signals

A fault is declared and the redundant system goes into BACKUP mode if the modem signal is lost for a configurable length of time on a redundant serial port set to a Frame Relay protocol (**FR-NET**, **FR-USER**) or transparent data protocol (**HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP**, **PASSTHRU**).

To configure a built-in serial port for monitoring the loss of modem signals:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **PORT**
2. Select the *Port number*
3. Set the *Protocol* to **FR-NET**, **FR-USER**, **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**
4. Set *Redundant link* to **YES**
5. Define the *Delay before declaring a signal down (s)*
6. Select which modem signals should be monitored, by setting the corresponding parameters to **YES**. The parameters that are displayed depend on the type of interface detected on this port:
   - **DCE:**
     - **V.35/V.11, TIA-232 (V.24), TIA-449 (V.36), TIA-530:** *Watch the DTR MODEM signal* and *Watch the RTS MODEM signal*
     - **X.21, X.21 EU:** *Watch the Control MODEM signa*l
   - **DTE:**
     - **V.35/V.11, TIA-232 (V.24), TIA-449 (V.36), TIA-530:** *Watch the DSR MODEM signal*, *Watch the CTS MODEM signal* and *Watch the DCD MODEM signal*
     - **X.21, X.21 EU:** *Watch the Indication MODEM signal*
7. Change the other port parameters from their default values, if required.

   Further information on Frame Relay port parameters is available in the appendix *SE/PORT Configuration Parameters* of the *WAN/Frame Relay* module of this document series. For details on transparent port parameters, refer to the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module.

To configure a serial port on the Dual Serial interface card for monitoring the loss of modem signals:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Channel number*
4. Continue with step **3** on "Set the Protocol to FR-NET, FR-USER, HDLC, T-ASYNC, R-ASYNC, BSC, COP or PASSTHRU" on page 3-25.

SE/PORT/#/ HDLC example: for monitoring modem signal loss on a DCE-RS449 interface

```
UNIT.7>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 1
PORT 1> Protocol (def:OFF) ? HDLC
PORT 1> Interface.............................DCE-RS449
PORT 1> Clocking mode (def:INTERNAL) ?
PORT 1> Port speed (bps) (1200-2048000,def:56000) ?
PORT 1> Fallback speed (def:ENABLE) ?
PORT 1> Idle (def:FLAG) ?
```

```
PORT 1> Transmission start level (def:AUTO) ?
PORT 1> CRC encoding (def:NRZ) ?
PORT 1> Modem control signal (def:STATIC) ?
PORT 1> Frame delay (ms) (def:0.0) ?
PORT 1> Remote unit (def:) ? UNIT.8
PORT 1> Class (def:3) ?
PORT 1> Remote port number (1-65534,def:1) ?
PORT 1> Redundant link (def:NO) ? YES
PORT 1> Delay before declaring a signal down (s) (0-1000,def:60) ?
PORT 1> Watch the DTR MODEM signal (def:NO) ? YES
PORT 1> Watch the RTS MODEM signal (def:NO) ? YES
```

SE/PORT/#/ COP example: for monitoring modem signal loss on a DTE-RS449 interface

```
NIT.7>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 3
PORT 3> Protocol (def:OFF) ? COP
PORT 3> Interface.............................DTE-RS449
PORT 3> Clocking mode (def:EXTERNAL) ?
PORT 3> Modem control signal (def:STATIC) ?
PORT 3> Transmission start level (def:AUTO) ?
PORT 3> Idle (def:MARK) ?
PORT 3> Synchronization character (def:1616) ?
PORT 3> Number of desynch. characters (1-100,def:3) ?
PORT 3> Desynchronization character (def:FF) ?
PORT 3> Remote unit (def:) ? UNIT.8
PORT 3> Class (def:3) ?
PORT 3> Remote port number (1-65534,def:3) ?
PORT 3> Redundant link (def:NO) ? YES
PORT 3> Delay before declaring a signal down (s) (0-1000,def:60) ?
PORT 3> Watch the DSR MODEM signal (def:NO) ? YES
PORT 3> Watch the CTS MODEM signal (def:NO) ? YES
PORT 3> Watch the DCD MODEM signal (def:NO) ? YES
```

SE/PORT/#/ HDLC example: for monitoring modem signal loss on a DCE-X21 interface

```
UNIT.7>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 1
PORT 1> Protocol (def:OFF) ? HDLC
PORT 1> Interface.............................DCE-X21
PORT 1> Clocking mode.........................INTERNAL
PORT 1> Port speed (bps) (1200-2048000,def:56000) ?
PORT 1> Fallback speed (def:ENABLE) ?
PORT 1> Idle (def:FLAG) ?
PORT 1> Transmission start level (def:AUTO) ?
PORT 1> CRC encoding (def:NRZ) ?
PORT 1> Modem control signal (def:STATIC) ?
PORT 1> Frame delay (ms) (def:0.0) ?
PORT 1> Remote unit (def:) ? UNIT.8
PORT 1> Class (def:3) ?
PORT 1> Remote port number (1-65534,def:1) ?
PORT 1> Redundant link (def:NO) ? YES
PORT 1> Delay before declaring a signal down (s) (0-1000,def:60) ?
PORT 1> Watch the Control MODEM signal (def:NO) ? YES
```

SE/PORT/#/ HDLC example: for monitoring modem signal loss on a DTE-X.21 interface

```
UNIT.7>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 2
PORT 2> Protocol (def:OFF) ? HDLC
PORT 2> Interface.............................DTE-X21
PORT 2> Clocking mode.........................EXTERNAL
PORT 2> Idle (def:FLAG) ?
PORT 2> Transmission start level (def:AUTO) ?
PORT 2> CRC encoding (def:NRZ) ?
PORT 2> Modem control signal (def:STATIC) ?
PORT 2> Frame delay (ms) (def:0.0) ?
PORT 2> Remote unit (def:) ? UNIT.8
PORT 2> Class (def:3) ?
PORT 2> Remote port number (1-65534,def:2) ?
PORT 2> Redundant link (def:NO) ? YES
PORT 2> Delay before declaring a signal down (s) (0-1000,def:60) ?
PORT 2> Watch the Indication MODEM signal (def:NO) ? YES
```

3.8.2 Monitoring Loss of Data on a Frame Relay Port

A fault is declared and the redundant system goes into BACKUP mode if data is lost for a configurable length of time on a redundant serial port set to a Frame Relay protocol (**FR-NET** or **FR-USER**). This occurs if the port status is anything other than **DATA**.

To configure a built-in serial port for monitoring the loss of data:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **PORT**
2. Select the *Port number*
3. Set the *Protocol* to **FR-NET** or **FR-USER**
4. Set *Redundant link* to **YES**
5. Define the *Delay before declaring a signal down (s)*
6. Set *Watch the port state* to **YES**.
7. Change the other port parameters from their default values, if required.

   Further information on Frame Relay port parameters is available in the appendix *SE/PORT Configuration Parameters* of the *WAN/Frame Relay* module of this document series.

To configure a serial port on the Dual Serial interface card for monitoring the loss of data:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Channel number*
4. Continue with step **3** on "Set the Protocol to FR-NET or FR-USER" on page 3-27.

SE/PORT/#/FR-NET example: for monitoring data loss

```
UNIT.7>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 1
PORT 1> Protocol (def:OFF) ? FR-NET
PORT 1> Interface.............................UNDEFINE
PORT 1> Clocking mode (def:INTERNAL) ?
PORT 1> Port speed (bps) (1200-2048000,def:56000) ?
PORT 1> Fallback speed (def:ENABLE) ?
PORT 1> Frame delay (ms) (def:0.0) ?
PORT 1> Management interface (def:LMI) ?
PORT 1> Congestion flow control (def:ON) ?
PORT 1> Enquiry timer (s) (1-30,def:10) ?
PORT 1> CLLM function (def:OFF) ?
PORT 1> Cell Packetization (def:YES) ?
PORT 1> Maximum number of voice channels (0-10000,def:10000) ?
PORT 1> Maximum Voice Channels If High Priority Data (0-
10000,def:10000) ?
PORT 1> Reference port for conditional LMI (def:0) ?
PORT 1> Drop signals on LMI down (def:NO) ?
PORT 1> Redundant link (def:NO) ? YES
PORT 1> Delay before declaring a signal down (s) (0-1000,def:60) ?
PORT 1> Watch the port state (def:NO) ? YES
```

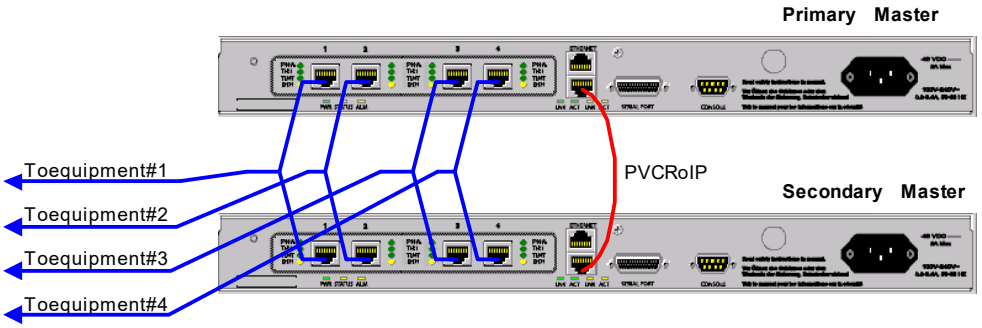
SDM-9210 Digital Link Bypass and 1:1 Redundancy

4.1 Installation Requirements

NOTE: The SDM-9210 supports *Digital Link Bypass* and *1:1 Redundancy* when it is installed with dual E1/T1 interfaces specially designed for these features.

The basic equipment setup for Digital Link Bypass and 1:1 Redundancy on the SDM-9210 is shown in Figure 4-4-1.

1:1 Redundancy:



Bypass:

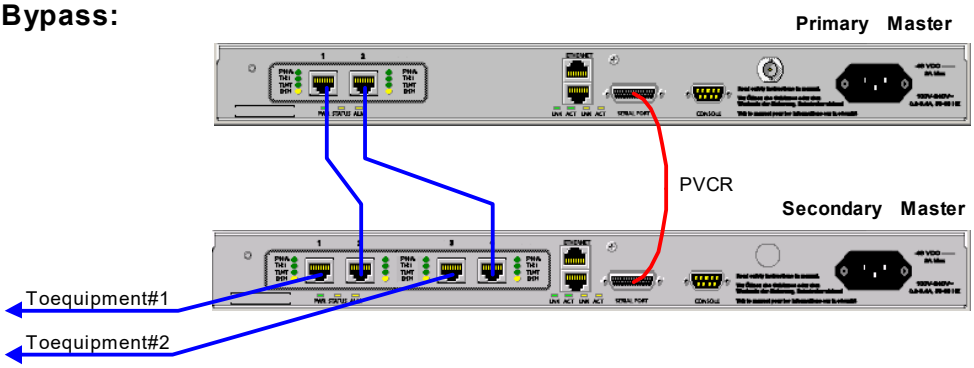


Figure 4-1: Redundant SDM-9210 Units with Digital Link Bypass and 1:1 Redundancy

- No RSP link or gang switch is required
- A PVCR link is required between the Primary Master and Secondary Master units. This link may be established through:
  - The LAN, by configuring a PVCRoIP PVC on each unit (see the **1:1 Redundancy** equipment setup in Figure 4-4-1), ***or***
  - The WAN, by configuring the serial port or a digital channel on each unit with the PVCR protocol (see the **Bypass** equipment setup in Figure 4-4-1).

NOTE: A Frame Relay connection with PVCR PVCs may also be used to create a WAN link.

- The redundancy scenario that will be used is determined through hardware strapping on the E1/T1 interface:
  - Bypass: Jumper pins are *installed* on jumpers J8 and J9 of the E1/T1 interface
  - 1:1 Redundancy: Jumper pins are *removed* from jumpers J8 and J9.

  Refer to the *SDM-9210 Hardware Installation Guide* (Product No. 620-0226-001) for details on hardware strapping.
- For 1:1 Redundancy, a Y-cable must be installed between the two units and the end-user device.

4.1.1 Y-cable Requirements

The Y-cable for 1:1 Redundancy must meet the following specifications:

- Comprised of 4 shielded twisted-pair cables, 28 gauge
- All received signals must be carried over the same twisted-pair cable (RX). Likewise, all transmitted signals must be carried over a single cable (TX)
- Any unused wire of a twisted pair, or unused twisted pair of a cable, must be cut flush at both ends of the cable
- Maximum length of the 2 cable branches that connect to the E1/T1 ports on the SDM-9210: 75 mm (3”)

NOTE: There is no restriction on the length of the cable stem, which connects to the user equipment.

4.2 Digital Link Operating Modes

With special E1/T1 “Bypass” interfaces, available for the SDM-9210, digital links can operate in *Standard*, *Bypass*, or *1:1 Redundancy* mode. Bypass and 1:1 Redundancy modes can be set manually (traffic always routed), or controlled automatically in a NetPerformer Redundancy application.

4.2.1 Standard Mode

Each digital link on the dual E1/T1 interface operates independently of the other, and the SDM-9210 can access each link for both receive and transmit operations. This is the only operating mode available on the standard E1/T1 interface (non-“Bypass”).

4.2.2 Bypass Mode

In case of a power or hardware failure, integrated relays on the E1/T1 interface route all traffic to the other digital link. This is much like having a gang switch on the interface.

How Bypass Works

Bypass works by pairs of E1/T1 ports on the same SDM-9210 unit (ports 1 and 2, or ports 3 and 4). When Bypass is activated and a failure occurs, the two ports of the span are paired, allowing continued traffic transport.

- Within each pair, if one port fails the other takes over, and all traffic is relayed between the two ports
- If a NetPerformer unit goes down, the operator can keep at least one digital link functioning.

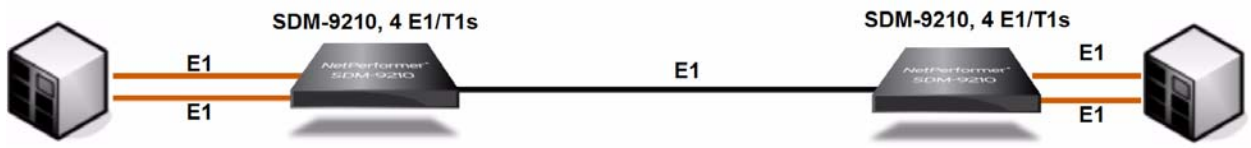


Figure 4-2: Standard Operation without Bypass

Figure 4-3: Bypass Mode

How to Set Up the Units for Bypass Mode

Important: To allow for Bypass operation, jumper pins must be installed on jumpers J8 and J9 of the E1/T1 interface. Refer to the *SDM-9210 Hardware Installation Guide* for details (Product No. 620-0226-001).

Bypass can be set manually (traffic always routed), or controlled automatically through the NetPerformer Redundancy option. Refer to Configuring the Digital Link Operating Mode on page 7.

NOTE: When used with the NetPerformer Redundancy option, only the **SECONDARY** unit requires interfaces that support Bypass mode:

- The first span of this unit is connected to the user equipment (the BTS or BSC). The second span is connected to a span on the **PRIMARY** unit.

  A crossover cable may also be required, depending on the NT/TE mode of the interface.
- In **NORMAL** Redundancy mode, the **SECONDARY** unit puts the interface on its first span into Bypass operating mode, which connects the user equipment to the interface on the **PRIMARY** unit.
- In **BACKUP** Redundancy mode, the **SECONDARY** unit puts the interface into Standard operating mode, which connects the user equipment to another interface on a second span of the **SECONDARY** unit.

4.2.3 1:1 Redundancy Mode

In 1:1 Redundancy mode (also referred to as *Standby* mode), traffic is switched from one digital link to another in case of failure.

NOTE: This section addresses 1:1 Redundancy on the SDM-9210. On the SDM-9620 this feature is set up quite differently. Refer to the chapter SDM-9620 1:1 Redundancy on page 1 for details.

How 1:1 Redundancy Works on the SDM-9210

Integrated relays on the E1/T1 interfaces disconnect the wires in such a way that the NetPerformer no longer transmits or receives across the RJ-45 connector. As a result, one area of the network, connected to the first link, is physically isolated from another area

connected to the second link.

Figure 4-4: Standard Operation without 1:1 Redundancy

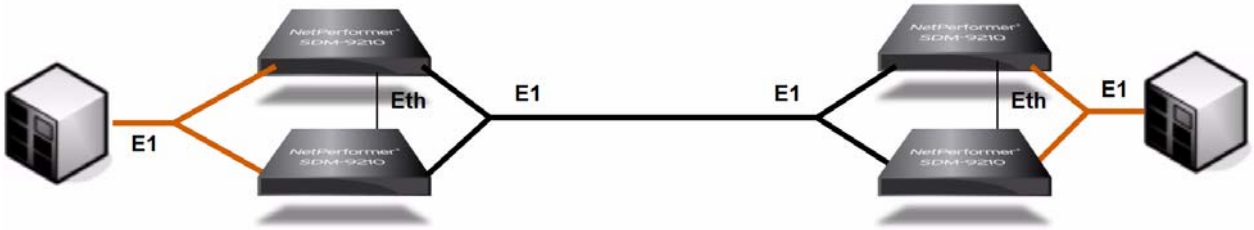


Figure 4-5: 1:1 Redundancy Mode at Both Sides of the Network

How to Set Up SDM-9210 Units for 1:1 Redundancy

To allow for 1:1 Redundancy operation, jumper pins must be removed from jumpers J8 and J9 of the E1/T1 interface. Refer to the *SDM-9210 Hardware Installation Guide* for details.

This mode also requires installation of a Y-cable between the user equipment at one end, e.g. a hub, PBX, BTS or BSC, and the two NetPerformer digital links at the other end. Refer to Y-cable Requirements on page 3.

The same E1/T1 interfaces that permit Bypass using integrated relays also support 1:1 Redundancy, and switching is automatic if failure occurs.

- The WAN connection is achieved through an E1/T1 channel, serial port or Ethernet port (PVCRoIP)

  A gang switch is required if the serial port is used.

- Relays on the E1 redundancy card of the backup unit can be configured to remain in open state (disconnected) when waiting in Standby mode

- 1:1 Redundancy can be set manually (links always disconnected), or controlled automatically through the NetPerformer Redundancy option. Refer to the next section, Configuring the Digital Link Operating Mode.

  When used with the NetPerformer Redundancy option, the currently active unit drives all transmit and receive operations to the user equipment. The active unit is determined from its current Redundancy status: **NORMAL** or **BACKUP**.

4.3 Configuring the Digital Link Operating Mode

Important: You must ascertain whether jumpers are installed on J8 and J9 of the E1/T1 interface to configure the digital link operating mode properly.

- **If jumper pins are installed on jumpers J8 and J9** of the E1/T1 interface, the digital link operating mode should be set to **AUTO BYPASS** or **MANUAL BYPASS** only.
- **If jumper pins are *not* installed on jumpers J8 and J9** of the E1/T1 interface, the digital link operating mode should be set to **STANDARD**, **AUTO STANDBY** or **MANUAL STANDBY** only.

