NetPerformer® System Reference

WAN Leased Lines

COMTECH EF DATA

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redefining network efficiency

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PowerCell Technology

1.1 About PowerCell Technology

Memotec's PowerCell technology has been designed to carry multiple traffic types (data, voice, fax and LAN) over a Wide Area Network. The advantages of PowerCell include:

- Efficient multiplexing of data from all sources
- High-performance data compression to improve throughput and reduce telecommunications costs
- Load balancing to provide high-speed support using multiple circuits
- Dynamic bandwidth utilization and flexible network connections
- Enhanced rerouting capabilities, with switching through intermediate nodes
- Dial backup of WAN links
- Bandwidth On Demand over leased lines for cost-effective management of bursty LAN traffic
- Efficient prioritization across the network, reducing transmission delays and preserving the quality of delay-sensitive traffic (voice/fax).

1.1.1 PowerCell Principle of Operation

PowerCell operation includes several distinct functions:

- **Protocol Sorting:** First, whole frames are differentiated as to traffic type, and identified as to priority level (see "Protocol Sorting" on page 1-4)
- **Fragmentation:** The NetPerformer splits the frames into small cells, or blocks, to reduce access time (see "Fragmentation" on page 1-4)
- **Data Compression:** After fragmentation it compresses the contents of the cells, when required for smooth traffic flow (see "Data Compression" on page 1-6)
- **Multiplexing:** The NetPerformer then multiplexes cells from all sources (see "Multiplexing and Cell Relay Transmission" on page 1-7)
- **Transmission:** Finally, it transmits the multiplexed, compressed traffic across the link (see "Multiplexing and Cell Relay Transmission" on page 1-7).

The NetPerformer at the receiving end performs the reverse process: demultiplexing and decompressing the cells, then reconstructing the original whole frames before sending them to the appropriate destination user device.

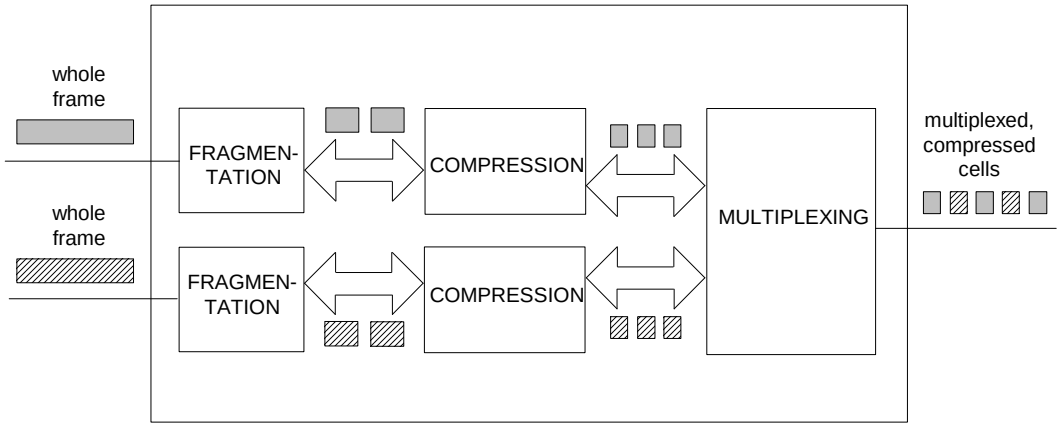

Figure 1-1: PowerCell Principle of Operation

This process incurs very little network delay. For example, the SDM-9220 can switch up to 7,000 cells per second (cps), the SDM-8400 up to 10,000 cps and the SDM-9230 up to 20,000 cps.

1.2 Protocol Sorting

Through *protocol sorting*, the NetPerformer differentiates delay-sensitive traffic from non-sensitive traffic, and directs these traffic streams to their corresponding transmit queues. Sorting is based on the traffic type, the *weight class* to which the traffic is assigned, and any additional *traffic filters* you may wish to create. To learn how to configure NetPerformer classes and filters, refer to the *Quality of Service (QoS)* module of this document series.

The architecture of the NetPerformer receivers combined with their capacity to differentiate traffic types, ensures accelerated processing of delay-sensitive data (for example, voice) without jeopardizing the processing of non-sensitive data.

1.3 Fragmentation

During *fragmentation*, the NetPerformer splits whole frames into small cells to reduce access time. It also performs *protocol stripping* at this stage, to remove flags and synchronization characters from transparent user data. and dynamically compresses the cell contents in accordance with current traffic levels (see “Data Compression” on page 1-6).

Frames received on all ports are analyzed and cut into variable-length cells, from 1 to 96 characters long. A small frame with 96 characters or less occupies a single cell. Larger frames are segmented and the resulting cells tagged with sequencing information for later reconstruction.

During fragmentation, the order in which the NetPerformer cuts the frames depends on:

- The order the frames arrive in
- The priority assigned to that traffic type
- The priority of other traffic types arriving at the same time.
  - If a high-priority frame (for example, voice or SNA) arrives while the NetPerformer is fragmenting a low-priority frame (for example, LAN), it turns immediately to the high-priority frame before continuing.
  - From that point on, cells are cut alternately from the two frames (high and low-priority) as the traffic arrives at the receiver.

There are six types of traffic cells:

- **BEGIN**: First cell of a long frame (more than 96 characters)
- **MIDDLE**: Middle cell of a long frame
- **END**: Last cell of a good frame
- **ABORT**: Last cell of a bad frame
- **COMPLETE**: The only cell of a small frame (96 characters or less)
- **VARIABLE**: A compressed, variable-length cell.

For example, a long frame will be fragmented into the following cells if it is a good frame:

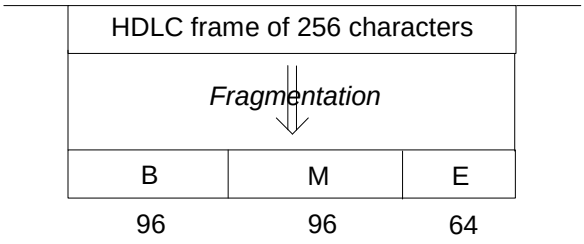

Figure 1-2: A Long Frame Fragmented into Cells

Through fragmentation, the NetPerformer is able to reduce internal delays in three ways:

- Compression and multiplexing can start as soon as the first cell is received. The NetPerformer does not have to wait for the end of frame. This reduces transmission delay to the time needed to receive and cut a single cell.
- Fallback transmit and receive clocks. If the port or channel is in fallback mode, the NetPerformer reduces the transmitter speed to an appropriate fallback speed when the number of characters left in an incompletely fragmented frame falls below a pre-defined threshold. Fallback is explained further on “Fallback Speed” on page 1-10.
- Early transmission. The NetPerformer starts transmitting frames to the connected device as soon the first few cells are delivered to the transmitter, even if the frame has not been fully fragmented yet. The transmission start level is explained on “Transmission Start Level” on page 1-13.

1.4 Data Compression

If traffic levels are high, NetPerformer applies a dynamic data compression algorithm to the cell contents for increased throughput. After compression, each cell contains the amount of data required to maintain a smooth, delay-free flow. Cells do not have to be full before they are transmitted.

Data compression improves bandwidth utilization, which results in reduced telecommunications costs. It is applied to all protocols that analyze the traffic in terms of frames.

NOTE: Voice compression algorithms operate independently of data compression, and use DSPs for processing. Refer to the *Digital Voice* module of this document series.

The built-in data compressor on the NetPerformer can enhance the throughput of a composite link from 100% to 400%. The actual compression ratio achieved depends on the type of data being transferred and the amount of traffic on the link. It is usually between 2 and 4 (refer to “Checking WAN Link Status” on page 7-1).

The NetPerformer compressor processes the cells that were produced during fragmentation, in the following way:

- First, it carries out *run-length encoding* on the contents of each cell, replacing identical characters with an escape code.
- Then it builds a dynamic dictionary for each port, using the most frequently encountered character strings.
- It then assigns a Huffman code to each common string, and
- Replaces the character strings with these codes.

Decompression is carried out by the data compressor in the destination NetPerformer unit. It replaces the Huffman codes with the original character strings, and decodes the escape codes as the original characters.