  All of these operating modes are explained below.

NOTE: For basic digital link configuration, refer to the configuration procedures provided in the *Digital Data* module of this document series.

To configure the digital link operating mode:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Port number*
4. Enter **LINK**
5. Define the *Framer Type* for this link: **E1** or **T1**
6. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
7. Set *Clock recovery* to **ENABLE** if required for your application
8. Select the *Digital port clock source*, either **INTERNAL** or the slot number of the interface that provides the clock source
9. Set the *Signaling mode* to **NONE**
10. Set the *Interface operating mode* to one of the following:
    - **STANDARD:** Normal operating mode. The unit can access the E1/T1 interface for both receive and transmit operations. **This is the default value.**
    - **MANUAL BYPASS:** Traffic is always routed between ports 1 and 2 on this E1/T1 interface using integrated relays that have been manually configured through hardware strapping (jumper pins installed on jumpers J8 and J9).
    - **MANUAL STANDBY:** Ports 1 and 2 can be independently configured so as to disconnect them. No traffic is routed between the ports via the integrated relays, due to manual configuration of the hardware (jumper pins removed from jumpers J8

and J9). Another port on a different E1/T1 interface can be connected to the BTS or BSC using a Y-cable, providing a redundant connection.

- **AUTO BYPASS:** The NetPerformer Redundancy option controls the **Digital Link Bypass** feature:
  - On a **PRIMARY** unit in **NORMAL** Redundancy mode, the integrated relays are positioned for **Standard** digital link operating mode
  - On a **SECONDARY** unit in **NORMAL** Redundancy mode, the integrated relays are positioned for **Bypass** operating mode. Thus Bypass mode is used if a failure occurs in the redundant system.
  - If the **SECONDARY** unit goes into **BACKUP** Redundancy mode, the digital links automatically go into **Standard** digital link operating mode.

NOTE: **For AUTO BYPASS to work, you must *install* jumper pins on jumpers J8 and J9 of the E1/T1 interface.** Refer to the *Hardware Installation Guide* for your NetPerformer product.

- **AUTO STANDBY:** The Redundancy option controls the **1:1 Digital Link Redundancy** (or *Standby*) feature:
  - On a **PRIMARY** unit in **NORMAL** Redundancy mode, the integrated relays are positioned for **Standard** digital link operating mode
  - If the **PRIMARY** unit goes into **BACKUP** Redundancy mode, the digital links automatically go into **Standby** operating mode (1:1 Redundancy)
  - On a **SECONDARY** unit in **NORMAL** Redundancy mode, the integrated relays are positioned for **Standby** operating mode
  - If the **SECONDARY** unit goes into **BACKUP** Redundancy mode, the digital links automatically go into **Standard** digital link operating mode.

  For AUTO STANDBY to work, you must *remove* the jumper pins from jumpers J8 and J9 on the E1/T1 interface.

NOTE: **When you configure a digital link for Bypass operation, the change affects both links of the E1/T1 interface simultaneously.** That is, if you change the value of the *Interface operating mode* parameter on one link to **AUTO BYPASS** or **MANUAL BYPASS**, the *Interface operating mode* parameter on the other link will be updated to the same value. This is due to the fact that both links are involved in Bypass operations. For the **STANDARD**, **AUTO STANDBY** and **MANUAL STANDBY** values, only the digital link which you have actually configured will be affected by the change.

When you change the value of the *Interface operating mode* parameter a message is

displayed at the console to remind you that:

- Jumpers J8 and J9 must be *installed* on the interface for a Bypass mode to work (**AUTO BYPASS** or **MANUAL BYPASS**)
- Jumpers J8 and J9 must be *removed* from the interface for a Standby mode to work (**AUTO STANDBY** and **MANUAL STANDBY**)
- The **SE/REDUNDANCY** command must be used to configure 1:1 Redundancy on the unit.

SE/SLOT/#/ LINK example: on an E1/T1 "Bypass + Redundancy" interface card

```
SDM-9230_PRI>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/...,def:REDUNDANCY) ? SLOT
SLOT> Slot number (1/2,def:1) ? 1
Port number (1/2,def:1) ? 1
Item (LINK/CHANNEL,def:LINK) ? LINK
PORT 100> Framer Type (def:E1) ?
PORT 100> Status (def:DISABLE) ? ENABLE
PORT 100> Clock recovery (def:DISABLE) ? ENABLE
GLOBAL  > Digital port clock source (def:1) ?
PORT 100> Signaling mode (def:NONE) ?
PORT 100> Pcm encoding law (def:A-LAW) ?
PORT 100> Hunt Group Sorting (def:RRA) ?
PORT 100> Idle code (def:7E) ?
PORT 100> Zero suppression mode (def:HDB3) ?
PORT 100> Long Haul (def:NO) ?
PORT 100> Impedance and Line Build Out (def:120 OHMS) ?
PORT 100> Custom Waveform (def:DISABLE) ?
PORT 100> CRC4 mode (def:ENABLE) ?
PORT 100> International bit (def:ENABLE) ?
PORT 100> Loopback (def:DISABLE) ?
PORT 100> PVCR Link management (def:DISABLE) ?
PORT 100> Interface operating mode (def:STANDARD) ? AUTO STANDBY

WARNING: You must remove jumpers J8 and J9 from the interface card
for Standby mode to work.  Refer to the Hardware Installation Guide
for your product.

TIP: Use SE/REDUNDANCY to configure 1:1 Redundancy on this unit.
```

SDM-9620 1:1 Redundancy

5.1 How 1:1 Redundancy Works on the SDM-9620

NOTE: The SDM-9600 chassis supports 1:1 Redundancy only when installed with SDM-9620 blades and an RTM that have been specially designed for this feature. See "Installation Requirements" on page 5-8 for details.

The 1:1 Redundant RTM allows one SDM-9620 blade to back up all digital spans on another blade without requiring an external gang switch.

- Unlike the standard (non-redundant) SDM-9620 blade, the redundant SDM-9620 blade has no E1/T1 terminations. They are on the redundant RTM, instead.

  It is thus very important to install the appropriate type of SDM-9620 blade in front of a redundant RTM.

- The redundant RTM is internally wired to direct the signals to whichever SDM-9620 blade is currently active. Thus no Y-cables are required.

  You must configure all REDUNDANCY parameters on both SDM-9620 blades for the RTM to operate. This prevents a non-configured blade from perturbing another blade on the same RTM.

- The SDM-9600 chassis supports IPMC connectivity. PVCR WAN connectivity is not required in order to switch modes.

- Either SDM-9620 blade can control the redundant RTM, but highest priority is given to the blade in the upper slot. Thus the upper blade determines a switch to **BACKUP** mode or a return to **NORMAL** mode.

  See Switching Operating Modes on page 6 for an explanation of how the NetPerformer switches modes automatically in a redundant system, and how you can switch modes manually.

5.1.1 Advantages of SDM-9620 Redundancy

- Low cost solution providing 16 redundant E1/T1 ports
- Supports PVCR backhaul applications at the same time in the same unit
- Gateway availability is ensured through redundant IP and MAC addresses
- No need for an external A/B gang switch
- No need for Y-cables
- Simple configuration procedure:
  - Primary Slaves and Secondary Slaves are automatically detected in an application
  - A PVCR WAN connection is optional due to backplane and IPMC connectivity on the SDM-9600 chassis.

5.1.2 Primary Master and Secondary Master

In the SDM-9600 chassis, the lower SDM-9620 blade is always the Primary Master and the upper blade is always the Secondary Master. Refer to "SDM-9620 Units with 1:1 Redundancy" on page 5-8.

- The two blades communicate using PVCR over Backplane (PVCRoBP), PVCR over IP (PVCRoIP) or IPMC connectivity to identify which blade has the right to use the common RTM for E1/T1 output.
- The Secondary Master (the upper blade) controls which set of E1/T1 terminations on the redundant RTM are used.

When the Secondary Master communicates with the Primary Master and discovers that the operating mode of the Primary Master (**NORMAL** or **BACKUP**) is not the same as its own operating mode, the Secondary Master will request a change of state. The Primary Master acknowledges the request with a confirmation message, and changes its state accordingly.

IMPORTANT: The position of the SDM-9620 blades in the SDM-9600 chassis is not detected automatically. For each blade, you must specify:

- The correct *Role*, using the **REDUNDANCY/CRITERIA** submenu of the Setup (**SE**) command
- The slot number occupied by the other blade, using the **REDUNDANCY/REMOTE** submenu of the **SE** command:
  - If the *Role* is set to **PRIMARY MASTER**, configure the *Slot number of Secondary Master*
  - If the *Role* is set to **SECONDARY MASTER**, configure the *Slot number of Primary Master*

  Examples are provided on "Configuring the Unit Role and Fault Criteria" on page 5-13.

Caution: Configure the slot number properly. If you enter the incorrect slot number, IPMC will not be able to provide communication between the blades and the redundant RTM, and backplane connectivity will be the only communication path available.

5.1.3 IPMC Connectivity

Intelligent Platform Management Controller (IPMC) communication is supported on the SDM-9600 for two purposes:

- To ensure communication between redundant SDM-9620 units installed in the SDM-9600.

  Redundancy requires a direct PVCR link between the two redundant units. On the SDM-9600, the backplane offers this connection by default as long as one of the units is installed in slot 2. In other cases, a PVCR PVC over IP connection can be used.

However, if the Secondary Master cannot communicate with the Primary Master using PVCR, IPMC connectivity provides the only communication path. In this case, the Secondary Master will use the IPMC path to retrieve the state of the Primary Master.

NOTE: This implementation of IPMC communication requires the configuration of the Primary Master and Secondary Master slot numbers, as mentioned in the preceding section.

- To avoid the potential problem where two SDM-9620 units, one the Primary Master and the other the Secondary Master, could have the same *Unit Name* in different states.

  If the Primary Master's state differs from the local state, the Secondary Master will request the Primary Master to change its state to the same state as the Secondary Master. In this way, if both units are properly configured for redundancy, they cannot have the same *Unit Name* at the same time.

5.1.4 Ethernet Port Addressing in a 1:1 Redundancy Application

Each Ethernet port on the SDM-9620 can be configured with up to 2 redundant IP addresses (see next section) and one redundant MAC address (see "Redundant MAC Address" on page 5-5). These redundant addresses are used in a 1:1 redundancy application to ensure that the host on the Ethernet port does not lose gateway access when one unit replaces another, and to permit PVCRoIP communications.

Redundant IP Addresses

Two redundant IP addresses configurable with a mask are available on each Ethernet port of a redundant SDM-9620 blade. Redundant IP addresses permit the following features:

- Configuration of PVCs over IP at the remote site. A remote IP address is required for this. To reach the active unit in a redundant setup, the same IP address can be configured in both units. Only the active unit will have this IP address activated (see Table 5-1, below).
- A local default gateway. When either SDM-9620 in a redundant system can serve as the default gateway in a local area network, configure the same IP address in both units. The hosts on the LAN are provided with the IP address, and the currently active unit acts as the default gateway.

On each SDM-9620 in a redundant system, only one set of IP addresses is active at one time: either the redundant addresses (*Redundancy IP address 1* and *Redundancy IP address 2*) or the non-redundant addresses (*IP address 1* and *IP address 2*). A redundant IP

address becomes active when the unit is active, as follows:

Operating Mode	Active on Primary Master (lower slot)	Active on Secondary Master (upper slot)
NORMAL	*Redundancy IP address 1, Redundancy IP address 2*	*IP address 1, IP address 2*
BACKUP	*IP address 1, IP address 2*	*Redundancy IP address 1, Redundancy IP address 2*

Table 5-1: Active IP addresses on redundant SDM-9620 units

NOTE: IP addresses on the Ethernet ports can be configured on the same subnet

Redundant IP addresses are active only when the unit is operating state. When the unit is in **STANDBY** or **REPLACED** mode, its redundant IP addresses are deactivated.

Configuration details and an example from the NetPerformer console are provided on "Configuring the Ethernet Ports" on page 5-10.

Redundant MAC Address

One redundant MAC address can be configured on each Ethernet port of a redundant SDM-9620 blade. The redundant MAC address permits using either SDM-9620 in a redundant system as the default IP gateway on a local segment (LAN).

- The hosts do not need to update their ARP tables if the default gateway changes from Primary Master to Secondary Master, as the same MAC address is configured on both units. The hosts on the LAN are provided with the MAC address, and the currently active unit acts as the default gateway.
- The **DISPLAY** option of the **ARP** command includes the LAN interface in the ARP table to distinguish cases where more than one ARP entry has the same destination IP address.

On each SDM-9620 in a redundant system, only one MAC address is active at one time: either the *Redundancy MAC address* or the *MAC address*. The redundant MAC address becomes active when the unit is active, as follows:

Operating Mode	Active on Primary Master (lower slot)	Active on Secondary Master (upper slot)
NORMAL	*Redundancy MAC address*	*MAC address*
BACKUP	*MAC address*	*Redundancy MAC address*

Table 5-2: Active MAC address on redundant SDM-9620 units

NOTE: The default value of the *MAC address* parameter is the burnt-in address (BIA) of the unit. In a redundant system this parameter can be set to **0.0.0.0** (not configured).

The *Redundancy MAC address* is used on transmission **only when the unit sends an IP frame with a redundant IP address as the source IP address.**

On reception, the redundant MAC address is used to validate a received frame regardless of the destination IP address in the IP frame.

A redundant MAC address can be configured only when this feature is activated on the Ethernet port using the *Redundancy MAC address active* parameter. For details, refer to Configuring the Ethernet Ports on page 10.

The unit must also be fully configured for 1:1 Redundancy, and be in operating state for the redundant MAC address to be used. When the unit is in **STANDBY** or **REPLACED** mode, its redundant MAC address is deactivated.

5.1.5 Startup Delay and Transition Delay

As of NetPerformer V10.4.1 R01, the scope of operation of the Redundancy Criteria *Startup delay (s)* parameter has been changed. It is now activated only on system startup, and is used exclusively for processes that must be executed on startup.

On the SDM-9620, the *Startup delay* defines the amount of time, in seconds, that must elapse after a system startup before the following features can be activated:

- Operations on the redundant RTM (E1/T1 terminations)
- Redundant MAC address on the LAN ports
- Redundant IP addresses on the LAN ports
- Also serves as a required timeout before starting the *Transition delay.*

NOTE: Refer to "Startup delay (s)" on page 7-5 for a description of how the *Startup delay (s)* parameter is used on other NetPerformer products.

The *Transition delay* ensures that all units in the system are stable before switching from **NORMAL** to **BACKUP** mode. The *Transition delay (s)* parameter (see "Transition delay (s)" on page 7-5) has been added to the Redundancy Criteria configuration (**SE/REDUNDANCY/CRITERIA**) to configure this delay, in seconds. On system startup or after a change to **NORMAL** mode (either manual or automatic), the unit will wait for this duration of time before proceeding with a switch to **BACKUP** mode.

Notes:

- **The *Startup delay* must expire before the** *Transition delay* **timer can start**
- The *Transition delay* timer is started when the units switch to **NORMAL** mode
- Any major fault which triggers a switch to **BACKUP** mode will not be taken into consideration until the *Transition delay* has expired
- Thus when two redundant units return to **NORMAL** mode from **BACKUP** mode, the *Transition delay* timer must expire before the Secondary Master can detect a problem requiring a return to **BACKUP** mode.

5.2 Installation Requirements

The SDM-9600 chassis supports 1:1 Redundancy *only* when installed with the following hardware:

- **2 SDM-9620 blades** specially designed for 1:1 Redundancy (Part no. 100-1205-503), installed in the front of the SDM-9600 chassis in 2 contiguous slots.

  The redundant SDM-9620 blade is identified with assembly ID **3**, whereas the non-redundant blade is assembly ID **1**. Execute the DHI command to verify the assembly ID of a blade; enter **DHI** at the NetPerformer console command line.

- **1 redundant RTM** (Part no. 100-1215-502), installed at the rear of the chassis in the same 2 slots as the SDM-9620 blades.

  The redundant RTM is 2U high, compared to the non-redundant RTM, which is 1U high.

  The alarm **FRU/RTM MISMATCH** is displayed when the type of SDM-9620 blade installed (the FRU) does not correspond to the type of RTM it is connected with.

The basic equipment setup for 1:1 Redundancy on the SDM-9620 is shown in Figure 5-5-1.

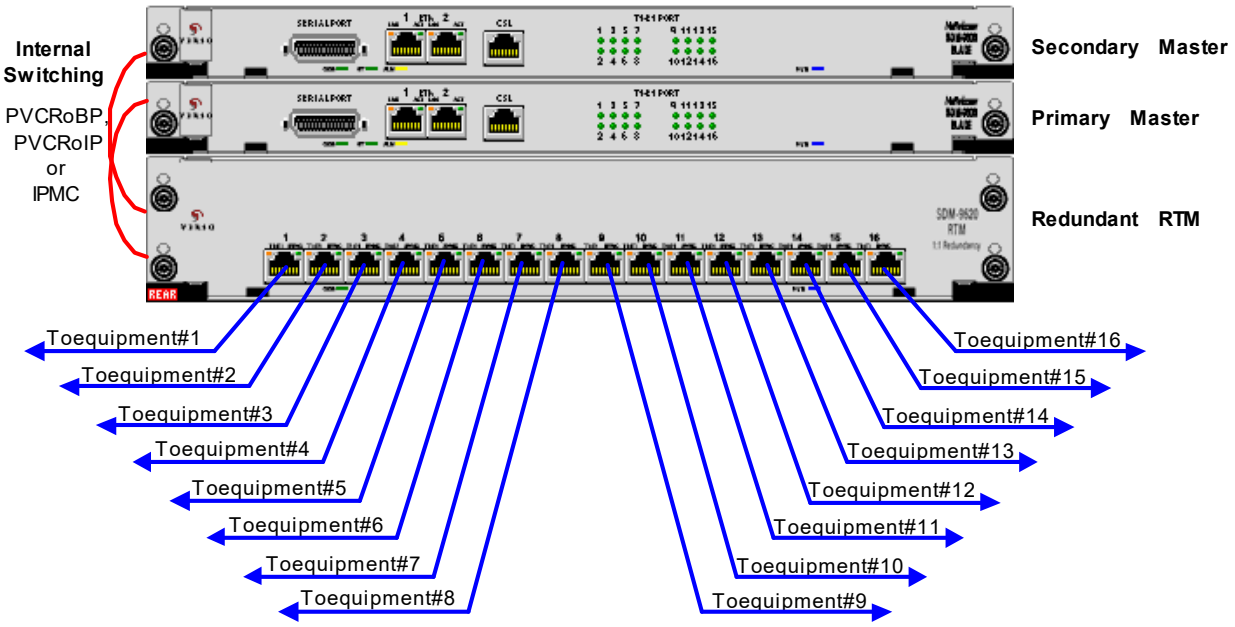


Figure 5-1: SDM-9620 Units with 1:1 Redundancy

- No RSP link or gang switch is required; the switch to **BACKUP** mode is internally wired and automatically triggered
- No Y-cables are required for connection of user equipment
- A PVCR link is required between the Primary Master and Secondary Master units. This link may be established through:

- IPMC communication on the SDM-9600 chassis
- PVCR transport over the SDM-9600 backplane (PVCRoBP), ***or***
- The LAN, by configuring a PVCRoIP PVC on each unit.