1.5 Multiplexing and Cell Relay Transmission

Using a process called *Programmable Variable Cell Relay* (PVCR), the NetPerformer sends the individual, variable-sized cells resulting from fragmentation and compression over the high-speed link. Delay-sensitive cells such as voice and fax go first. User-defined criteria determine traffic prioritization for LAN and legacy data. Refer to the *Quality of Service (QoS)* module of this document series.

The mix of high and low-priority cells ensures that, before a non-sensitive frame is sent, a delay-sensitive frame has been completely transferred to the remote device. This avoids interruptions in voice/fax traffic and session timeouts for data traffic such as SNA/SDLC.

The NetPerformer uses an advanced statistical multiplexing technique that combines voice, fax and data from all active input ports and channels, and sends the combined traffic over the network via one or more composite links.

- When multiple links are available, *load balancing* ensures that an equal traffic weight is transmitted over all available links. This feature is described more fully in “Load Balancing” on page 2-2.
- A multiple link configuration also allows for *automatic link backup*, which provides additional reliability in case of link failure. See “Automatic Dial Backup” on page 2-5.
- Through *Bandwidth On Demand*, multiple links can be activated and deactivated automatically according to current traffic levels and bandwidth needs. This is ideal for applications requiring varying bandwidth levels. See “Bandwidth On Demand” on page 2-7.
- You can also define a range of different link connection scenarios for automatic time-of-day connect, building a *schedule* that mimics your peak and minimum traffic times. See “Schedule Operation” on page 2-9 for an example of how this works, and “Schedule for Automatic Link Activation” on page 5-1 for configuration details.

NetPerformer WAN links use a proprietary level 2 synchronous protocol called PVCR (Programmable Variable Cell Relay) and include a proprietary level 3 protocol.

- **Level 2 layer:** Responsible for retransmitting frames in case of errors on the links (e.g. for SNA devices). Also used when reliable asynchronous transmission is required.

  When the link detects errors on cells destined for a transparent user port, the NetPerformer resets all queues for that port, resynchronizes the compressor and then resumes transmission.
- **Level 3 layer:** Includes flow control and traffic congestion procedures (see *“Intelligent Congestion Control” on page 1-10*). Also responsible for establishing and maintaining up to 64 channels in an SNA/SDLC application, one per SNA device (PU).

The composite link carries HDLC frames, with multiple cells in each frame. The frame size on the link is limited to 1024 bytes.

NOTE: This has no bearing on the frame size permitted on transparent user ports or channels configured with the HDLC protocol.

The NetPerformer at the remote end demultiplexes the cells and uses the cell numbering to sort the cells into their original order. It reconstructs the original frames from this cell sequence, and transmits them to the destination devices.

1.6 Mesh Topology

NetPerformer nodes can be connected in a WAN mesh topology. In the application represented in Figure 1-3, source unit A and destination unit D perform protocol sorting, fragmentation, compression/decompression, multiplexing/demultiplexing and cell relay transmission. The intermediary units B and C perform cell relay transmission only.

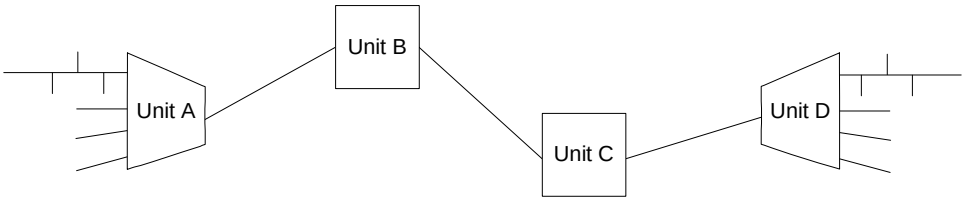

Figure 1-3: Mesh Topology

1.7 Prioritization of Voice/Fax Transmissions

The NetPerformer is well suited for handling voice and fax traffic, due to its ability to prioritize traffic, reduce delays and control traffic congestion. When data transmission is cell-based, the frame does not have to be completely processed at any location before changing to a new virtual path. The result is that latency and overhead are reduced to a minimum, producing shorter transmission delays. This is essential to satisfactory voice and fax communications.