A PVCR WAN link, although feasible and configurable, is not required in this application.

For complete information on the SDM-9600 chassis, SDM-9620 blades, RTMs, and optional installable equipment, refer to the *NetPerformer SDM-9600 with SDM-9620 Blades Hardware Installation Guide* (Document No. 620-0229-001).

5.3 Configuring the SDM-9620 for 1:1 Redundancy

To configure an SDM-9620 blade for 1:1 Redundancy:

- Configure the global parameters that affect the redundant system (see Configuring the Global Parameters on page 3)
- Configure the Ethernet port with a redundant MAC address and redundant IP addresses (see next section)
- Configure the unit *Role* and fault criteria (see "Configuring the Unit Role and Fault Criteria" on page 5-13)
- Configure the *Backup name* and remote unit identification (see "Configuring the Backup Name and Remote Unit Identification" on page 5-14)
- If you want to use SNMP traps to trigger unit backup, define the SNMP trap filters (see Configuring the SNMP Trap Filters on page 20).

5.3.1 Configuring the Ethernet Ports

Ethernet port configuration on the redundant SDM-9620 includes new parameters for defining the redundant MAC and IP addresses. To access these parameters from the NetPerformer console, execute the **PORT/ETH1** or **PORT/ETH2** option of the Setup (**SE**) command:

1. At the NetPerformer command line prompt, enter the menu sequence: **SE** ↵ **PORT**
2. At the *Port number* prompt, enter either **ETH1** or **ETH2**
3. Change a parameter value by entering the new value after the parameter prompt

A complete configuration example is provided on "SE/PORT/ETH1 example: on redundant SDM-9620" on page 5-12.

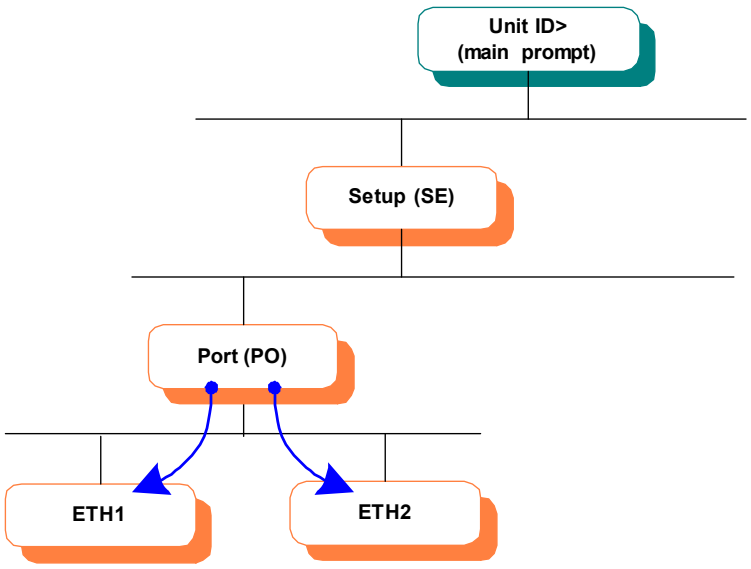


Figure 5-2: SETUP/PORT/ETH1 and SETUP/PORT/ETH2 Path in the CLI Tree

Redundant MAC Address

To activate the redundant MAC address on an Ethernet port (refer to Redundant MAC Address on page 5):

- Set the Ethernet port parameter *Redundancy MAC address active* to **YES**
- Define the *Redundancy MAC address* on the Ethernet port
- Configure the unit for 1:1 Redundancy
- The unit must also be in operating state. If it is in **STANDBY** or **REPLACED** mode, the redundant MAC address state will be displayed as **inactive**. Refer to Ethernet Port Status on page 8.

The following parameters have been added to the configuration of an Ethernet port for the redundant MAC address:

- ***Redundancy MAC address active*** (Configuration file: [iflan] *RedunMacAddrActive*; SNMP: *iflanRedunMacAddressActive*):
  - **YES:** Allows for configuration of a redundant MAC address on this Ethernet port. This MAC address will be used as the source address instead of the default BIA or configured physical MAC address.
  - **NO:** (default value) A redundant MAC address is not available for this Ethernet port.

  Set this parameter to **YES** in a redundant system. This allows the two redundant units to have the same MAC address and be on the same LAN. The unit that is currently active is the one that uses the redundant MAC address.
- ***Redundancy MAC address*** (Configuration file: [iflan] *RedunMacAddr*; SNMP: *iflanRedunMacAddress*):

  Determines the redundant MAC address that the Ethernet port will use as source address when the unit is operating in a redundant system.

  1:1 Redundancy must be fully configured on this unit (using **SE/REDUNDANCY**) for this parameter to take effect, including the unit *Role* and fault criteria (see "Configuring the Unit Role and Fault Criteria" on page 5-13) and the *Backup name* and remote unit identification (see "Configuring the Backup Name and Remote Unit Identification" on page 5-14).
  - Range of hexadecimal values: **00005E000000** to **00005E0000FF**

  This range of MAC addresses is the Ethernet address block that the Internet Assigned Numbers Authority (IANA) has specified for unicast address assignments or other special purposes.
  - Default value: **00005E000000**

  Caution: Be careful when configuring this parameter. With the exception of the redundant unit, the *Redundancy MAC address* must be different from the MAC address of other units on the same LAN if the other units can operate at the same time as the one you are configuring.

Redundant IP Addresses

The following parameters have been added to the configuration of an Ethernet port for the redundant IP addresses (refer to Redundant IP Addresses on page 4):

- ***Redundancy IP address 1*** (Configuration file: [iflan] *RedunIpAddress1*; SNMP: *iflanRedunIpAddress1*):

  Specifies the first redundant IP address that is activated by the Redundancy feature when the unit is operative.

  - IP address value: class A, class B or class C IP address in **x.x.x.x** format
  - Default value: **0.0.0.0**

- ***Redundancy subnet mask 1 (number of bits)*** (Configuration file: [iflan] *SNRedunMask1*; SNMP: *iflanRedunSNMask1*):

  Specifies the subnet mask for the first redundant IP address, in number of bits. For example, the value **8** corresponds to **255.0.0.0**, and 16 corresponds to **255.255.0.0**.

  - Range of integer values: **0** to **32**
  - Default value: **8**

- ***Redundancy IP address 2*** (Configuration file: [iflan] *RedunIpAddress2*; SNMP: *iflanRedunIpAddress2*):

  Specifies the second redundant IP address that is activated by the Redundancy feature when the unit is operative.

  - IP address value: class A, class B or class C IP address in **x.x.x.x** format
  - Default value: **0.0.0.0**

- ***Redundancy subnet mask 2 (number of bits)*** (Configuration file: [iflan] *SNRedunMask2*; SNMP: *iflanRedunSNMask2*):

  Specifies the subnet mask for the second redundant IP address, in number of bits. For example, the value **8** corresponds to **255.0.0.0**, and 16 corresponds to **255.255.0.0**.

  - Range of integer values: **0** to **32**
  - Default value: **8**

NOTE: In this example, port **ETH1** is defined with a redundant MAC address, one redundant IP address and redundant subnet mask.

SE/PORT/ ETH1 example: on redundant SDM-9620

```
AF.9620-1>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:ETH1) ? ETH1
PORT ETH 1> Protocol (def:ETH AUTO) ?
PORT ETH 1> Link integrity (def:YES) ?
```

```
PORT ETH 1> LAN speed (mbps) (def:AUTO) ?
PORT ETH 1> MAC address (def:000000000000) ?
PORT ETH 1> Redundancy MAC address active (def:NO) ? YES
PORT ETH 1> Redundancy MAC address (def:000000000000) ?
00005B000005
PORT ETH 1> DHCP (def:DISABLE) ?
PORT ETH 1> IP address 1 (def:000.000.000.000) ? 005.050.002.002
PORT ETH 1> Subnet mask 1 (number of bits) (0-32,def:8) ? 24
  {255.255.255.000}
PORT ETH 1> IP address 2 (def:000.000.000.000) ?
PORT ETH 1> Subnet mask 2 (number of bits) (0-32,def:8) ?
{255.000.000.000}
PORT ETH 1> Redundancy IP address 1 (def:000.000.000.000) ?
005.050.002.001
PORT ETH 1> Redundancy subnet mask 1 (number of bits) (0-32,def:8)
? 24

{255.255.255.000}
PORT ETH 1> Redundancy IP address 2 (def:000.000.000.000) ?
PORT ETH 1> Redundancy subnet mask 2 (number of bits) (0-32,def:8)
?

{255.000.000.000}
PORT ETH 1> Allow routing between IP networks (def:YES) ?
PORT ETH 1> Frame size (128-8192,def:1500) ?
PORT ETH 1> IP RIP (def:V1) ? V2 MULTICAST
PORT ETH 1> IP RIP TX/RX (def:DUPLEX) ?
PORT ETH 1> IP RIP Authentication (def:NONE) ?
PORT ETH 1> OSPF (def:DISABLE) ?
PORT ETH 1> IGMP enable (def:NO) ?
PORT ETH 1> IP multicast active (def:NO) ?
PORT ETH 1> IP multicast 1 (def:000.000.000.000) ?
PORT ETH 1> IP multicast 2 (def:000.000.000.000) ?
PORT ETH 1> IP multicast 3 (def:000.000.000.000) ?
PORT ETH 1> IP multicast 4 (def:000.000.000.000) ?
PORT ETH 1> IP GSM group management (def:000.000.000.000) ?
PORT ETH 1> NAT enable (def:NO) ?
PORT ETH 1> VLAN enable (def:NO) ?
PORT ETH 1> IPX RIP (def:DISABLE) ?
PORT ETH 1> IPX SAP (def:DISABLE) ?
PORT ETH 1> IPX network number (def:00000000) ?
PORT ETH 1> IPX encapsulation (def:ETH 802.2) ?
PORT ETH 1> Physical connectivity detection (def:DISABLE) ?
```

5.3.2 Configuring the Unit Role and Fault Criteria

The unit *Role* and redundancy fault criteria are configured using the **REDUNDANCY/ CRITERIA** submenu of the **SETUP** console command. Refer to "Configuring the Unit Role and Fault Criteria" on page 3-13 for details on this submenu. The different features controlled by the *Startup delay (s)* and the *Transition delay (s)* are described on "Startup Delay and Transition Delay" on page 5-6. Details on all Redundancy Criteria parameters can be found in the section CRITERIA Parameters on page 2.

SE/ REDUNDANCY /CRITERIA example: SDM-9620 Primary Master

```
AF.9620-1>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:PORT) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? PRIMARY MASTER
CRITERIA> Unit operating mode (def:NORMAL) ?
CRITERIA> Node operating mode (def:NORMAL) ?
CRITERIA> Detect name conflict (def:YES) ?
CRITERIA> Force unit to restart in backup mode (def:NO) ?
CRITERIA> Startup delay (s) (0-1000,def:60) ?
CRITERIA> Transition delay (s) (0-1000,def:60) ?
CRITERIA> Delay before declaring unit lost (s) (30-1000,def:60) ?
CRITERIA> Monitor redundant PVCR PVC links (def:ALL) ?
CRITERIA> Delay before declaring PVCR PVC link down (s) (0-
1000,def:60) ?
CRITERIA> Monitor power supplies (def:YES) ?
CRITERIA> Monitor fans (def:YES) ?
```

SE/ REDUNDANCY /CRITERIA example: SDM-9620 Secondary Master

```
AF.9620-2>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:PORT) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? CRITERIA
CRITERIA> Role (def:DISABLED) ? SECONDARY MASTER
CRITERIA> Unit operating mode (def:NORMAL) ?
CRITERIA> Node operating mode (def:NORMAL) ?
CRITERIA> Startup delay (s) (0-1000,def:60) ?
CRITERIA> Transition delay (s) (0-1000,def:60) ?
CRITERIA> Delay before declaring unit lost (s) (30-1000,def:60) ?
CRITERIA> Monitor redundant PVCR PVC links (def:ALL) ?
CRITERIA> Delay before declaring PVCR PVC link down (s) (0-
1000,def:60) ?
CRITERIA> Monitor power supplies (def:YES) ?
CRITERIA> Monitor fans (def:YES) ?
CRITERIA> Test switches and secondary set before backup (def:YES) ?
```

5.3.3 Configuring the Backup Name and Remote Unit Identification

The *Backup name* and remote unit identification are configured using the **REDUNDANCY/ REMOTE** submenu of the **SETUP** console command. Refer to "Configuring the Backup Name and Remote Unit Identification" on page 3-16 for details on this submenu. The need for defining the slot number occupied by the opposite blade is explained in the section Primary Master and Secondary Master on page 3. Details on all Redundancy Remote parameters can be found in the section REMOTE Parameters on page 10.

NOTE: The *Unit names* and *Backup names* of the remote Primary Slaves and Secondary Slaves do not need to be defined.

SE/ REDUNDANCY /REMOTE example: on SDM-9620 Primary Master

```
AF.9620-1>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:CRITERIA) ? REMOTE
REMOTE> Slot number of Secondary Master (def:NONE) ? 2
REMOTE> Backup name (def:) ? AF.9620-1X
REMOTE> Unit name of Secondary Master (def:) ? AF.9620-2
REMOTE> Unit name of Primary Slave #1 (def:) ?
REMOTE> Unit name of Primary Slave #2 (def:) ?
REMOTE> Unit name of Primary Slave #3 (def:) ?
REMOTE> Unit name of Primary Slave #4 (def:) ?
REMOTE> Unit name of Primary Slave #5 (def:) ?
REMOTE> Unit name of Primary Slave #6 (def:) ?
REMOTE> Unit name of Primary Slave #7 (def:) ?
REMOTE> Unit name of Primary Slave #8 (def:) ?
REMOTE> Unit name of Primary Slave #9 (def:) ?
REMOTE> Unit name of Primary Slave #10 (def:) ?
REMOTE> Unit name of Secondary Slave #1 (def:) ?
REMOTE> Unit name of Secondary Slave #2 (def:) ?
REMOTE> Unit name of Secondary Slave #3 (def:) ?
REMOTE> Unit name of Secondary Slave #4 (def:) ?
REMOTE> Unit name of Secondary Slave #5 (def:) ?
REMOTE> Unit name of Secondary Slave #6 (def:) ?
REMOTE> Unit name of Secondary Slave #7 (def:) ?
REMOTE> Unit name of Secondary Slave #8 (def:) ?
REMOTE> Unit name of Secondary Slave #9 (def:) ?
REMOTE> Unit name of Secondary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Master (def:) ? AF.9620-1
REMOTE> Backup name of Primary Slave #1 (def:) ?
REMOTE> Backup name of Primary Slave #2 (def:) ?
REMOTE> Backup name of Primary Slave #3 (def:) ?
REMOTE> Backup name of Primary Slave #4 (def:) ?
REMOTE> Backup name of Primary Slave #5 (def:) ?
REMOTE> Backup name of Primary Slave #6 (def:) ?
REMOTE> Backup name of Primary Slave #7 (def:) ?
REMOTE> Backup name of Primary Slave #8 (def:) ?
REMOTE> Backup name of Primary Slave #9 (def:) ?
REMOTE> Backup name of Primary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Slave #1 (def:) ?
REMOTE> Backup name of Secondary Slave #2 (def:) ?
REMOTE> Backup name of Secondary Slave #3 (def:) ?
REMOTE> Backup name of Secondary Slave #4 (def:) ?
REMOTE> Backup name of Secondary Slave #5 (def:) ?
REMOTE> Backup name of Secondary Slave #6 (def:) ?
REMOTE> Backup name of Secondary Slave #7 (def:) ?
REMOTE> Backup name of Secondary Slave #8 (def:) ?
REMOTE> Backup name of Secondary Slave #9 (def:) ?
REMOTE> Backup name of Secondary Slave #10 (def:) ?
```

SE/ REDUNDANCY /REMOTE example: on SDM-9620 Secondary Master

```
AF.9620-2>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:CRITERIA) ? REMOTE
REMOTE> Slot number of Primary Master (def:NONE) ? 1
REMOTE> Backup name (def:) ? AF.9620-1
REMOTE> Unit name of Primary Master (def:) ? AF.9620-1
REMOTE> Unit name of Primary Slave #1 (def:) ?
REMOTE> Unit name of Primary Slave #2 (def:) ?
REMOTE> Unit name of Primary Slave #3 (def:) ?
REMOTE> Unit name of Primary Slave #4 (def:) ?
REMOTE> Unit name of Primary Slave #5 (def:) ?
REMOTE> Unit name of Primary Slave #6 (def:) ?
REMOTE> Unit name of Primary Slave #7 (def:) ?
REMOTE> Unit name of Primary Slave #8 (def:) ?
REMOTE> Unit name of Primary Slave #9 (def:) ?
REMOTE> Unit name of Primary Slave #10 (def:) ?
REMOTE> Unit name of Secondary Slave #1 (def:) ?
REMOTE> Unit name of Secondary Slave #2 (def:) ?
REMOTE> Unit name of Secondary Slave #3 (def:) ?
REMOTE> Unit name of Secondary Slave #4 (def:) ?
REMOTE> Unit name of Secondary Slave #5 (def:) ?
REMOTE> Unit name of Secondary Slave #6 (def:) ?
REMOTE> Unit name of Secondary Slave #7 (def:) ?
REMOTE> Unit name of Secondary Slave #8 (def:) ?
REMOTE> Unit name of Secondary Slave #9 (def:) ?
REMOTE> Unit name of Secondary Slave #10 (def:) ?
REMOTE> Backup name of Primary Master (def:) ? AF.9620-1X
REMOTE> Backup name of Primary Slave #1 (def:) ?
REMOTE> Backup name of Primary Slave #2 (def:) ?
REMOTE> Backup name of Primary Slave #3 (def:) ?
REMOTE> Backup name of Primary Slave #4 (def:) ?
REMOTE> Backup name of Primary Slave #5 (def:) ?
REMOTE> Backup name of Primary Slave #6 (def:) ?
REMOTE> Backup name of Primary Slave #7 (def:) ?
REMOTE> Backup name of Primary Slave #8 (def:) ?
REMOTE> Backup name of Primary Slave #9 (def:) ?
REMOTE> Backup name of Primary Slave #10 (def:) ?
REMOTE> Backup name of Secondary Slave #1 (def:) ?
REMOTE> Backup name of Secondary Slave #2 (def:) ?
REMOTE> Backup name of Secondary Slave #3 (def:) ?
REMOTE> Backup name of Secondary Slave #4 (def:) ?
REMOTE> Backup name of Secondary Slave #5 (def:) ?
REMOTE> Backup name of Secondary Slave #6 (def:) ?
REMOTE> Backup name of Secondary Slave #7 (def:) ?
REMOTE> Backup name of Secondary Slave #8 (def:) ?
REMOTE> Backup name of Secondary Slave #9 (def:) ?
REMOTE> Backup name of Secondary Slave #10 (def:) ?
```

5.3.4 Notice Concerning Switch Configuration on an SDM-9620

The Redundancy Switch parameters do not need to be defined on an SDM-9620. If you access the **REDUNDANCY/SWITCH** submenu of the Setup (**SE**) command, simply leave the **SWITCH** parameters at their default values.