Due to the delay-sensitive nature of voice and fax transmissions, it is essential that they be prioritized to avoid the generation of delays. All voice/fax traffic entering a NetPerformer channel is automatically given high-priority status with respect to data from other sources. This ensures guaranteed bandwidth access in a shared network environment, and an uninterrupted flow from source to destination.

NOTE: Voice/fax traffic can be assigned to a specific priority class if desired. For details, refer to the *Quality of Service (QoS)* module of this document series.

Each NetPerformer along the virtual connection path selects a virtual channel according to the priority class assigned to that virtual connection. In this way, the high priority of voice/fax traffic can be maintained uniformly from source to destination.

Each NetPerformer unit monitors its transmit queue for the priority level of the cells that are received. When high-priority cells arrive, they are expedited to the next NetPerformer on the virtual path before processing the lower priority cells. Lower-priority cells are buffered until the higher-priority voice and fax cells are sent. This also guarantees voice/fax prioritization throughout the network.

1.8 Intelligent Congestion Control

The NetPerformer is equipped with intelligent congestion control that prevents adverse network situations from interfering with delay-sensitive traffic such as voice communications.

Using Memotec's *Virtual Connections* technology, traffic can be sent from the source NetPerformer unit over several hops, or intervening NetPerformers, to reach the destination unit. The best route is always chosen, and rerouting is performed automatically through simple routing table updates. As a result, the network topology is highly flexible and adaptable to congestion.

Delays tend to get higher as a virtual path gets longer, each hop typically adding a 10 ms delay. If any NetPerformer along the virtual connection detects congestion while it is transmitting, it automatically retains more data in its buffers to ease the flow.

The turnaround time for the NetPerformer is typically 150 ms across a Wide Area Network. This is significantly better than satellite service, which has a typical latency of 250 ms. Given that the human tolerance for voice delay is about 500 ms, the processing speed of the NetPerformer produces satisfactory results even when congestion is encountered.

The NetPerformer includes flow control techniques to minimize congestion problems and ensure maximum efficiency of the transmitter and receiver at all times. These techniques include:

- *Fallback speed* of the transmit and receive clocks, and
- Early frame transmission based on the *Transmission start level*.

1.8.1 Fallback Speed

The NetPerformer supports fallback for data received over a transparent user port (non-PVCR) under the following conditions:

- The transparent user port is a built-in serial port

  Digital channels and ports on the Dual Serial interface card do not support fallback.
- The NetPerformer controls both the transmit and receive clocks on the port (**DCE** port in internal clocking mode)

  With **DCE** internal clocking, the NetPerformer can set the port speed (normal or fallback) depending on current traffic conditions (uncongested or congested, respectively).
- The port is **not** configured with an asynchronous or passthrough protocol (**T-ASYNC**, **R-ASYNC** or **PASSTHRU**), **and**
- The equipment connected to the port supports fallback speeds.

Fallback is enabled or disabled with the *Fallback speed* port parameter. However, the actual fallback speed is **not** configurable. The NetPerformer determines the appropriate fallback speed automatically from the combined speed of all WAN links that carry traffic to the destination unit.

The NetPerformer provides two independent clocks: one for the receiver (the *receive clock*) and one for the transmitter (the *transmit clock*).

NOTE: When fallback is applied on the receive clock, the speed of the transmit clock is not affected. Likewise, when fallback is applied on the transmit clock, the receive clock is not affected.

Fallback on Receive Clock

Congestion can occur on the WAN links when the NetPerformer transmits data to the remote side. This congestion is caused by a low compression ratio or too much traffic queued by the user ports. When congestion occurs, a burst of data on a user port will be stored in the NetPerformer receiver queue.

However, if the data burst size exceeds the capacity of the receiver queue, that data will be lost. This situation is called a *receiver overrun*. When a receiver overrun occurs, the NetPerformer requests the attached equipment to retransmit the data.

NOTE: To determine whether overruns have occurred on a particular port, execute the Display Errors (**DE**) command. Refer to “Displaying WAN Link Errors” on page 7-7.

Overruns occur when the user port speed is too high for current capabilities of all WAN links to the destination unit. To prevent overruns, the NetPerformer slows down the receive clock on the user port to the fallback speed, allowing the WAN links to catch up to the traffic flow.

As mentioned earlier, the fallback speed is adjusted automatically to the current traffic situation. In most situations, the NetPerformer sets the fallback to one half of the sum of the speeds of all WAN links to the same destination unit.

NOTE: On some legacy NetPerformer products the fallback speed is not calculated automatically. On these products, you must set the *Fallback speed* to an appropriate bit rate for your application.

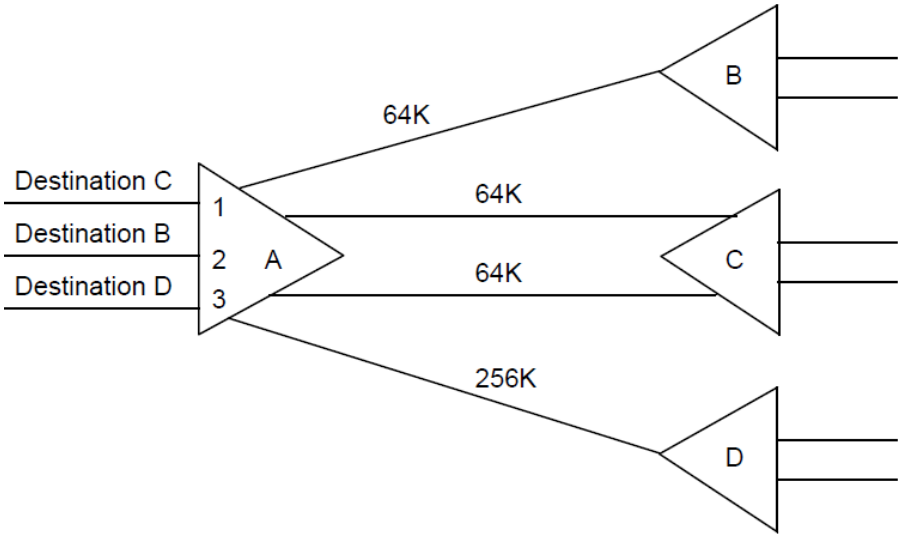

Figure 1-4: Using Fallback Speed for Flow Control

In the example above, the fallback speeds on ports 1 to 3 are calculated as follows:

Port Number on Unit "A"	Destination Unit	Link(s) to Destination	Sum of Link Speeds	Fallback Speed (1/2 the Sum of Link Speeds)
1	C	A - C (dual link)	128K	64K
2	B	A - B (single link)	64K	32K
3	D	A - D (single link)	256K	128K

Table 1-1: Fallback Speeds on Ports 1 to 3

How it works: When the *Fallback speed* port parameter is enabled, the receiver reduces its speed if the number of characters in the receiver queue exceeds a configurable threshold (the *Transmission start level* port parameter). During this time, the amount of data transmitted on the links exceeds the amount of data received on the port, and the congestion situation is resolved before the user port receiver queue becomes full. This avoids both data loss and the delays due to retransmissions. The user port returns to its normal speed when the number of characters in the receiver queue falls below the *Transmission start level*.

Fallback on Transmit Clock

Fallback is applied to the transmit clock to prevent *transmitter underruns*. Underruns occur when frames arrive too slowly from the remote unit, so that the user port transmits the beginning part of the frame before it has received the end of the frame. When an underrun occurs on the transmitter, the current frame is aborted.

NOTE: To determine whether underruns have occurred on a particular port, execute the Display Errors (**DE**) command. Refer to "Displaying WAN Link Errors" on page 7-7.

To prevent underruns, the transmitter is slowed down to the fallback speed, which reduces the rate that data is received from the WAN link.

How it works: When the *Fallback speed* port parameter is enabled, the user port transmitter reduces its speed if the number of characters of an incomplete frame in the output queue goes below the current value of the *Transmission start level* parameter (see next section). During this time, the port transmission rate is slower than the rate at which data is received from the WAN links, which allows the port to receive the end of frame before the beginning part of the frame has been completed transmitted to the attached equipment. Once the frame is sent, the transmitter returns to normal speed.

1.8.2 Transmission Start Level

A NetPerformer user port can start transmitting a frame as soon as a specified number of characters have been received from the WAN link. Transmission delays are reduced when the transmitter can start before the incoming frame has been completely received.