- Either press **<Enter>** after each **SWITCH** parameter that is displayed on the console screen, or press **<Esc>** to return to the main command line prompt.
- By default, no redundancy switch is active.

```
AF.9620-1>SE
SETUP
Item (BACKPLANE/BRIDGE/CALLER ID/CLASS/...,def:REDUNDANCY) ?
Item (ALL/CRITERIA/REMOTE/SWITCH,def:REMOTE) ? SWITCH
REDUNDANCY SWITCH number (1-10,def:1) ?
SWITCH 1> Switch active (def:NO) ?
SWITCH 1> IP address (def:000.000.000.000) ? <Esc>
AF.9620-1>
```

Monitoring the Redundant System

6.1 About the Redundant System

Status information about a redundant system is available from the NetPerformer console and via SNMP, including:

- The current values of all configurable parameters (see next section)
- The current status of all units in the redundant system (see "Displaying the Current Status of All Units" on page 6-6) and the Ethernet ports of one unit (see "Ethernet Port Status" on page 6-8)
- The number and type of errors that have occurred (see "Displaying the Errors" on page 6-10)
- The number of frames that have been transmitted and received (see "Displaying the Frame Count" on page 6-12)
- The alarms that have been logged (see "Displaying the Alarms" on page 6-13).

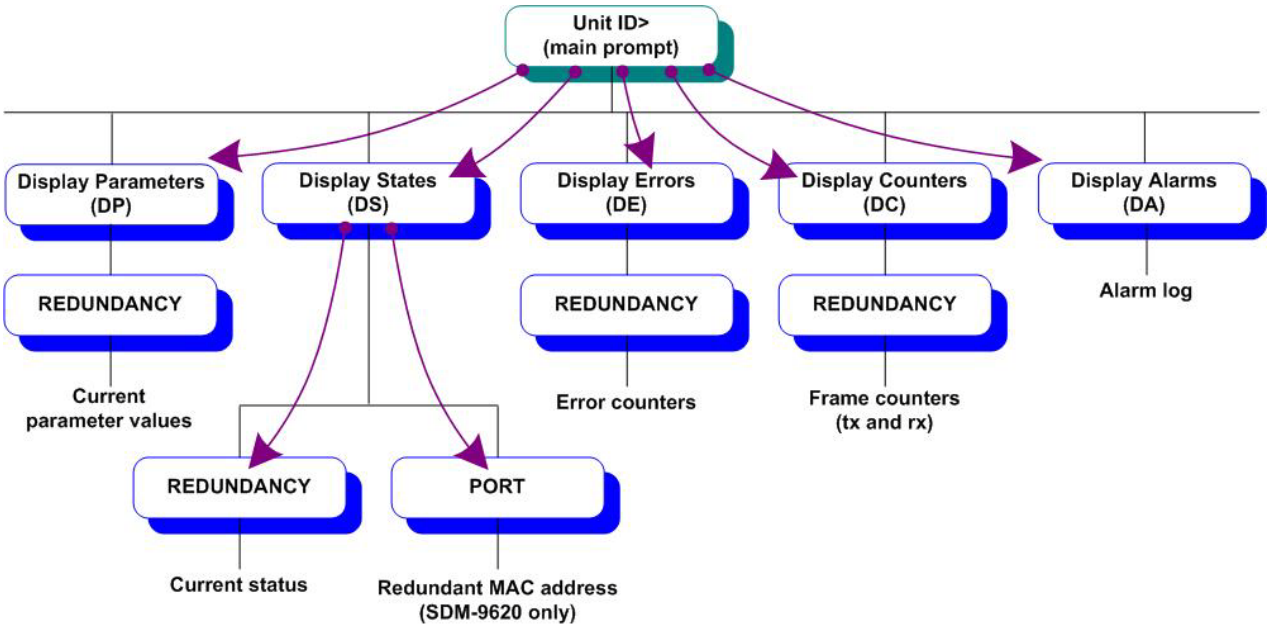


Figure 6-1: Redundancy Display Commands on the CLI Path

6.2 Displaying Current Parameter Values

To check the current values of all configurable parameters involved in setting up a redundant system, use the **REDUNDANCY** option of the Display Parameters (**DP**) command.

To display the REDUNDANCY parameters:

1. At the NetPerformer command line prompt, enter the menu sequence: **DP** ↵ **REDUNDANCY**
2. Select one of the following:
   - **ALL:** To list all **REDUNDANCY** parameters

     NetPerformer the **REDUNDANCY** parameters and their current values in the same order as they appear in the Setup (**SE**) command, with the **CRITERIA** parameters first, the **REMOTE** parameters, and then the **SWITCH** parameters.
   - **CRITERIA:** To list the **CRITERIA** parameters only
   - **REMOTE:** To list the **REMOTE** parameters only
   - **SWITCH:** To list the **SWITCH** parameters only.

NOTE: The **REDUNDANCY** parameters are also listed when you execute the **ALL** option of the **DP** command.

DP/ REDUNDANCY example: on Primary Master SDM-9620 in NORMAL mode

```
AF.9620-1>DP
DISPLAY PARAMETERS
Item (BACKPLANE/BRIDGE/CLASS/CUSTOM/ELOG/GLOBAL/GSM/IP/IPX/PORT/
   REDUNDANCY/
SPAN/SS7/USER/ALL,def:GLOBAL) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ?
CRITERIA> Role.....................................PRIMARY MASTER
CRITERIA> Unit operating mode......................NORMAL
CRITERIA> Node operating mode......................NORMAL
CRITERIA> Detect name conflict.....................YES
CRITERIA> Force unit to restart in backup mode.....NO
CRITERIA> Startup delay (s)........................60
CRITERIA> Transition delay (s).....................60
CRITERIA> Delay before declaring unit lost (s).....60
CRITERIA> Monitor redundant PVCR PVC links.........ALL
CRITERIA> Delay before declaring PVCR PVC link down (s) 60
CRITERIA> Monitor power supplies...................YES
CRITERIA> Monitor fans.............................YES
REMOTE> Slot number of Secondary Master............2
REMOTE> Backup name................................AF.9620-1X
REMOTE> Unit name of Secondary Master..............AF.9620-2
REMOTE> Unit name of Primary Slave #1..............
REMOTE> Unit name of Primary Slave #2..............
REMOTE> Unit name of Primary Slave #3..............
REMOTE> Unit name of Primary Slave #4..............
```

```
REMOTE> Unit name of Primary Slave #5.............
REMOTE> Unit name of Primary Slave #6.............
REMOTE> Unit name of Primary Slave #7.............
REMOTE> Unit name of Primary Slave #8.............
REMOTE> Unit name of Primary Slave #9.............
REMOTE> Unit name of Primary Slave #10............
REMOTE> Unit name of Secondary Slave #1...........
REMOTE> Unit name of Secondary Slave #2...........
REMOTE> Unit name of Secondary Slave #3...........
REMOTE> Unit name of Secondary Slave #4...........
REMOTE> Unit name of Secondary Slave #5...........
REMOTE> Unit name of Secondary Slave #6...........
REMOTE> Unit name of Secondary Slave #7...........
REMOTE> Unit name of Secondary Slave #8...........
REMOTE> Unit name of Secondary Slave #9...........
REMOTE> Unit name of Secondary Slave #10..........
REMOTE> Backup name of Secondary Master...........AF.9620-1
REMOTE> Backup name of Primary Slave #1...........
REMOTE> Backup name of Primary Slave #2...........
REMOTE> Backup name of Primary Slave #3...........
REMOTE> Backup name of Primary Slave #4...........
REMOTE> Backup name of Primary Slave #5...........
REMOTE> Backup name of Primary Slave #6...........
REMOTE> Backup name of Primary Slave #7...........
REMOTE> Backup name of Primary Slave #8...........
REMOTE> Backup name of Primary Slave #9...........
REMOTE> Backup name of Primary Slave #10..........
REMOTE> Backup name of Secondary Slave #1.........
REMOTE> Backup name of Secondary Slave #2.........
REMOTE> Backup name of Secondary Slave #3.........
REMOTE> Backup name of Secondary Slave #4.........
REMOTE> Backup name of Secondary Slave #5.........
REMOTE> Backup name of Secondary Slave #6.........
REMOTE> Backup name of Secondary Slave #7.........
REMOTE> Backup name of Secondary Slave #8.........
REMOTE> Backup name of Secondary Slave #9.........
REMOTE> Backup name of Secondary Slave #10........
```

DP/ REDUNDANCY example: on Secondary Master SDM-9500 in BACKUP Mode

```
(A2) A1>DP
DISPLAY PARAMETERS
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/
   PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:REDUNDANCY) ? REDUNDANCY
Item (ALL/CRITERIA/REMOTE/SWITCH,def:ALL) ? ALL
CRITERIA> Role.....................................SECONDARY MASTER
CRITERIA> Unit operating mode.....................BACKUP
CRITERIA> Node operating mode.....................BACKUP
CRITERIA> Startup delay (s).......................60
CRITERIA> Transition delay (s).....................60
CRITERIA> Delay before declaring unit lost (s).....60
CRITERIA> Monitor redundant PVCR PVC links.........ALL
CRITERIA> Delay before declaring PVCR PVC link down (s) 60
CRITERIA> Monitor power supplies...................YES
CRITERIA> Monitor fans.............................YES
REMOTE> Backup name................................A1
REMOTE> Unit name of Primary Master................A1
```

```
REMOTE> Unit name of Primary Slave #1.............B1
REMOTE> Unit name of Primary Slave #2.............C1
REMOTE> Unit name of Primary Slave #3.............
REMOTE> Unit name of Primary Slave #4.............
REMOTE> Unit name of Primary Slave #5.............
REMOTE> Unit name of Primary Slave #6.............
REMOTE> Unit name of Primary Slave #7.............
REMOTE> Unit name of Primary Slave #8.............
REMOTE> Unit name of Primary Slave #9.............
REMOTE> Unit name of Primary Slave #10............
REMOTE> Unit name of Secondary Slave #1...........B2
REMOTE> Unit name of Secondary Slave #2...........C2
REMOTE> Unit name of Secondary Slave #3...........
REMOTE> Unit name of Secondary Slave #4...........
REMOTE> Unit name of Secondary Slave #5...........
REMOTE> Unit name of Secondary Slave #6...........
REMOTE> Unit name of Secondary Slave #7...........
REMOTE> Unit name of Secondary Slave #8...........
REMOTE> Unit name of Secondary Slave #9...........
REMOTE> Unit name of Secondary Slave #10..........
REMOTE> Backup name of Primary Master.............AX
REMOTE> Backup name of Primary Slave #1...........BX
REMOTE> Backup name of Primary Slave #2...........CX
REMOTE> Backup name of Primary Slave #3...........
REMOTE> Backup name of Primary Slave #4...........
REMOTE> Backup name of Primary Slave #5...........
REMOTE> Backup name of Primary Slave #6...........
REMOTE> Backup name of Primary Slave #7...........
REMOTE> Backup name of Primary Slave #8...........
REMOTE> Backup name of Primary Slave #9...........
REMOTE> Backup name of Primary Slave #10..........
REMOTE> Backup name of Secondary Slave #1.........B1
REMOTE> Backup name of Secondary Slave #2.........C1
REMOTE> Backup name of Secondary Slave #3.........
REMOTE> Backup name of Secondary Slave #4.........
REMOTE> Backup name of Secondary Slave #5.........
REMOTE> Backup name of Secondary Slave #6.........
REMOTE> Backup name of Secondary Slave #7.........
REMOTE> Backup name of Secondary Slave #8.........
REMOTE> Backup name of Secondary Slave #9.........
REMOTE> Backup name of Secondary Slave #10........
SWITCH> Switch active.............................YES
SWITCH> IP address................................005.000.002.041
SWITCH> Get community.............................GetCommunity
SWITCH> Set community.............................SetCommunity
SWITCH> OID
   (1.3.6.1...).........................4.1.727.7.2.10.2.1.2
SWITCH> Index.....................................1,3-5,10
SWITCH> Value type................................INTEGER
SWITCH> Value for Primary active..................1
SWITCH> Value for Secondary active................2
SWITCH> Polling active............................YES
SWITCH> Polling delay (s).........................60
SWITCH> Timeout (ms)..............................3000
SWITCH> Log errors in the journal.................NO
SWITCH> Maximum OID per GET frame.................5
SWITCH> Maximum OID per SET frame.................1
```

6.3 Displaying the Current Status of All Units

To check the current status of all units in the redundant system, use the **REDUNDANCY** option of the Display States (**DS**) command. You can view the status of the local unit (**LOCAL**), or of all other units in the redundant system (**REMOTES**).

To display the unit status:

1. At the NetPerformer command line prompt, enter the menu sequence: **DS** ↵ **REDUNDANCY**
2. At the Item prompt, select:
   - **LOCAL:** To view the current status of the local unit, i.e. the unit you are currently accessing at the console.

     These statistics are available via SNMP using the *statRedundancyLocal* entries.
   - **REMOTES:** To view the current status of all other units in the redundant system.

     These statistics are available via SNMP using the *statRedundancyRemote* entries.

6.3.1 Local Unit Status

DS/ REDUNDANCY /LOCAL example: on Primary Master

```
A1>DS
DISPLAY STATES
Item (GLOBAL/PORT/PU/PVC/REDUNDANCY/SLOT/SVC/VLAN,def:GLOBAL) ?
   REDUNDANCY
Item (LOCAL/REMOTES,def:LOCAL) ?
Role.....................................PRIMARY MASTER
Unit operating mode......................NORMAL
Node operating mode......................NORMAL
Unit name................................A1
Backup name..............................AX
Reason for the last fault................At least one power
   supply has been detected down in the primary set - WED   2004/01/14
   11:04:27
Number of redundant PVCR PVC links up....1
Number of redundant PVCR PVC links down..0
Number of power supplies up..............1
Number of power supplies down............0
Number of fans up........................1
Number of fans down......................0
```

For details on these statistics, go to "DS/REDUNDANCY/LOCAL" on page 8-2.

6.3.2 Remote Unit Status

DS/ REDUNDANCY /REMOTES example: on SDM-9500 Primary Master

```
A1>DS
DISPLAY STATES
Item (GLOBAL/PORT/PU/PVC/REDUNDANCY/SLOT/SVC/VLAN,def:REDUNDANCY) ?
Item (LOCAL/REMOTES,def:LOCAL) ? REMOTES
Number of remotes.............................3

Role.........................................SECONDARY MASTER
Index........................................2
Unit name....................................A2
Backup name..................................A1
Number of units up...........................2
Number of units down.........................0
Number of redundant PVCR PVC links up..........0
Number of redundant PVCR PVC links down.........1
Number of power supplies up..................2
Number of power supplies down................0
Number of fans up............................2
Number of fans down..........................0

Role.........................................PRIMARY SLAVE
Index........................................101
Unit name....................................B1
Backup name..................................BX
Number of units up...........................1
Number of units down.........................0
Number of redundant PVCR PVC links up..........0
Number of redundant PVCR PVC links down.........0
Number of power supplies up..................1
Number of power supplies down................0
Number of fans up............................1
Number of fans down..........................0

Role.........................................SECONDARY SLAVE
Index........................................201
Unit name....................................B2
Backup name..................................B1
Number of units up...........................1
Number of units down.........................0
Number of redundant PVCR PVC links up..........0
Number of redundant PVCR PVC links down.........0
Number of power supplies up..................1
Number of power supplies down................0
Number of fans up............................1
Number of fans down..........................0
```

DS/ REDUNDANCY /REMOTES example: on SDM-9620 Secondary Master

```
AF.9620-1>DS
DISPLAY STATES
Item (GLOBAL/PORT/REDUNDANCY/SPAN,def:GLOBAL) ? REDUNDANCY
Item (LOCAL/REMOTES,def:LOCAL) ? REMOTES
Number of remotes.................................1

Role.............................................PRIMARY MASTER
Index............................................1
Unit name........................................AF.9620-1
Backup name......................................AF.9620-1X
Number of units up...............................1
Number of units down.............................0
Number of redundant PVCR PVC links up............0
Number of redundant PVCR PVC links down..........0
Number of power supplies up......................0
Number of power supplies down....................0
Number of fans up................................0
Number of fans down..............................0
Number of signals up.............................0
Number of signals down...........................0
Number of interfaces up..........................0
Number of interfaces down........................0
Slot number......................................1
```

For details on these statistics, go to "DS/REDUNDANCY/REMOTES" on page 8-5.

6.3.3 Ethernet Port Status

Statistics have been added to the display of Ethernet port status to show the redundant MAC address and its current status: **inactive** or **active**.

To view these statistics:

- At the NetPerformer command line prompt, enter the menu sequence: **DS** ↵ **PORT**

DS/PORT example

```
AF.9620-1>DS
DISPLAY STATES
Item (GLOBAL/PORT/REDUNDANCY/SPAN,def:GLOBAL) ? PORT
PORT ETH 1> Protocol.............................ETHERNET
PORT ETH 1> Interface............................10BASET
PORT ETH 1> Speed................................100M
PORT ETH 1> Duplex mode..........................FULL
PORT ETH 1> Operating mode.......................L-
PORT ETH 1> State................................OPEN
PORT ETH 1> Network address.....................00200CE014F1
PORT ETH 1> Redundancy MAC address..............00005E000000
   (inactive)
PORT ETH 1> Burned-in address...................00200CE014F1
PORT ETH 1> Number of deferred transmissions.....0
PORT ETH 1> Number of collision frames...........0

PORT ETH 2> Protocol.............................ETHERNET
```

```
PORT ETH 2> Interface.............................10BASET
PORT ETH 2> Speed.................................UNKNOWN
PORT ETH 2> Duplex mode...........................HALF
PORT ETH 2> Operating mode........................--
PORT ETH 2> State.................................OPEN
PORT ETH 2> Network address.......................00200CE014F2
PORT ETH 2> Redundancy MAC address................00005E000001
   (active)
PORT ETH 2> Burned-in address.....................00200CE014F2
PORT ETH 2> Number of deferred transmissions.....0
PORT ETH 2> Number of collision frames............0

PORT CSL> Protocol................................CSL
PORT CSL> Interface...............................DTE-UNDEFINED
PORT CSL> Speed used (bps)........................38400
PORT CSL> TxC speed (bps).........................N.A.
PORT CSL> RxC speed (bps).........................N.A.
PORT CSL> Modem signals...........................----C-
PORT CSL> State...................................DISC

PORT 1> Protocol..................................PVCR
PORT 1> Interface.................................UNDEFINED
PORT 1> Speed used (bps)..........................0
PORT 1> TxC speed (bps)...........................0
PORT 1> RxC speed (bps)...........................0
PORT 1> Modem signals.............................------
PORT 1> State.....................................CALL

Modem signals:  d(S)r  d(T)r  (D)cd  (R)ts  (C)ts  r(I)  (-)off
```

The redundant MAC address information can be retrieved in SNMP using the following entries in the *statSystem* table:

- *statSystemRedunMacAddrState1*
- *statSystemRedunMacAddr1*
- *statSystemRedunMacAddrState2*
- *statSystemRedunMacAddr2.*

6.4 Displaying the Errors

To display the number and type of errors that have occurred in a redundant system, use the **REDUNDANCY** option of the Display Errors (**DE**) command.