Transmission flow control must also be applied to avoid underruns and ensure a smooth traffic flow. Refer to “Fallback Speed” on page 1-10.

To specify the number of characters that must be received before the port can start transmitting a frame, set the *Transmission start level* port parameter.

NOTE: The user port must be in **DCE** internal clocking mode, and the attached equipment must support this feature.

In the port transmitter queue, transmission will start when the *Transmission start level* is reached or the frame is complete. The transmitter will go into fallback if the frame is incomplete and the receive rate is slow.

Setting the Transmission Start Level

Set the *Transmission start level* to **AUTO** if you would like the NetPerformer to start the user port transmitter automatically according to the port clocking mode, speed and fallback speed settings.

If you do not want the NetPerformer to control the *Transmission start level* automatically, you need to consider:

- The user port clocking mode
  - Set *Transmission start level* to **MAX** if the port is **not** in **DCE** internal clocking mode. The transmitter will start only when the complete frame has been received from the remote unit.
- Whether *Fallback speed* is enabled on the port
  - Set *Transmission start level* to **MAX** if fallback is disabled.

- If fallback is enabled **and** the user port is in **DCE** internal clocking mode, set the *Transmission start level* according to the speed of the port, as shown in Table 1-2.

User Port Speed	Transmission Start Level
less than 56 Kbps	48 bytes
56 - 96 Kbps	96 bytes
96 - 144 Kbps	144 bytes
144 - 192 Kbps	192 bytes
192 - 256 Kbps	256 bytes
256 - 512 Kbps	512 bytes
512 - 1024 Kbps	1024 bytes
1024 - 2048 Kbps	2048 bytes
more than 2048 Kbps	MAX

Table 1-2: Settings for Transmission Start Level

NOTE: The *Transmission start level* parameter behaves differently for a Passthrough channel (built-in serial port set to the **PASSTHRU** protocol). It represents the number of transparent data blocks (rather than characters of an incomplete frame) that the port must accumulate before enabling the transmitter. On a **PASSTHRU** port, the *Transmission start level* can be set from a minimum of 3 to a maximum of 12 blocks. Refer to the *Legacy Data* module of this document series.

2

NetPerformer Multiple Link Capabilities

2.1 About Multiple Link Capabilities

The NetPerformer supports multiple WAN links with:

- Load balancing (see next section)
- Inverse multiplexing (see “Inverse Multiplexing” on page 2-4)
- Automatic dial backup (see “Automatic Dial Backup” on page 2-5)
- Bandwidth On Demand (see “Bandwidth On Demand” on page 2-7)
- Schedule operation (see “Schedule Operation” on page 2-9).

2.2 Load Balancing

The NetPerformer uses a cell balancing method to accomplish load balancing dynamically across multiple WAN links:

- As described in “PowerCell Principle of Operation” on page 1-2, the NetPerformer cuts all frames into small cells, and routes them over the first available link.
- Using dynamic load balancing, the NetPerformer transmits the cells in parallel over all active links.
- Since each cell is routed individually the available bandwidth is maximized and transmission time is reduced as much as possible, resulting in improved response time and throughput.
- The cells are later reassembled in their original frame format by the NetPerformer at the other end.

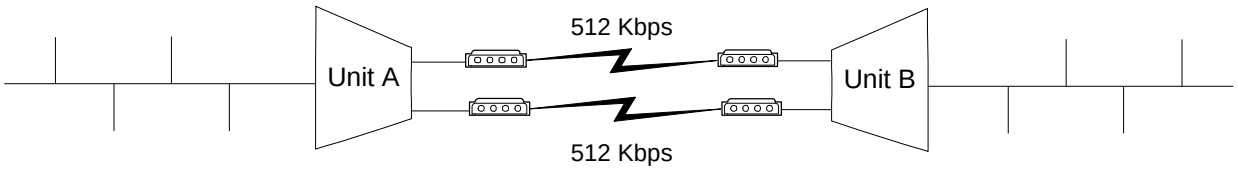

Figure 2-1: Load Balancing Application

In some cases *static* load balancing (rather than dynamic) should be used in order to set a preferred route over multiple dedicated links. This may be required when:

- More than one route is available
- The cost is greater than 0
- All available routes are equal in cost

You can set a separate preferred route for each traffic class. When you assign a different preferred route to different classes, you ensure static load balancing of transparent user traffic over all routes. Set the preferred route for a particular class with the *Preferred route*

parameter, found in the **SETUP/CLASS** menu. Details are provided in the *Quality of Service (QoS)* module of this document series.

2.3 Inverse Multiplexing

The multiple link capabilities of the NetPerformer can be used to create an inverse multiplexing application. Inverse multiplexing provides high-speed support using multiple digital circuits. Here are two possible inverse multiplexing applications that can be created on a single NetPerformer:

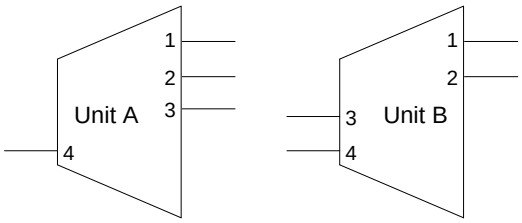

Figure 2-2: Inverse Multiplexing Applications

2.4 Automatic Dial Backup

The NetPerformer includes an *automatic dial backup* function which provides network security and redundancy in case of link failure. When dial backup is configured between two NetPerformers, a backup link is automatically activated if the dedicated link fails.

In typical applications the backup function is controlled from the NetPerformer unit at the central site. A branch site unit is normally responsible for its own site only, although it can be configured to back up other units in the network.

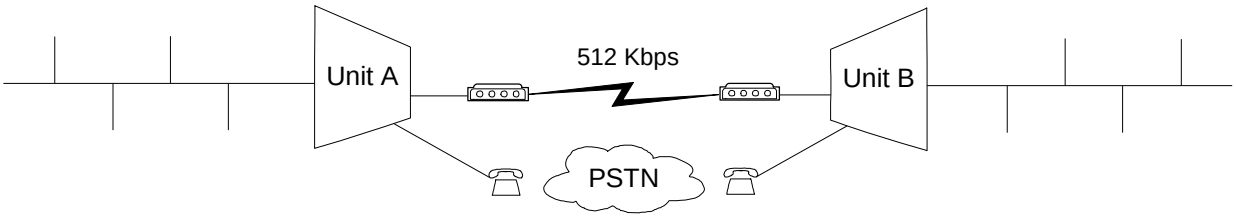

Figure 2-3: Dial Backup Application

How it works: In case of a line failure on a dedicated WAN link, the NetPerformer unit controlling the backup mechanism can activate a backup link to take over.

- The NetPerformer tries to establish a backup link when it discovers that it has lost contact with a destination that is listed in its PowerCell routing table (refer to "Displaying PowerCell Destinations" on page 7-17).
- A backup link can be configured to backup a specific dedicated WAN link, any dedicated WAN link that fails, or all dedicated WAN links.

NOTE: The dedicated WAN link must go to a destination that has been established as an entry in the PowerCell routing table.

- The backup link is activated according to its dialing mode setting, for example, by raising the **DTR** or **X.21 COMMAND** signal.
  - The dialing mode is configured with the WAN link (**PVCR** port) *Dialer* parameter (see "Dialer" on page 8-33).
  - If the backup link is established by sending a **V25bis** or **AT** command to a modem, all links to the lost destination unit must be down before the phone number will be dialed.
- When the backup link comes up, the NetPerformer automatically runs a test to ensure that it is operative.

  On a successful test, the traffic load is immediately shared between the backup link and the other active WAN links. In other words, load balancing continues to operate between all active links, whether they are dedicated or backup links.
- When the failed dedicated link comes back up, the NetPerformer detects that the lost destination is now back. It runs another test and enables load balancing with the newly returned link.

- If the dedicated link does not fail during the test period, the NetPerformer deactivates the backup link by lowering the **DTR** or **X.21 COMMAND** signal.

NOTE: You can also terminate backup manually using the **HANG** command (see "HANG Command" on page 6-3). In this case the *Backup termination mode* parameter on the backup port must be set to **MANUAL**. For complete details, turn to "Configuring a Backup Link" on page 3-6.

In a Frame Relay application, your network can also include backup PVCs. These PVCs are activated if a line failure occurs on any or all **PVCR** links or PVCs. For details, refer to the *WAN/Frame Relay* module of this document series.