> **NOTE:** **The error counters are not accessible via SNMP**.

To display the REDUNDANCY error counters:

1. At the NetPerformer command line prompt, enter the menu sequence: **DE** ↵ **REDUNDANCY.**
2. The unit displays the total occurrences for each error counter since the last reset with the:
   - Reset Counters (**RC**) command, ***or***
   - Factory Setup (**FS**) command.

DE/ REDUNDANCY example: on SDM-9500 Primary Master

```
A1>DE
DISPLAY ERRORS
Item (BOOTP/CHANNEL/DICT/GROUP/NAT/PORT/PU/PVC/Q922/REDUNDANCY/SLOT/
   SVC/
TIMEP,def:BOOTP) ? REDUNDANCY
Number of frames discarded.....................2
Number of frames with invalid size.............0
Number of frames with invalid version field.....0
Number of frames with invalid command field.....0
Number of frames from an invalid master.........6
Number of frames from an invalid remote.........6
Number of SNMP objects discarded................0
Number of SNMP commands not sent................0
Number of SNMP busy indications.................0
```

DE/ REDUNDANCY example: on SDM-9620 Primary Master

NOTE: In this example we see the addition of error statistics for exchanges between the NetPerformer application and IPMC.

```
AF.9620-1>DE
DISPLAY ERRORS
Item (BOOTP/CHANNEL/DICT/GROUP/NAT/PORT/Q922/REDUNDANCY/SPAN/TIMEP,
def:BOOTP) ? REDUNDANCY
Number of frames discarded.........................0
Number of frames with invalid size.................0
Number of frames with invalid version field.........0
Number of frames with invalid command field.........0
Number of frames from an invalid master.............0
Number of frames from an invalid remote.............0
Number of IPMC tx frames discarded..................0
Number of IPMC rx frames discarded..................0
Number of IPMC rx frames with invalid version.......0
Number of IPMC rx frames with invalid length........0
Number of IPMC rx frames with invalid command.......0
Number of IPMC rx frames with invalid seq. number...0
Number of IPMC rx frames with invalid state.........0
```

For details on these statistics, go to “DE/REDUNDANCY” on page 8-9.

6.5 Displaying the Frame Count

To display the number of frames that have been transmitted and received across a particular unit in the redundant system, use the **REDUNDANCY** option of the Display Counters (**DC**) command.

> **NOTE:** **The frame counters are not accessible via SNMP**.

To display the REDUNDANCY frame counters:

1. At the NetPerformer command line prompt, enter the menu sequence: **DC** ↵ **REDUNDANCY.**
2. The unit displays the total occurrences for each frame counter since the last reset with the:
   - Reset Counters (**RC**) command, ***or***
   - Factory Setup (**FS**) command.

DC/ REDUNDANCY example: on Primary Master

```
A1>DC
DISPLAY COUNTERS
Item (BOOTP/CHANNEL/CONFIG/DNS/GROUP/IP/NAT/PORT/QOS/REDUNDANCY/SNMP/
TIMEP,def:REDUNDANCY) ? REDUNDANCY
Number of rx frames.............................130050
Number of tx frames (total).....................130044
Number of tx frames (first attempt).............130040
Number of tx frames (second attempt)............2
Number of tx frames (third attempt).............2
Number of SNMP objects sent.....................3128
Number of SNMP objects received.................3128
```

For details on these statistics, go to "DC/REDUNDANCY" on page 8-13.

6.6 Displaying the Alarms

Events involving the redundant system are logged in the NetPerformer Alarm Log. Use the Display Alarms (DA) command to view this log.

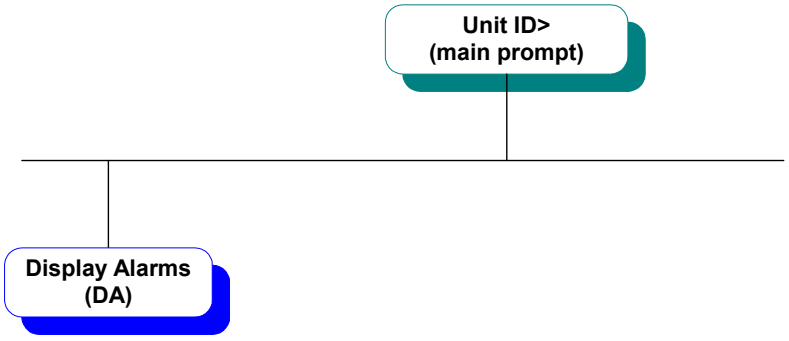


Figure 6-2: DA Command in the CLI Tree

To display the alarms:

1. At the NetPerformer command line prompt, enter: **DA**

   The alarms are available via SNMP using the *statAlarm* entries

2. Press the **[Enter]** key to scroll through the alarm log at the console
3. Press the **[Esc]** key to return to the console command line prompt.

DA example: Redundancy alarms on SDM-9620 blade

```
AF.9620-1>DA
DISPLAY ALARMS
SDM-9620 v10.4.1 (R1) Memotec Inc. (c) 2008
Console connected on port CSL
Voice transport method:  PowerCell
GSM license (AAAA-BBBB-CCCCCCCC-DDDD) enabled on this unit
File system status at bootup:  NO ERROR
Time> TUE   2008/03/11 16:26:35

Alarm>    RESET BY USER                       TUE   2008/03/11 16:24:07
Alarm>    REDUN PVCR PVC UP                   TUE   2008/03/11 16:17:29
Alarm>    PVC 2 UP (GSM:AF.9620-2)            TUE   2008/03/11 16:17:29
Alarm>    PVC 1 UP (AF.9620-2)                TUE   2008/03/11 16:17:28
Alarm>    ALL REDUN PVCR PVC DOWN             TUE   2008/03/11 16:14:52
Alarm>    CARD 1 UP (PRIMARY-DOWN)            TUE   2008/03/11 16:14:40
Alarm>    UNIT NAME: AF.9620-1X               TUE   2008/03/11 16:14:31
Alarm>    BACKUP MODE STARTED                 TUE   2008/03/11 15:47:32
Alarm>    BEGINNING SWITCH TO BACKUP MODE     TUE   2008/03/11 15:47:24
Alarm>    CARD 2 UP (AF.9620-2)               TUE   2008/03/11 15:42:13
Alarm>    UNIT NAME:  AF.9620-1               TUE   2008/03/11 15:42:03
Alarm>    NORMAL MODE: RX IPMC NOTIFICATION   TUE   2008/03/11 15:42:03
Alarm>    NORMAL MODE STARTED                 TUE   2008/03/11 15:42:03
Alarm>    CARD 2 DOWN (AF.9620-1)             TUE   2008/03/11 15:42:01
Alarm>    BEGINNING SWITCH TO NORMAL MODE     TUE   2008/03/11 15:41:53
Alarm>    CARD 2 UP (AF.9620-1)               TUE   2008/03/11 15:41:30
Alarm>    CARD 2 DOWN (AF.9620-2)             TUE   2008/03/11 15:41:27
Alarm>    UNIT NAME:  AF.9620-1X              TUE   2008/03/11 15:41:24
```

```
Alarm>    BACKUP MODE: RX IPMC NOTIFICATION  TUE   2008/03/11 15:41:24
Alarm>    BACKUP MODE STARTED                TUE   2008/03/11 15:41:24
Alarm>    BEGINNING SWITCH TO BACKUP MODE    TUE   2008/03/11 15:41:16
Alarm>    CARD 2 UP (AF.9620-2)              TUE   2008/03/11 15:39:35
Alarm>    UNIT NAME:  AF.9620-1              TUE   2008/03/11 15:39:35
Alarm>    NORMAL MODE: RX IPMC NOTIFICATION  TUE   2008/03/11 15:39:35
Alarm>    NORMAL MODE STARTED                TUE   2008/03/11 15:39:35
Alarm>    CLK SRC SWITCHED TO SPAN 12        TUE   2008/03/11 15:39:35
...
```

DA example: Redundancy alarms on SDM-9500 card

```
(A2) A1>DA
DISPLAY ALARMS
SDM-9585 vX.X.X Memotec Inc. (c) 2004
Signaling Engine vX.X.X Memotec Inc. (c) 2004
DSP code version: X.X.X
Console connected on port CSL
SkyPerformer enabled on this unit (AAAA-BBBB-CCCCCCCC-DDDD)
Time> FRI   2004/01/23 16:58:30
Alarm>    NORMAL MODE STARTED                FRI   2004/01/23 16:58:28
Alarm>    UNIT NAME:  A2                     FRI   2004/01/23 16:58:28
Alarm>    BEGINNING SWITCH TO NORMAL MODE    FRI   2004/01/23 16:58:18
Alarm>    PRIMARY ONLINE CONFIRMATION        FRI   2004/01/23 16:58:18
Alarm>    RESET REDUNDANCY MODE              FRI   2004/01/23 16:58:02
Alarm>    PVC 1 UP (A3)                      FRI   2004/01/23 16:56:21
Alarm>    CARD 23 UP (B1)                    FRI   2004/01/23 16:56:21
Alarm>    CARD 13 UP (BX)                    FRI   2004/01/23 16:56:21
Alarm>    CARD 11 UP (AX)                    FRI   2004/01/23 16:56:21
Alarm>    CARD 23 DOWN (B2)                  FRI   2004/01/23 16:56:17
Alarm>    CARD 11 DOWN (A1)                  FRI   2004/01/23 16:56:17
Alarm>    CARD 13 DOWN (B1)                  FRI   2004/01/23 16:56:17
Alarm>    BACKUP MODE STARTED                FRI   2004/01/23 16:56:17
Alarm>    UNIT NAME:  A1                     FRI   2004/01/23 16:56:17
Alarm>    BEGINNING SWITCH TO BACKUP MODE    FRI   2004/01/23 16:56:07
Alarm>    FRAME RELAY LINK (1) UP            FRI   2004/01/23 16:20:42
Alarm>    CARD 23 UP (B2)                    FRI   2004/01/23 16:20:31
Alarm>    CARD 11 UP (A1)                    FRI   2004/01/23 16:20:31
Alarm>    CARD 13 UP (B1)                    FRI   2004/01/23 16:20:23
Alarm>    UNIT NAME:  A2                     FRI   2004/01/23 16:20:13
Alarm>    All fans are working properly      FRI   2004/01/23 16:20:13
Alarm>    Power supply up                    FRI   2004/01/23 16:20:13
Alarm>    SOFT START (RST)                   FRI   2004/01/23 16:19:40
```

SE/Redundancy Configuration Parameters

7.1 CRITERIA Parameters

7.1.1 Role

Console	SNMP	Text-based Config
Role	redundancyCriteriaRole	[Redundancy] Role

Defines the role of this unit in the redundant system. A redundant system can be installed at each node in the network, or at critical nodes only. See "Redundant System using SDM-9500 Chassis" on page 1-7 and "Redundant System using Standalone Units" on page 1-8 for examples.

Each redundant system includes two sets of units with identical hardware and software. Their configuration is almost identical, the only differences concerning their IP addresses and **REDUNDANCY** parameters.

- **Primary set:** operates when the redundant system is in **NORMAL** mode. This set is comprised of:
  - 1 **Primary Master** unit
  - 0, 1 or more **Primary Slave** units (maximum 10)
- **Secondary set:** operates when the redundant system is in **BACKUP** mode. This set is comprised of:
  - 1 **Secondary Master** unit
  - 0, 1 or more **Secondary Slave** units (maximum 10).

Refer to Unit Roles on page 10 for further information.

Values: DISABLED, PRIMARY MASTER, PRIMARY SLAVE, SECONDARY MASTER, SECONDARY SLAVE

Default: DISABLED

7.1.2 Unit operating mode

Console	SNMP	Text-based Config
Unit operating mode	redundancyCriteriaUnit-OperatingMode	[Redundancy] UnitOper-atingMode

Forces a unit to a particular mode of operation. Use the default value, **NORMAL**, unless you are experiencing problems with the system. For example, you should force a replacement unit to **BACKUP** mode when installing it in a system that is currently operating in **BACKUP** mode.

NOTE: This parameter is not available from the console if the *Role* parameter is set to **DISABLED**.

Values: NORMAL, BACKUP

Default: NORMAL

7.1.3 Node operating mode

Console	SNMP	Text-based Config
Node operating mode	redundancyCriteriaNode-OperatingMode	[Redundancy] NodeOper-atingMode

For a Primary Master or Secondary Master only

Forces all units in the redundant system to switch from one mode to the other.

- **NORMAL:** Forces a switch from **BACKUP** mode (using the secondary set of units) to **NORMAL** mode (using the primary set).

  Caution: The switch to NORMAL mode will take place whether or not the fault situation has been corrected. Also observe the Traffic Limitations when Switching Modes on page 12.

- **BACKUP:** Forces a switch from **NORMAL** to **BACKUP** mode. This can be useful for testing the redundancy function on a system that is operating normally with no faults.

NOTE: This parameter is not available from the console if the *Role* parameter is set to **PRIMARY SLAVE**, **SECONDARY SLAVE** or **DISABLED**.

Values: NORMAL, BACKUP

Default: NORMAL

7.1.4 Detect name conflict

Console	SNMP	Text-based Config
Detect name conflict	redundancyCriteria-DetectNameConflict	[Redundancy] DetectNa-meConflict

For a Primary Master or Primary Slave only.

When this parameter is set to **YES**, the Primary Master or Primary Slave is able to resolve a unit name conflict automatically. If the primary unit discovers that the same *Unit name* is currently employed on more than one unit:

- The primary unit changes its own name to its *Backup name*. This avoids a name conflict if the primary unit goes down and then comes back up after the rest of the system has switched to **BACKUP** mode.
- The alarm **NAME CONFLICT/GO TO BACKUP MODE** is logged on the primary unit, and an SNMP trap is sent.

Set this parameter to **NO** to disable the detection and automatic resolution of a name conflict.

Caution: In some circumstances, a **NO** setting could compromise system operations during or after an automatic switch to **BACKUP** mode. **If this parameter is set to NO, make sure the *Force unit to restart in backup mode* parameter is set to YES** (described next).

Values: NO, YES

Default: YES

7.1.5 Force unit to restart in backup mode

Console	SNMP	Text-based Config
Force unit to restart in backup mode	redundancyCriteria-RestartInBackup	[Redundancy] RestartIn-Backup

For a Primary Master or Primary Slave only.

When this parameter is set to **YES**, the unit will assume its *Backup name* on the next restart. When it is set to **NO**, the unit will reestablish the same operating mode it used the last time it was up and running.

Caution: If you change the value of this parameter to YES, make sure the *Detect name conflict* parameter has been set to NO (as described above).

Values: NO, YES

Default: NO

7.1.6 Startup delay (s)

Console	SNMP	Text-based Config
Startup delay (s)	redundancyCriteria-StartupDelay	[Redundancy] StartupDelay

For a Primary Master or Secondary Master only.

This timer, in seconds, is used to ensure that all units in the system are stable after a system startup, before the following features can be activated:

- *On the SDM-9210 only:* **REDUN+BYPASS** interfaces that are configured in **AUTO STANDBY**
- *On the SDM-9620 only:*
  - Operations on the redundant RTM (E1/T1 terminations)
- All products*:*
  - Redundant MAC address on the LAN ports
  - Redundant IP addresses on the LAN ports.

  Timeout before starting the *Transition delay (s)* timer (see next parameter).

Values: 0 - 1000

Default: 60

7.1.7 Transition delay (s)

Console	SNMP	Text-based Config
Transition delay (s)	redundancyCriteria-TransitionDelay	[Redundancy] TransitionDelay

For a Primary Master or Secondary Master only.

This timer, in seconds, is used to ensure that all units in the system are stable before switching from **NORMAL** to **BACKUP** mode or from **BACKUP** to **NORMAL** mode. On system startup or after a change of operating mode (either manual or automatic), the unit will wait for this duration of time before proceeding with a switch to another mode.

> **NOTE:** **The *Startup delay* (see previous parameter) must expire before this timer can start.**

Values: 0 - 1000

Default: 60

7.1.8 Delay before declaring unit lost (s)

Console	SNMP	Text-based Config
Delay before declaring unit lost (s)	redundancyCriteriaDelay-ForUnitLost	[Redundancy] DelayFo-rUnitLost

For a Primary Master or Secondary Master only.

Sets the period of time that the Primary Master or Secondary Master will wait before raising a fault condition that a unit has gone down.

Values: 30 - 1000

Default: 60

7.1.9 Monitor redundant PVCR PVC links

Console	SNMP	Text-based Config
Monitor redundant PVCR PVC links	redundancyCriteria-Moni-torPvcrPvcLinks	[Redundancy] Monitor-PvcrPvcLinks

For a Primary Master or Secondary Master only.

Controls whether the status of redundant PVCR PVC links will be monitored. A *redundant PVCR PVC link* is a PVC that has its *Protocol* parameter set to **PVCR** and its *Redundant link* parameter set to **YES**.

You can select:

- **ANY:** The unit monitors redundant PVCR PVC link status. If one or more redundant PVCR PVC links go down, the unit starts the timer configured with the *Delay before declaring PVCR PVC link down (s)* parameter.
- **ALL:** The unit monitors redundant PVCR PVC link status. If *all* redundant PVCR PVC links go down, the unit starts the timer configured with the *Delay before declaring PVCR PVC link down (s)* parameter.
- **DISABLED:** The unit does not monitor redundant PVCR PVC link status.

NOTE: When the system is operating in **NORMAL** mode, the Primary Master does not monitor the status of redundant PVCR PVC links in the secondary set, as none of those PVCs are used. Likewise, when the system is operating in **BACKUP** mode, the Secondary Master does not monitor the status of redundant PVCR PVC links in the primary set.

Values: DISABLED, ANY, ALL

Default: ALL

7.1.10 Delay before declaring PVCR PVC link down (s)

Console	SNMP	Text-based Config
Delay before declaring PVCR PVC link down (s)	redundancyCriteriaDelay-ForPvcrPvcDown	[Redundancy] DelayFor-PvcrPvcDown

For a Primary Master or Secondary Master only.

Sets the period of time that the Primary Master or Secondary Master will wait before raising a fault condition that one or more redundant PVCR PVC links have gone down.

NOTE: If the *Monitor redundant PVCR PVC links* parameter is set to **DISABLED**, no fault is raised regardless of the status of the redundant PVCR PVC links.

Values: 0 - 1000

Default: 60

7.1.11 Monitor power supplies

Console	SNMP	Text-based Config
Monitor power supplies	redundancyCriteria-Moni-torPowerSupplies	[Redundancy] Monitor-PowerSupplies

For a Primary Master or Secondary Master only.

Controls whether the power supply status will be monitored. Set this parameter to **YES** to enable monitoring.

Caution: The global *Watch power supplies and fans* parameter must be set to a value that allows monitoring of the power supplies, either **PS** or **BOTH**. Refer to Configuring the Global Parameters on page 3.

Values: NO, YES

Default: YES

7.1.12 Monitor fans

Console	SNMP	Text-based Config
Monitor fans	redundancyCriteria-Moni-torFans	[Redundancy] Monitor-Fans

For a Primary Master or Secondary Master only.

Controls whether the chassis fans will be monitored. Set this parameter to **YES** to enable monitoring.

Caution: The global *Watch power supplies and fans* parameter must be set to a value that allows monitoring of the power supplies, either **FANS** or **BOTH**. Refer to Configuring the Global Parameters on page 3.

Values: NO, YES

Default: YES

7.1.13 Monitor analog interfaces

Console	SNMP	Text-based Config
Monitor analog interfaces	redundancyCriteria-MonitorAnalogInterfaces	[Redundancy] Monitor-AnalogInterfaces

For a Primary Master or Secondary Master only; SDM-9220 or SDM-9230 unit installed with an FXO, FXS or E&M interface card.

Controls whether the analog voice interfaces will be monitored for the following problems:

- **Interface type error:** The interface type of the analog interfaces must match the type that was read at boot-up. If it does not, the unit assumes that this interface has a detection problem.
- **Read CODEC error:** The CODEC version on the analog interfaces must match the value that is hard-coded in the main program. If it does not, the unit assumes there is a problem reading the CODEC.
- **Write/read FPGA error:** The test performs a *Write* to the FPGA in a special memory space for tests. A *Read* of this memory space must match the value just written. If it does not, the unit assumes there is a problem writing to and reading from the FPGA.
- **DSP not in ready state:** The onboard DSP must be running when the link is enabled and some channels are configured. If it is not, the unit assumes there is a problem with the DSP.
- **DSP allocation error:** An allocation failure due to lack of DSPs should not occur on an analog interface. If it does, the unit assumes that this interface has a DSP allocation problem.

By default, *Monitor analog interfaces* is set to **NO**. Set this parameter to **YES** to enable monitoring. When set to **YES**, the test frequency can be configured with the *Interface polling interval (min)* parameter.

Values: NO, YES

Default: NO

7.1.14 Interface polling interval (min)

Console	SNMP	Text-based Config
Interface polling interval (min)	redundancyCriteria-InterfacePollingInter-val	[Redundancy] Interface-PollingInter-val

For a Primary Master or Secondary Master only; SDM-9220 or SDM-9230 unit installed with an FXO, FXS or E&M interface card.

Sets the interval of time, in minutes, between each test of the analog interfaces on this unit.

Values: 1 - 1440

Default: 5

7.1.15 Test switches and secondary set before backup

Console	SNMP	Text-based Config
Test switches and secondary set before backup	redundancyCriteriaTest-BeforeBackup	[Redundancy] TestBe-foreBackup

For a Secondary Master only.

Controls whether the Secondary Master will test all Secondary Slaves and Redundancy Switches before it notifies the redundant system that a change to **BACKUP** mode is required.

- **YES:** The Secondary Master tests the secondary set and Redundancy Switches when a fault is raised. If it cannot communicate with its slaves or switches, the problem is with the secondary set, and the primary set remains in operation (**NORMAL** mode). If no problem is detected with the secondary set or Redundancy Switches, the Secondary Master executes a switch to **BACKUP** mode.
- **NO:** The Secondary Master does not test the secondary set or Redundancy Switches before executing a switch to **BACKUP** mode.

Values: NO, YES

Default: YES

7.2 REMOTE Parameters

7.2.1 Slot number of Primary Master

Console	SNMP	Text-based Config
Slot number of Primary Master	redundancyRemoteSlot-NumberPriMaster	[Redundancy] SlotNum-berPriMaster

For a redundant SDM-9620 configured as a Secondary Master only.

Specifies the slot number of the Primary Master unit, which is required for IPMC communication on the SDM-9600 chassis.

Caution: Configure the slot number properly. If you enter the incorrect slot number, IPMC will not be able to provide communication between the SDM-9620 blades and the redundant RTM.

Values: NONE, 1, 2, 3, 4, 5

Default: NONE

7.2.2 Slot number of Secondary Master

Console	SNMP	Text-based Config
Slot number of Second-ary Master	redundancyRemoteSlot-NumberSecMaster	[Redundancy] SlotNum-berSecMaster

For a redundant SDM-9620 configured as a Primary Master only.

Specifies the slot number of the Secondary Master unit, which is required for IPMC communication on the SDM-9600 chassis.

Caution: Configure the slot number properly. If you enter the incorrect slot number, IPMC will not be able to provide communication between the SDM-9620 blades and the redundant RTM.

Values: NONE, 1, 2, 3, 4, 5

Default: NONE

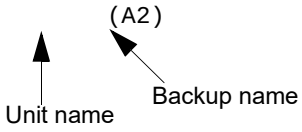
7.2.3 Backup name

Console	SNMP	Text-based Config
Backup name	redundancyRemote-BackupName	[Redundancy] Backup-Name

For all Role types.

Defines the name of the unit when the system operates in **BACKUP** mode. From the console, both the *Unit name* and the *Backup name* are presented in the main command line prompt when the unit is operating in **BACKUP** mode. The *Unit name* is shown first, in

parentheses:



Caution: Choose the *Backup name* carefully, following these two rules:

1.The *Backup name* of a unit in the secondary set **must be the *same* as** the *Unit name* of the unit in the primary set that it backs up.

2.The *Backup name* of a unit in the primary set **must be *different* from** the *Unit name* of the unit in the secondary set that takes over in **BACKUP** mode.

Important: If you do not assign the *Backup name* in accordance with these two rules, data and voice transmissions will not work in BACKUP mode.

Values: Maximum 16-character alphanumeric string

Default: no value

Example:

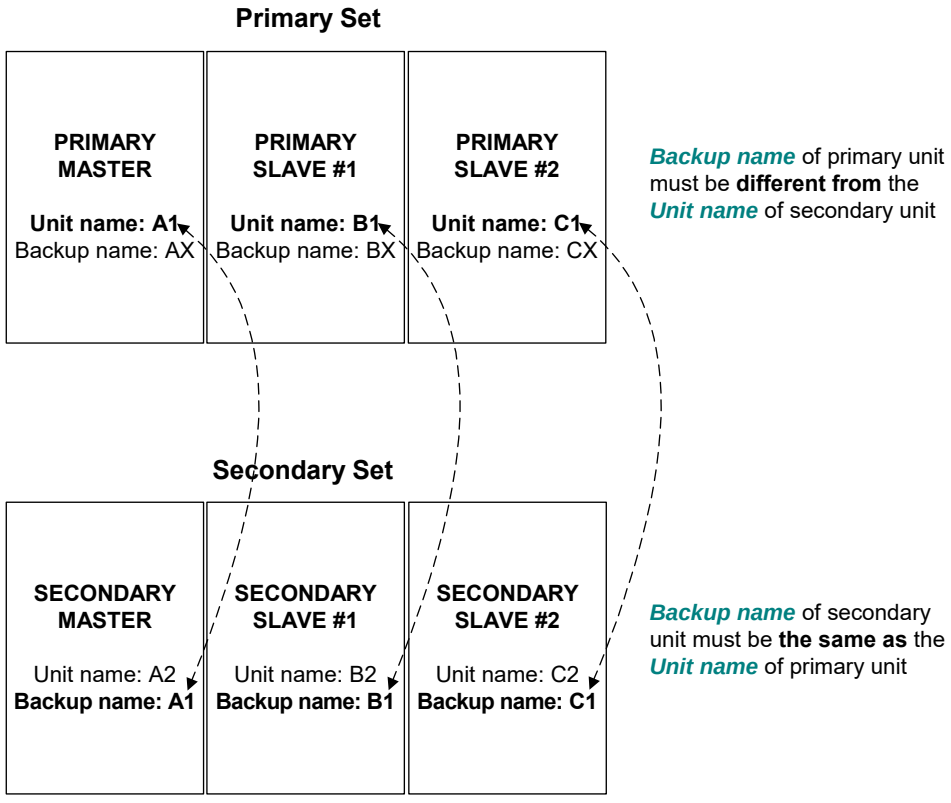


Figure 7-1: Assigning the Backup Names

7.2.4 Unit name of Primary Master

Console	SNMP	Text-based Config
Unit name of Primary Master	redundancyRemote-NamePriMaster	[Redundancy] NamePri-Master

For a Primary Slave, Secondary Master or Secondary Slave only.

Identifies the unit that will serve as the Primary Master when the system is operating in **NORMAL** mode.

Caution: This name must be the same as the value of the *Unit name* parameter currently defined on the Primary Master.

Values: Maximum 16-character alphanumeric string

Default: no value

Example:

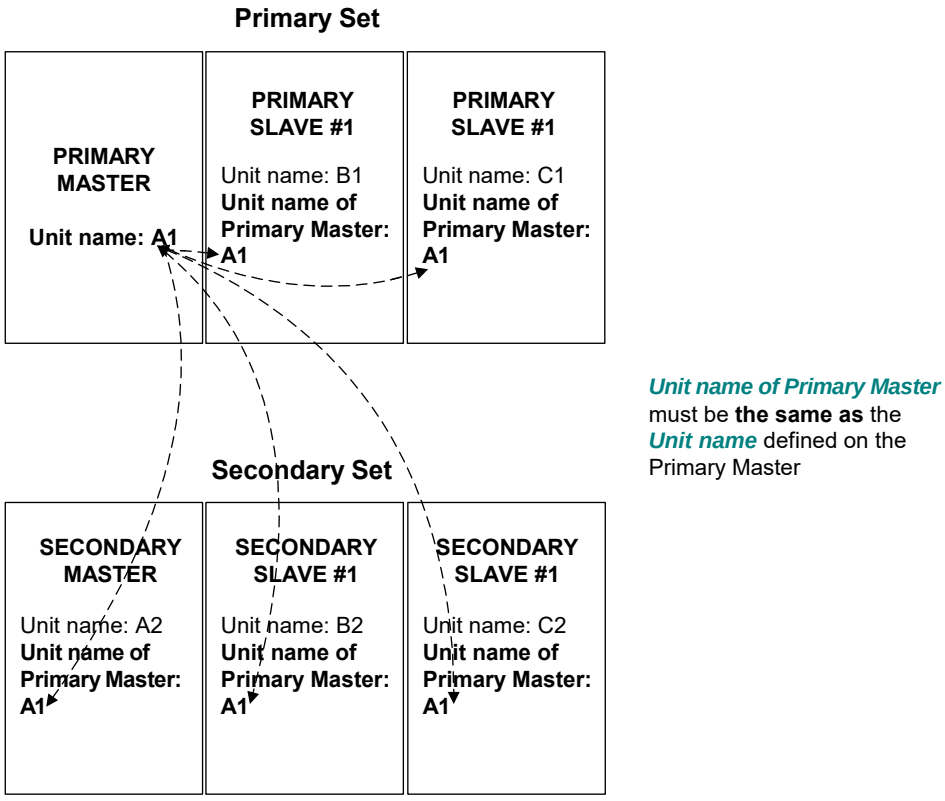


Figure 7-2: Assigning the Unit Name of Primary Master

7.2.5 Unit name of Secondary Master

Console	SNMP	Text-based Config
Unit name of Secondary Master	redundancyRemote-NameSecMaster	[Redundancy] NameSec-Master

For a Primary Master, Primary Slave or Secondary Slave only.

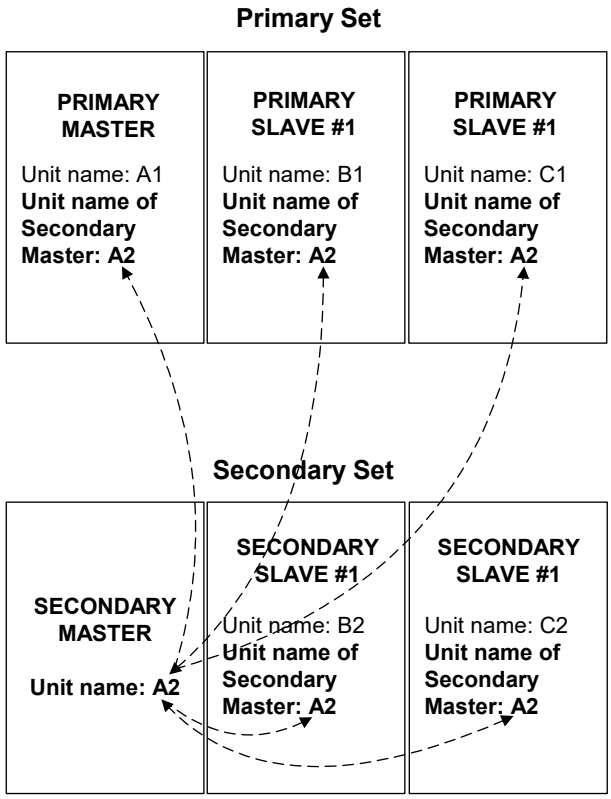
Identifies the unit that will serve as the Secondary Master when the system is operating in **NORMAL** mode.

Caution: This name must be the same as the value of the *Unit name* parameter currently defined on the Secondary Master.

Values: Maximum 16-character alphanumeric string

Default: no value

Example:



Unit name of Secondary Master must be **the same as** the ***Unit name*** defined on the Secondary Master

Figure 7-3: Assigning the Unit Name of Secondary Master

7.2.6 Unit name of Primary Slave #1 to #10

Console	SNMP	Text-based Config
Unit name of Primary Slave #1	redundancyRemote-NamePriSlave01	[Redundancy] NamePriSlave01
Unit name of Primary Slave #2	redundancyRemote-NamePriSlave02	NamePriSlave02
Unit name of Primary Slave #3	redundancyRemote-NamePriSlave03	NamePriSlave03
Unit name of Primary Slave #4	redundancyRemote-NamePriSlave04	NamePriSlave04
Unit name of Primary Slave #5	redundancyRemote-NamePriSlave05	NamePriSlave05
Unit name of Primary Slave #6	redundancyRemote-NamePriSlave06	NamePriSlave06
Unit name of Primary Slave #7	redundancyRemote-NamePriSlave07	NamePriSlave07
Unit name of Primary Slave #8	redundancyRemote-NamePriSlave08	NamePriSlave08
Unit name of Primary Slave #9	redundancyRemote-NamePriSlave09	NamePriSlave09
Unit name of Primary Slave #10	redundancyRemote-NamePriSlave10	NamePriSlave10

Table 7-1: Unit name of Primary Slave #1 to #10

For a Primary Master or Secondary Master only.

There may be 0, 1 or up to 10 Primary Slaves in a redundant system. Each of the Primary Slaves must be identified to both the Primary Master and Secondary Master to permit a switch from one operating mode to another.

For each of the Unit name of *Primary Slave #n* parameters, enter the value of the Unit name parameter that is currently defined on the Primary Slave.

Caution: The Redundancy Option will not work properly for any Primary Slave that has been assigned a *Unit name of Primary Slave* that is different from its own *Unit name*. The Primary Master or Secondary Master will not be able to retrieve any information concerning this Primary Slave, and will declare it down.

Values: Maximum 16-character alphanumeric string

Default: no value

Example:

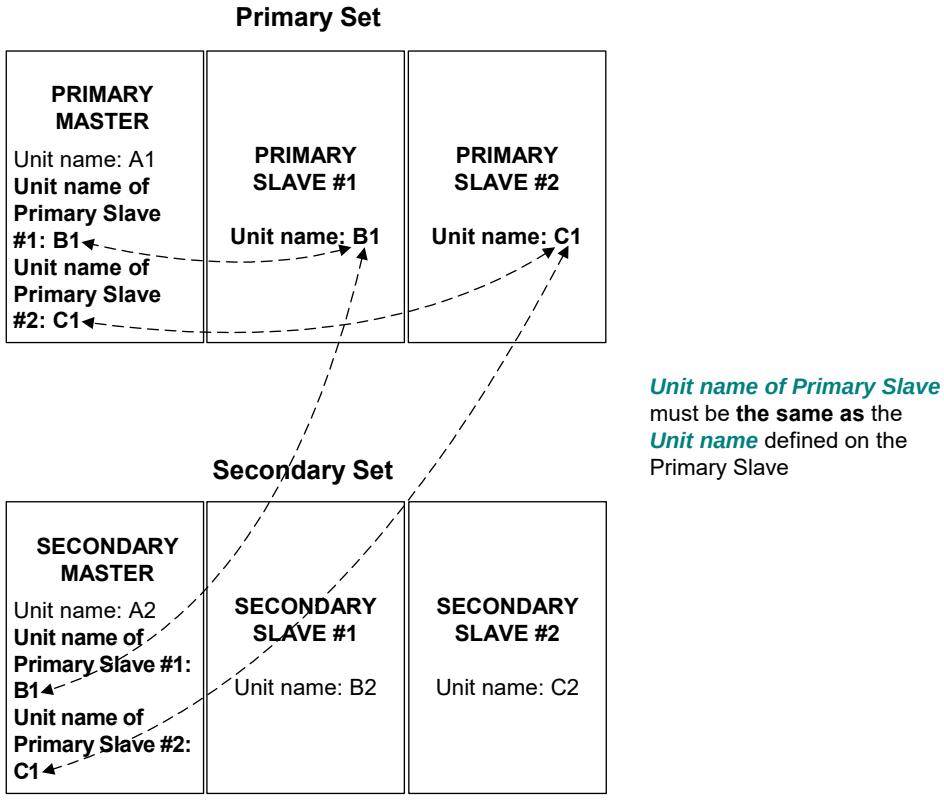


Figure 7-4: Assigning the Unit Name of Primary Slave

7.2.7 Unit name of Secondary Slave #1 to #10

Console	SNMP	Text-based Config
Unit name of Secondary Slave #1	redundancyRemoteNameSecSlave01	[Redundancy] NameSecSlave01
Unit name of Secondary Slave #2	redundancyRemoteNameSecSlave02	NameSecSlave02
Unit name of Secondary Slave #3	redundancyRemoteNameSecSlave03	NameSecSlave03
Unit name of Secondary Slave #4	redundancyRemoteNameSecSlave04	NameSecSlave04
Unit name of Secondary Slave #5	redundancyRemoteNameSecSlave05	NameSecSlave05

Table 7-2: Unit name of Secondary Slave #1 to #10

Console	SNMP	Text-based Config
Unit name of Secondary Slave #6	redundancyRemoteNameSecSlave06	NameSecSlave06
Unit name of Secondary Slave #7	redundancyRemoteNameSecSlave07	NameSecSlave07
Unit name of Secondary Slave #8	redundancyRemoteNameSecSlave08	NameSecSlave08
Unit name of Secondary Slave #9	redundancyRemoteNameSecSlave09	NameSecSlave09
Unit name of Secondary Slave #10	redundancyRemoteNameSecSlave10	NameSecSlave10

Table 7-2: Unit name of Secondary Slave #1 to #10

For a Primary Master or Secondary Master only.

There may be 0, 1 or up to 10 Secondary Slaves in a redundant system. Each of the Secondary Slaves must be identified to both the Primary Master and Secondary Master to permit a switch from one operating mode to another.

For each of the *Unit name of Secondary Slave #n* parameters, enter the value of the *Unit name* parameter that is currently defined on the Secondary Slave.

Caution: The Redundancy Option will not work properly for any Secondary Slave that has been assigned a *Unit name of Secondary Slave* that is different from its own *Unit name*. The Primary Master or Secondary Master will not be able to retrieve any information concerning this Secondary Slave, and will declare it down.

Values: Maximum 16-character alphanumeric string

Default: no value

Example:

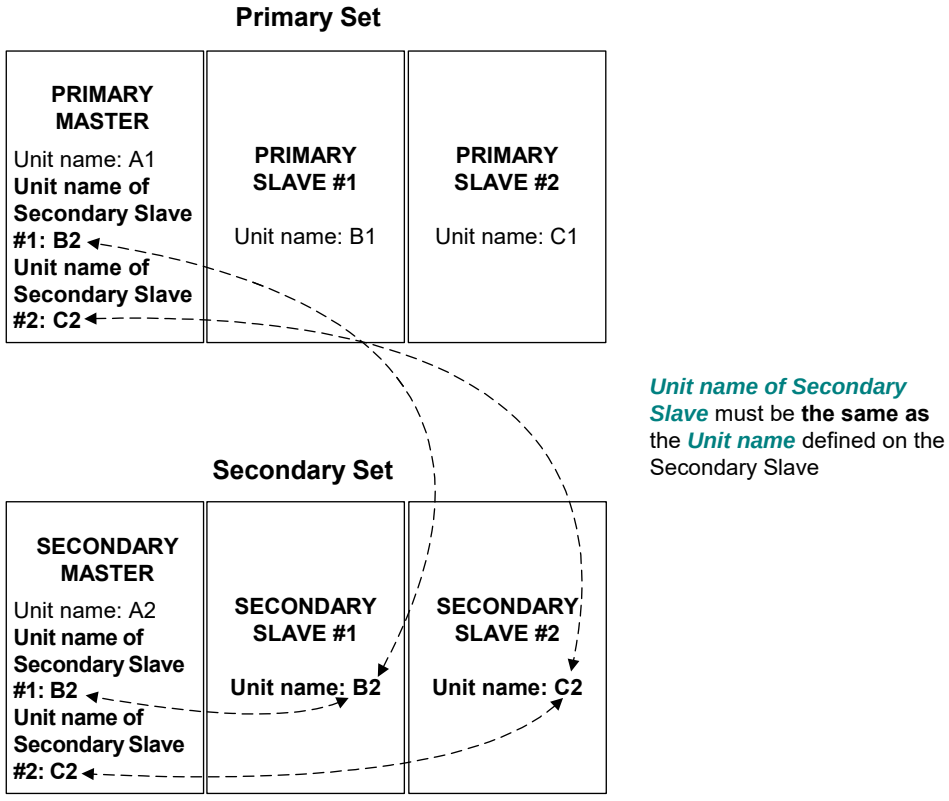


Figure 7-5: Assigning the Unit Name of Secondary Slave

7.2.8 Backup name of Primary Master

Console	SNMP	Text-based Config
Backup name of Primary Master	redundancyRemoteBkup-NamePriMaster	[Redundancy] Bkup-NamePriMaster

For a Primary Slave, Secondary Master or Secondary Slave only.

Identifies the unit that will serve as the Primary Master when the system is operating in **BACKUP** mode.

NOTE: You do not have to configure this parameter manually. The unit learns this name automatically through WAN connectivity when the system is operating in **NORMAL** mode.

Values: Maximum 16-character alphanumeric string

Default: no value

7.2.9 Backup name of Secondary Master

Console	SNMP	Text-based Config
Backup name of Secondary Master	redundancyRemoteBkupNameSecMaster	[Redundancy] BkupNameSecMaster

For a Primary Master, Primary Slave or Secondary Slave only.

Identifies the unit that will serve as the Secondary Master when the system is operating in **BACKUP** mode.

NOTE: You do not have to configure this parameter manually. The unit learns this name automatically through WAN connectivity when the system is operating in **NORMAL** mode.

Values: Maximum 16-character alphanumeric string

Default: no value

7.2.10 Backup name of Primary Slave #1 to #10

Console	SNMP	Text-based Config
Backup name of Primary Slave #1	redundancyRemoteBkupNamePriSlave01	[Redundancy] BkupNamePriSlave01
Backup name of Primary Slave #2	redundancyRemoteBkupNamePriSlave02	BkupNamePriSlave02
Backup name of Primary Slave #3	redundancyRemoteBkupNamePriSlave03	BkupNamePriSlave03
Backup name of Primary Slave #4	redundancyRemoteBkupNamePriSlave04	BkupNamePriSlave04
Backup name of Primary Slave #5	redundancyRemoteBkupNamePriSlave05	BkupNamePriSlave05
Backup name of Primary Slave #6	redundancyRemoteBkupNamePriSlave06	BkupNamePriSlave06
Backup name of Primary Slave #7	redundancyRemoteBkupNamePriSlave07	BkupNamePriSlave07
Backup name of Primary Slave #8	redundancyRemoteBkupNamePriSlave08	BkupNamePriSlave08

Table 7-3: Backup name of Primary Slave #1 to #10

Console	SNMP	Text-based Config
Backup name of Primary Slave #9	redundancyRemote-BkupNamePriSlave09	BkupNamePriSlave09
Backup name of Primary Slave #10	redundancyRemote-BkupNamePriSlave10	BkupNamePriSlave10

Table 7-3: Backup name of Primary Slave #1 to #10

For a Primary Master or Secondary Master only.

Identifies each of the units that will serve as a Primary Slave when the system is operating in **BACKUP** mode.

NOTE: You do not have to configure these parameter manually. The unit learns these names automatically through WAN connectivity when the system is operating in **NORMAL** mode.

Values: Maximum 16-character alphanumeric string

Default: no value

7.2.11 Backup name of Secondary Slave #1 to #10

Console	SNMP	Text-based Config
Backup name of Secondary Slave #1	redundancyRemote-BkupNameSecSlave01	BkupNameSecSlave01
Backup name of Secondary Slave #2	redundancyRemote-BkupNameSecSlave02	BkupNameSecSlave02
Backup name of Secondary Slave #3	redundancyRemote-BkupNameSecSlave03	BkupNameSecSlave03
Backup name of Secondary Slave #4	redundancyRemote-BkupNameSecSlave04	BkupNameSecSlave04
Backup name of Secondary Slave #5	redundancyRemote-BkupNameSecSlave05	BkupNameSecSlave05
Backup name of Secondary Slave #6	redundancyRemote-BkupNameSecSlave06	BkupNameSecSlave06
Backup name of Secondary Slave #7	redundancyRemote-BkupNameSecSlave07	BkupNameSecSlave07

Table 7-4: Backup name of Secondary Slave #1 to #10

Console	SNMP	Text-based Config
Backup name of Secondary Slave #8	redundancyRemote-BkupNameSecSlave08	BkupNameSecSlave08
Backup name of Secondary Slave #9	redundancyRemote-BkupNameSecSlave09	BkupNameSecSlave09
Backup name of Secondary Slave #10	redundancyRemote-BkupNameSecSlave10	BkupNameSecSlave10

Table 7-4: Backup name of Secondary Slave #1 to #10

For a Primary Master or Secondary Master only.

Identifies each of the units that will serve as a Secondary Slave when the system is operating in **BACKUP** mode.

NOTE: You do not have to configure these parameter manually. The unit learns these names automatically through WAN connectivity when the system is operating in **NORMAL** mode.

Values: Maximum 16-character alphanumeric string

Default: no value

7.3 SWITCH Parameters

7.3.1 REDUNDANCY SWITCH number

Console	SNMP	Text-based Config
REDUNDANCY SWITCH number	redundancySwitchIndex	[RedundancySwitch#]

The number of the Redundancy Switch that you want to manage. Up to 10 Redundancy Switches are supported. Select an integer value.

Values: 1 - 10

Default: 1

7.3.2 Switch active

Console	SNMP	Text-based Config
Switch active	redundancySwitchActive	[RedundancySwitch#] Active

Controls whether the redundant system communicates with a Redundancy Switch via SNMP. Set this parameter to **YES** to activate management of the Redundancy Switch by this NetPerformer.

Values: NO, YES

Default: YES

7.3.3 IP address

Console	SNMP	Text-based Config
IP address	redundancySwitchIp-Address	[RedundancySwitch#] IpAddress

Provides the IP address of the Redundancy Switch. It is a 4-byte value in dotted decimal representation, with a maximum value of 255 for each byte, for example **5.0.1.42**. When this parameter is set to **0.0.0.0**, no IP address is defined for the Redundancy Switch.

Values: 0.0.0.0 - 255.255.255.255

Default: 0.0.0.0

7.3.4 SNMP version

Console	Text-based Config
Redundancy Switch x / SNMP version	[RedundancySwitch #] SnmpVersion =value

Support of SNMP v2 to control the latest redundant switch controller card from Dataprobe.

Description: Determine which version of SNMP to use to control the redundant switch.

Choice list of values: V1, V2

Default value: V1

7.3.5 Get community

Console	SNMP	Text-based Config
Get community	redundancySwitchGet-Community	[RedundancySwitch#] GetCommunity

Determines the community that the SNMP agent uses when the NetPerformer performs a GET command to read a value in the Redundancy Switch.

Values: Maximum 16-character string: digits, upper/lowercase letters and special characters such as **!**, **”**, **/**, **$**, **%**

Default: public

7.3.6 Set community

Console	SNMP	Text-based Config
Set community	redundancySwitchSet-Community	[RedundancySwitch#] Set-Community

Determines the community that the SNMP agent uses when the NetPerformer performs a SET command to write a value in the Redundancy Switch.

Values: Maximum 16-character string: digits, upper/lowercase letters and special characters such as **!**, **”**, **/**, **$**, **%**

Default: public

7.3.7 Variable type

Console	SNMP	Text-based Config
Variable type	redundancySwitch-Vari-ableType	[RedundancySwitch#] VariableType

Determines how the SNMP variable or object identifier (OID) should be entered for this Redundancy Switch: as a path (**PATH**) or an OID number (**NUMBER**).

When the NetPerformer determines that the Redundancy Switch must change its state, it informs the Redundancy Switch by sending it a *set* command that contains:

- The variable path or number of the Redundancy Switch (*Variable path* parameter described on page 23 or *Variable number (1.3.6.1…)* parameter described on page 25)
- Indexes of the card(s) in the Redundancy Switch that are affected by the change from Primary set to Secondary set, or vice versa (the *Indexes* parameter, described on page 26)
- An index of the desired change of status on the specified cards of this Redundancy Switch (*Value for Primary active* described on page 27, or *Value for Secondary active*, described on page 27).

Values: PATH, NUMBER

Default: PATH

7.3.8 Variable path

Console	SNMP	Text-based Config
Variable path	redundancySwitch-VariablePath	[RedundancySwitch#] VariablePath

For PATH Variable type only.
Identifies the SNMP variable by its path. To view a list of possible path names, enter a question mark (**?**) at the parameter prompt. **You must enter the specific path name exactly as it is listed.**

NOTE: The values listed below include the numeric equivalents (OID numbers) which you can use to transpose the *Variable path* into a *Variable number*, if required (see next parameter). **Do not enter these numbers with the value of *Variable path*.**

Values: none
presticom.ifwanIndex (4.1.727.7.2.2.2.1.1)
presticom.ifwanProtocol (4.1.727.7.2.2.2.1.3)
presticom.pvcIndex (4.1.727.7.2.10.2.1.1)
presticom.pvcMode (4.1.727.7.2.10.2.1.2)
presticom.atmpvcIndex (4.1.727.7.2.42.2.1.1)
presticom.atmpvcMode (4.1.727.7.2.42.2.1.2)
presticom.atmsvcIndex (4.1.727.7.2.43.2.1.1)
presticom.atmsvcMode (4.1.727.7.2.43.2.1.2)
cornet.ips.masterAB (4.1.1079.100.1.1.1.3)
cornet.ips.port_Port (4.1.1079.100.2.1.1.3)
cornet.ips.ipsDevice (4.1.1079.100.3.1)
cornet.ips.ipsDeviceNum (4.1.1079.100.3.2)
cornet.ips.ipsSlot (4.1.1079.100.3.3)
cornet.ips.ipsPort (4.1.1079.100.3.4)
cornet.ips.ipsIP (4.1.1079.100.3.5)
cornet.ips.ipsDescription (4.1.1079.100.3.6)
dataprobe.k16.k16CardPosition (4.1.1418.1.1.2.1.3)
dataprobe.k16.k16GangControl (4.1.1418.1.1.3)
omnitronix.sl81.siteID (4.1.3052.5.3.1)
omnitronix.sl81.esIndex (4.1.3052.5.2.1.2.1.1)
omnitronix.sl81.esName (4.1.3052.5.2.1.2.1.2)
omnitronix.sl81.trapEventTypeNumber (4.1.3052.5.3.4)
omnitronix.sl81.trapEventTypeName (4.1.3052.5.3.5)
omnitronix.sl81.esIndexPoint (4.1.3052.5.1.1.1.1.3)
omnitronix.sl81.esPointName (4.1.3052.5.1.1.1.1.4)
omnitronix.sl81.esID (4.1.3052.5.2.1.2.1.3)
omnitronix.sl81.currentTime (4.1.3052.5.2.8.1)
omnitronix.sl81.trapIncludedValue (4.1.3052.5.3.6)
omnitronix.sl81.trapIncludedString (4.1.3052.5.3.7)

omnitronix.sl81.trapEventClassNumber (4.1.3052.5.3.9)

omnitronix.sl81.trapEventClassName (4.1.3052.5.3.10)

omnitronix.sl10.siteID (4.1.3052.40.1.3)

omnitronix.sl10.thisTrapText (4.1.3052.40.1.7)

omnitronix.sl10.esIndexES (4.1.3052.40.10.1.1.1)

omnitronix.sl10.esIndexPoint (4.1.3052.40.10.1.1.3)

omnitronix.sl10.esPointName (4.1.3052.40.10.1.1.4)

omnitronix.sl10.esPointValueInt (4.1.3052.40.10.1.1.6)

Default: none

7.3.9 Variable number (1.3.6.1...)

Console	SNMP	Text-based Config
Variable number (1.3.6.1...)	redundancySwitch-VariableNumber	[RedundancySwitch#] VariableNumber

For NUMBER Variable type only.
Identifies the SNMP variable by its OID number. Delete the first 4 digits (**1.3.6.1**) from the OID used in your application for this Redundancy Switch. For example, if the OID is **1.3.6.1.5.2.1023.106.1.1.1.2**, enter **5.2.1023.106.1.1.1.2** as the value of the *Variable number (1.3.6.1…)* parameter.

NOTE: All OIDs are defined in the MIB for the Redundancy Switch. Your SNMP agent may provide a means of viewing the properties of a particular variable, in which case you can easily find its OID number. Otherwise, you will have to analyze the MIB to determine the hierarchy of the Redundancy Switch and the corresponding OID numbering sequence. **For your convenience, the OID numbers for commonly used SNMP variables are listed with the values of the *Variable path* parameter, above.**

Caution: The NetPerformer supports Redundancy Switches with OIDs that begin with **1.3.6.1** only. **This prefix *must not* be entered in the *Variable number (1.3.6.1…)* parameter.** Only the remaining part of the OID must be entered.

Values: Maximum 60-character string: digits (0-9) and dot (.) only

Default: No value

7.3.10 Indexes

Console	SNMP	Text-based Config
Indexes	redundancySwitch-Indexes	[RedundancySwitch#] Indexes

Defines the indexes of all cards in the Redundancy Switch that are affected by a change from Primary set to Secondary set, or vice versa. Leave this parameter undefined (no value) if no cards in the Redundancy Switch need to be specified.

The value of the *Indexes* parameter has the format of a sequence or range of OIDs, where each OID is a string of one or more integers separated by dots (.).

SNMP supports indexes that are composed of several numbers, depending on whether a second dimension, third dimension or fourth dimension of differentiation is required. An index with 4 dimensions has 4 integers, where the first dimension is the first integer, the second dimension the second integer, and so on.

- In most cases, a single integer (first dimension) will suffice to uniquely define a card in the Redundancy Switch
- To define more than one card, enter single numbers separated by a comma, or a range of numbers separated by a hyphen.

Examples:

- Values that define a single card in the Redundancy Switch: **3**, **1.1.1.1** or **10.20.30.40**
- Values that define several cards in non-contiguous slots: **1,5,10** or **1.1,1.2,2.1**
- Values that define a range of cards in contiguous slots: **1-10** or **1.1-3.3**

  The value **1.1.1-2.2.2** represents a range of indexes to Redundancy Switch cards, including: **1.1.1**, **1.1.2**, **1.2.1**, **1.2.2**, **2.1.1**, **2.1.2**, **2.2.1** and **2.2.2**.
- Values that define a combination of continuous and non-contiguous cards: **1,5,9-12** or **1.1,1.3,2.1-2.3**

Values: Maximum 60-character string: digits (0-9), dot (.), comma (,) hyphen (-)

Default: No value

7.3.11 Value type

Console	SNMP	Text-based Config
Value type	redundancySwitchValue-Type	[RedundancySwitch#] Val-ueType

Defines the format of the value that the Redundancy Switch requires to execute a change of mode (from Primary set to Secondary set or vice versa) using *get* and *set* commands.

The NetPerformer supports **INTEGER** and **STRING** values only. Consult the MIB for the Redundancy Switch to determine which value should be selected for the *Value type*.

Values: STRING, INTEGER

Default: INTEGER

7.3.12 Value for Primary active

Console	SNMP	Text-based Config
Value for Primary active	redundancySwitchPri-ActiveValue	[RedundancySwitch#] Pri-maryActiveValue

Defines the value that the NetPerformer will send to the Redundancy Switch to activate the Primary set of units. This occurs when the user enters the **Go to normal mode** command, or when the unit detects that the current state of the Redundancy Switch is wrong.

To determine the appropriate value for your Redundancy Switch, consult the manufacturer's MIB file.

NOTE: You must enter digits if the *Value type* parameter is set to **INTEGER**. Otherwise, you can enter a string of characters.

Example: 1 for position A on the Redundancy Switch.

Values: Maximum 16-character string:
INTEGER: digits only
STRING: upper/lowercase letters, numbers and special characters such as **!**, **"**, **/**, **$**, **%**

Default: 1

7.3.13 Value for Secondary active

Console	SNMP	Text-based Config
Value for Secondary active	redundancySwitchSec-ActiveValue	[RedundancySwitch#] SecondaryActiveValue

Defines the value that the NetPerformer will send to the Redundancy Switch to activate the Secondary set of units. This occurs when a failure has occurred on the Primary set, when the user enters the **Go to backup mode** command, or when the unit detects that the current state of the Redundancy Switch is wrong.

To determine the appropriate value for your Redundancy Switch, consult the manufacturer's MIB file.

NOTE: You must enter digits if the *Value type* parameter is set to **INTEGER**. Other-

wise, you can enter a string of characters.

Example: 2 for position B on the Redundancy Switch.

Values: Maximum 16-character string:
INTEGER: digits only
STRING: upper/lowercase letters, numbers and special characters such as **!**, **”**, */*, **$**, **%**

Default: 2

7.3.14 Polling active

Console	SNMP	Text-based Config
Polling active	redundancySwitchPolling-Active	[RedundancySwitch#] PollingActive

Determines whether the NetPerformer will monitor the Redundancy Switch for changes of state. Set this parameter to **YES** to activate monitoring.

The NetPerformer reads the current state of the Redundancy Switch by sending a GET command, and comparing the result with the expected state.

- If the current operating mode is **NORMAL**, the NetPerformer expects the value of the *Value for Primary active* parameter in the result of the GET command.
- If the current operating mode is **BACKUP**, the NetPerformer expects the value of the *Value for Secondary active* parameter.
- If the value received differs from the expected value, the NetPerformer sends a SET request to the Redundancy Switch to change its state to the correct state.

Values: NO, YES

Default: YES

NOTE: if the *Polling active* parameter is set to **YES**, the following two parameters also appear at the NetPerformer console.

7.3.15 Polling delay (s)

Console	SNMP	Text-based Config
Polling delay (s)	redundancySwitchPolling-Delay	[RedundancySwitch#] PollingDelay

Determines the time, in seconds, that will elapse between each poll of the Redundancy Switch for its current state.

Values: 60 - 1000

Default: 120

7.3.16 Maximum OID per GET frame

Console	SNMP	Text-based Config
Maximum OID per GET frame	redundancySwitchMax-OidPerGet	[RedundancySwitch#] MaxOidPerGet

This parameter limits the number of variables (or OIDs) that can be received with a single SNMP *get* command. The value of this parameter must be equal to or less than the corresponding limit on the Redundancy Switch.

Values: 1 - 20

Default: 20

7.3.17 Maximum OID per SET frame

Console	SNMP	Text-based Config
Maximum OID per SET frame	redundancySwitchMax-OidPerSet	[RedundancySwitch#] MaxOidPerSet

This parameter limits the number of variables (or OIDs) that can be sent with a single SNMP *set* command. The value of this parameter must be equal to or less than the corresponding limit on the Redundancy Switch.

Values: 1 - 20

Default: 20

7.3.18 Mode of sending

Console	SNMP	Text-based Config
Mode of sending	redundancySwitch-Send-ingMode	[RedundancySwitch#] SendingMode

Determines how frames are sent when the NetPerformer must build several frames at the same time.

- **SEQUENTIALLY:** The unit waits for a response from the unit on the remote side before sending another frame.
- **SIMULTANEOUSLY:** The unit sends each frame as soon as it is built, without waiting for a response to the previous frame from the unit on the remote side.

Caution: This value will operate properly only if the remote side supports frame queuing.

Values: SEQUENTIALLY, SIMULTANEOUSLY

Default: SEQUENTIALLY

7.3.19 Timeout (ms)

Console	SNMP	Text-based Config
Timeout (ms)	redundancySwitchTime-out	[RedundancySwitch#] Timeout

Determines the delay, in milliseconds, before the NetPerformer will conclude that the Redundancy Switch is unable to respond to an SNMP request. If this timeout expires without acknowledgement from the Redundancy Switch, the NetPerformer will retry up to 3 times.

Values: 100 - 10000

Default: 1000

7.3.20 Log errors in the journal

Console	SNMP	Text-based Config
Log errors in the journal	redundancySwitchLog-Errors	[RedundancySwitch#] SnmpSwitchLogErrors

Determines whether information and errors concerning the Redundancy Switch will be logged in the journal file.

- By default, these errors are logged (**YES**). This can be useful for debugging purposes. To retrieve the information and errors, execute the Display Journal (**DJOURNAL**) command at the NetPerformer command line prompt.
- Set this parameter to **NO** if you do not want to log the errors in the journal. If you do not need to debug the SNMP commands, this will avoid filling the journal with unnecessary content.

Values: NO, YES

Default: YES

7.3.21 SNMP trap filters to trigger BACKUP

Console	SNMP	Text-based Config
SNMP trap filters to trigger BACKUP	redundancySwitchSnmp-TrapFilters	[RedundancySwitch#] SnmpTrapFilters

Defines the numbers of all SNMP trap filters that will be used to determine whether a targeted event (an SNMP trap fault) has occurred on this Redundancy Switch.

- A fault is declared on reception of any SNMP trap identified in any of the trap filters listed. This forces the redundant system into **BACKUP** mode, and provides a way to trigger backup from an external SNMP device.
- Up to 20 trap filters can be defined, each permitting validation of the Community, Enterprise, Agent Address, generic trap type, specific trap type, and up to 15 objects with their specific values. Details are provided in Configuring the SNMP Trap Filters on page 20.

The value of the *SNMP trap filters to trigger BACKUP* parameter has the format of one or more integers, where a range of integers is separated by hyphens and a sequence of integers is separated by commas. For example, the value **1-3, 8, 10** defines SNMP trap filters 1, 2, 3, 8 and 10.

Leave this parameter undefined (no value) if no SNMP trap filters need to be specified for this Redundancy Switch.

Values: Maximum 60-character string: digits (0-9), hyphen (**-**), comma (**,**)

Default: No value

DISPLAY Command Statistics

8.1 DS/REDUNDANCY/LOCAL

8.1.1 Role

Console	SNMP
Role	statRedundancyLocalRole

Displays the role of the local unit that is currently accessed at the console: Primary Master, Primary Slave, Secondary Master or Secondary Slave.

8.1.2 Operating mode

Console	SNMP
Operating mode	statRedundancyLocalOperatingMode

Displays the current operating mode of the local unit, either **NORMAL** or **BACKUP**.

8.1.3 Unit name

Console	SNMP
Unit name	statRedundancyLocalUnitName

Displays the name of the local unit when the system operates in **NORMAL** mode. This is the *Unit name* of the local unit, configured with the **SETUP/GLOBAL** menu.

8.1.4 Backup name

Console	SNMP
Backup name	statRedundancyLocalBackupName

Displays the name of the local unit when the system operates in **BACKUP** mode.

8.1.5 Reason for the last fault

Console	SNMP
Reason for the last fault	statRedundancyLocalFaultReason

Explains why the local unit last changed its operating mode, and when this occurred.

NOTE: Since the Secondary Master is directly responsible for switching operating modes, it is the best unit to examine for details concerning the latest change. You should also examine the Alarm Log (see Displaying the Alarms on page 13).

8.1.6 Number of redundant PVCR PVC links up

Console	SNMP
Number of redundant PVCR PVC links up	statRedundancyLocalNbPvcrPvcLinksUp

Displays the number of redundant PVCR PVC links that are currently up on the local unit.

NOTE: A *redundant PVCR PVC link* is a PVC that has its *Protocol* parameter set to **PVCR** and its *Redundant link* parameter set to **YES**.

8.1.7 Number of redundant PVCR PVC links down

Console	SNMP
Number of redundant PVCR PVC links down	statRedundancyLocalNbPvcrPvcLinksDown

Displays the number of redundant PVCR PVC links that are currently down on the local unit.

8.1.8 Number of power supplies up

Console	SNMP
Number of power supplies up	statRedundancyLocalNbPowerSuppliesUp

Displays the number of power supplies on the local unit that are up and operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of power supplies that are operating normally on the local SDM-9500 chassis.

8.1.9 Number of power supplies down

Console	SNMP
Number of power supplies down	statRedundancyLocalNbPowerSuppliesDown

Displays the number of power supplies on the local unit that are down or not operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of power supplies that

are not operating normally on the local SDM-9500 chassis.

8.1.10 Number of fans up

Console	SNMP
Number of fans up	statRedundancyLocalNbFansUp

Displays the number of fans on the local unit that are up and operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of fans that are operating normally on the local SDM-9500 chassis.

8.1.11 Number of fans down

Console	SNMP
Number of fans down	statRedundancyLocalNbFansDown

Displays the number of fans on the local unit that are down or not operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of fans that are not operating normally on the local SDM-9500 chassis.

8.2 DS/REDUNDANCY/REMOTES

8.2.1 Number of remotes

Console	SNMP
Number of remotes	statRedundancyRemoteNumber

Shows the total number of remote units included in this status display. The status of each of these units is detailed separately in the console listing.

8.2.2 Role

Console	SNMP
Role	statRedundancyRemoteRole

Displays the role of the remote unit in the redundant system: Primary Master, Primary Slave, Secondary Master or Secondary Slave.

8.2.3 Index

Console	SNMP
Index	statRedundancyRemoteIndex

Provides an index number which uniquely identifies this remote unit in the redundant system. The index values are:

- **1:** Primary Master
- **2:** Secondary Master
- **101 to 110:** Primary Slaves #1 to #10
- **201 to 210:** Secondary Slaves #1 to #10.

8.2.4 Unit name

Console	SNMP
Unit name	statRedundancyRemoteUnitName

Displays the name of the remote unit when the system operates in **NORMAL** mode. This is the *Unit name* of the remote unit, configured with the **SETUP/GLOBAL** menu.

8.2.5 Backup name

Console	SNMP
Backup name	statRedundancyRemoteBackupName

Displays the name of the remote unit when the system operates in **BACKUP** mode.

8.2.6 Number of units up

Console	SNMP
Number of units up	statRedundancyRemoteNbUnitsUp

Displays the number of remote units in the redundant system that are up and running. When interpreting this number, keep in mind that:

- In the display of a remote slave unit (Primary Slave or Secondary Slave) the maximum *Number of units up* is **1**:
  - A value of **1** means that the remote slave unit is up and running
  - A zero value here (**0**) means it is down.
- In the display of a remote master unit (Primary Master or Secondary Master), the *Number of units up* may be higher than **1** if the unit has slaves:
  - A value of **1** means that the remote master unit is up and running, with no slaves in operation.

    This may indicate a problem, which can be confirmed with the *Number of units down* statistic, described next.
  - A zero value here (**0**) means that the remote master unit is down.
  - A value higher than **1** means that the remote master unit is up and running, with slaves in operation. The number of slaves that are up and running is the value of *Number of units up* minus **1**.

8.2.7 Number of units down

Console	SNMP
Number of units down	statRedundancyRemoteNbUnitsDown

Displays the number of remote units in the redundant system that are down. When interpreting this number, keep in mind that:

- A zero value (**0**) means there are no remote units down
- A non-zero value indicates one of the following:
  - **If the remote unit is a master and the *Number of units up* is 0:** The remote unit is down.
  - **If the remote unit is a master and the *Number of units up* is 1 or more:** The remote unit is up, but has at least one slave that is down. In this case, the *Number of units down* is equal to the number of slaves that are down.
  - **If the remote unit is a slave:** The remote unit is down.

8.2.8 Number of redundant PVCR PVC links up

Console	SNMP
Number of redundant PVCR PVC links up	statRedundancyRemoteNbPvcrPvcLinksUp

Displays the number of redundant PVCR PVC links that are currently up on the remote unit in the redundant system.

NOTE: A *redundant PVCR PVC link* is a PVC that has its *Protocol* parameter set to **PVCR** and its *Redundant link* parameter set to **YES**.

8.2.9 Number of redundant PVCR PVC links down

Console	SNMP
Number of redundant PVCR PVC links down	statRedundancyRemoteNbPvcrPvcLinksDown

Displays the number of redundant PVCR PVC links that are currently down on the remote unit in the redundant system.

8.2.10 Number of power supplies up

Console	SNMP
Number of power supplies up	statRedundancyRemoteNbPowerSuppliesUp

Displays the number of power supplies on the remote unit that are up and operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of power supplies that are operating normally on the remote SDM-9500 chassis.

8.2.11 Number of power supplies down

Console	SNMP
Number of power supplies down	statRedundancyRemoteNbPowerSupplies-Down

Displays the number of power supplies on the remote unit that are down or not operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of power supplies that are not operating normally on the remote SDM-9500 chassis.

8.2.12 Number of fans up

Console	SNMP
Number of fans up	statRedundancyRemoteNbFansUp

Displays the number of fans on the remote unit that are up and operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of fans that are operating normally on the remote SDM-9500 chassis.

8.2.13 Number of fans down

Console	SNMP
Number of fans down	statRedundancyRemoteNbFansDown

Displays the number of fans on the remote unit that are down or not operating normally.

NOTE: For a SDM-9585 card this statistic refers to the number of fans that are not operating normally on the remote SDM-9500 chassis.

8.2.14 Slot number

Console	SNMP
Slot number	statRedundancyRemoteSlotNumber

For a redundant SDM-9620 only
Displays the slot number in the SDM-9600 chassis where the remote unit is installed. When the unit *Role* (*statRedundancyLocalRole*) is Primary Master, this is the Secondary Master's slot. When the Role is Secondary Master, this is the Primary Master's slot.

8.3 DE/REDUNDANCY

8.3.1 Number of frames discarded

Console	SNMP
Number of frames discarded	(not available)

Displays the number of frames received with errors. These are frames that should have been sent to the remote unit, but that were discarded locally after three unsuccessful attempts. A master unit will try up to three times to send a request to the remote side. If no response has been received after three retries, the *Number of frames discarded* counter is increased by 1 for each frame discarded.

This problem can occur when:

- A remote *Unit name* or *Backup name* has been incorrectly configured, ***or***
- The PVCR link to reach the remote side is either down or overloaded.

8.3.2 Number of frames with invalid size

Console	SNMP
Number of frames with invalid size	(not available)

Displays the number of frames received with an invalid size. A non-zero value indicates transmission problems producing errors on reception, or problems associated with a firmware upgrade.

8.3.3 Number of frames with invalid version field

Console	SNMP
Number of frames with invalid version field	(not available)

Displays the number of frames received with an invalid version number in the *Version* field. A non-zero value indicates transmission problems producing errors on reception, or problems associated with a firmware upgrade.

8.3.4 Number of frames with invalid command field

Console	SNMP
Number of frames with invalid command field	(not available)

Displays the number of frames received with an invalid command number in the *Command* field. A non-zero value indicates transmission problems producing errors on reception, or problems associated with a firmware upgrade.

8.3.5 Number of frames from an invalid master

Console	SNMP
Number of frames from an invalid master	(not available)

Displays the number of frames that were received from an invalid master unit. When a unit receives a redundancy command, it validates that it comes from a master unit by comparing the name of the sender with the current name of the Primary Master or Secondary Master (the *Unit name* if in **NORMAL** mode, or *Backup name* if in **BACKUP** mode). If the names do not match, the frames are discarded and the *Number of frames from an invalid master* statistic is increased by the number of frames received.

8.3.6 Number of frames from an invalid remote

Console	SNMP
Number of frames from an invalid remote	(not available)

Displays the number of frames that were received from an invalid remote unit. When a master unit receives a redundancy response, it validates that it comes from one of the configured remote units by comparing the name of the sender with the current names of the remote units (the *Unit names* if in **NORMAL** mode, or *Backup names* if in **BACKUP** mode). If the master unit does not find the remote unit in its list of names, the frames are discarded and the *Number of frames from an invalid remote* statistic is increased by the number of frames received.

8.3.7 Number of SNMP objects discarded

Console	SNMP
Number of SNMP objects discarded	(not available)

For a card installed in the SDM-9500 only
Displays the number of times that an SNMP object has been discarded due to an internal validation failure. This is usually due to an incorrect IP address or an error in the SNMP code.

8.3.8 Number of SNMP commands not sent

Console	SNMP
Number of SNMP commands not sent	(not available)

For a card installed in the SDM-9500 only
Displays the number of SNMP commands that the NetPerformer could not send to the Redundancy Switch due to internal reasons.

8.3.9 Number of SNMP busy indications

Console	SNMP
Number of SNMP busy indications	(not available)

For a card installed in the SDM-9500 only
Displays the number of times that the NetPerformer could not add an object to the OID tree due to internal reasons. For example, this can occur if the new object is already in the OID tree.

8.3.10 Number of IPMC tx frames discarded

Console	SNMP
Number of IPMC tx frames discarded	(not available)

For a redundant SDM-9620 only
Displays the number of frames transmitted from the NetPerformer application to IPMC that were discarded on this unit.

8.3.11 Number of IPMC rx frames discarded

Console	SNMP
Number of IPMC rx frames discarded	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that were discarded on this unit.

8.3.12 Number of IPMC rx frames with invalid version

Console	SNMP
Number of IPMC rx frames with invalid version	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that had an invalid version indicator.

8.3.13 Number of IPMC rx frames with invalid length

Console	SNMP
Number of IPMC rx frames with invalid length	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that had an invalid length.

8.3.14 Number of IPMC rx frames with invalid command

Console	SNMP
Number of IPMC rx frames with invalid command	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that had an invalid command.

8.3.15 Number of IPMC rx frames with invalid seq. number

Console	SNMP
Number of IPMC rx frames with invalid seq. number	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that had an invalid sequence number.

8.3.16 Number of IPMC rx frames with invalid state

Console	SNMP
Number of IPMC rx frames with invalid state	(not available)

For a redundant SDM-9620 only
Displays the number of IPMC frames received that had an invalid unit state indicator.

8.4 DC/REDUNDANCY

8.4.1 Number of rx frames

Console	SNMP
Number of rx frames	(not available)

Displays the total number of redundancy frames received by this unit. This counter is increased by 1 every time the unit receives either a request or a response.

8.4.2 Number of tx frames (total)

Console	SNMP
Number of tx frames (total)	(not available)

Displays the total number of redundancy frames transmitted by this unit. This counter is increased by 1 every time the unit sends either a request or a response.

NOTE: This statistic is the total of the next three.

8.4.3 Number of tx frames (first attempt)

Console	SNMP
Number of tx frames (first attempt)	(not available)

Displays the total number of redundancy frames that the unit has successfully transmitted on the first attempt to receive a response from the remote unit. The transmitted frames can be either requests or responses.

NOTE: A unit responds only once to a request.

8.4.4 Number of tx frames (second attempt)

Console	SNMP
Number of tx frames (second attempt)	(not available)

Displays the total number of redundancy frames that the unit has successfully transmitted on the second attempt to receive a response from the remote unit.

NOTE: In this case the transmitted frames are always requests, since a unit never sends more than one response to a request. Consequently, only a master unit will increase this counter when it sends a request to another unit.

8.4.5 Number of tx frames (third attempt)

Console	SNMP
Number of tx frames (third attempt)	(not available)

Displays the total number of redundancy frames that the unit has successfully transmitted on the third attempt to receive a response from the remote unit.

NOTE: In this case the transmitted frames are always requests, since a unit never sends more than one response to a request. Consequently, only a master unit will increase this counter when it sends a request to another unit.

After the third attempt, the master unit stops resending the command. Since the master polls the remotes every 10 seconds, the same command will be sent during the next cycle.

NOTE: When the unit transmits a request or response, the frames are not discarded after the third attempt.

8.4.6 Number of SNMP objects sent

Console	SNMP
Number of SNMP objects sent	(not available)

Displays the number of outgoing SNMP commands that the NetPerformer has processed internally. This reflects the number of SNMP commands that have been sent to the Redundancy Switch.

8.4.7 Number of SNMP objects received

Console	SNMP
Number of SNMP objects received	(not available)

Displays the number of incoming SNMP commands that the NetPerformer has processed internally. This reflects the number of responses received from the Redundancy Switch.

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