2.5 Bandwidth On Demand

Bandwidth On Demand (BOD) allows for automatic activation and deactivation of multiple WAN links according to current traffic needs. With Bandwidth On Demand, the NetPerformer increases the bandwidth when traffic increases, and decreases it when traffic returns to normal levels.

A BOD solution is ideal for applications that require varying bandwidth levels, for example, LANs with traffic bursts. You can design the network to handle the average traffic load, and allow extra bandwidth to be added only when it is needed.

NOTE: Bandwidth On Demand is available on dedicated WAN links only, that is, a serial port or digital channel configured with in the PVCR protocol. For digital channels, some limitations apply (see "Configuring a Bandwidth on Demand Link" on page 3-9).

How it works: In a typical application of Bandwidth On Demand:

- One WAN link is configured for operation over a dedicated line, for example, local port 1 set in **PVCR** protocol with **DEDICATED** mode, connected to remote port 1 set in **PVCR** protocol with **DEDICATED** mode.
- A second WAN link is configured for operation over switched circuits, for example, port 2 set in **PVCR** protocol with **BOD-CALL** mode, and remote port 2 set in **PVCR** protocol with **ANSWER** mode.
- This link is activated only when the bandwidth usage reaches a pre-defined level (configured with the *BOD level* parameter).
- When the bandwidth usage on the dedicated link (port 1) reaches the *BOD level* and stays at that level for a pre-defined period (configured with the *Delay before BOD call activation* parameter), the switched line is automatically activated (port 2).

NOTE: The *Delay before BOD call activation* allows time for the bandwidth usage to return to normal in case of a brief burst of data.

- The traffic load is shared between the BOD link and all other active WAN links. In other words, load balancing continues to operate between all active links, whether they are dedicated or BOD links.
- When the bandwidth usage decreases to a significantly lower level (about half of the *BOD level*) and stays at that level for a pre-defined period (configured with the *Delay before BOD call deactivation* parameter), the switched line is disconnected.

NOTE: For a BOD link, you cannot choose a *Dialer* type that uses a dial phone number. You must select a *Dialer* type that raises the **DTR** (V.35 and RS-232) or **COMMAND** (X.21) signal to activate the modem. Refer to “Configuring a Bandwidth on Demand Link” on page 3-9 for complete configuration details.

2.6 Schedule Operation

The NetPerformer real-time clock permits a *Schedule* that controls a range of different link connection scenarios for automatic time-of-day connect. This Schedule defines the operating mode of each WAN link for a user-specified period of time.

Schedule periods can be configured on a weekly or daily basis, with a total of 10 periods available. To set up a Schedule for your WAN application, use the **SETUP/SCHEDULE** menu. For details, refer to "Schedule for Automatic Link Activation" on page 5-1.

How it works: In an example Schedule application, three periods are defined on the NetPerformer unit:

- Period 1, for normal business hours, sets the operating mode of
  - The main WAN link (port 1) to **DEDICATED**
  - The second link (port 2) to Bandwidth On Demand (**CALL-BOD**)

  If traffic becomes heavy, the second link is automatically activated, providing greater bandwidth to the DTE equipment when required during business hours.
- Period 2, for evenings, sets the operating mode of
  - The main WAN link (port 1) to **DEDICATED**
  - The second link (port 2) to Backup (**CALL-BACKUP**)

  This protects the dedicated link while avoiding long distance charges in the evening.
- Period 3, for nights and weekends, sets the operating mode of
  - The main WAN link (port 1) to **DEDICATED**
  - The second link (port 2) to **INACTIVE**

  Here, the second link will not take over even if the dedicated link fails. This reflects the network's reduced bandwidth needs at night and on weekends.
- When no periods are enabled, or no enabled period covers the current time, the NetPerformer uses the default link operating mode for each WAN link (set with the *Mode* parameter of the **PVCR** port). For details on configuring the schedule periods, refer to "Schedule for Automatic Link Activation" on page 5-1.

3

Configuring a WAN Link

3.1 About the WAN Link

On the NetPerformer, a WAN port is any serial port or digital channel configured with the PVCR (Programmable Variable Cell Relay) protocol. Under this protocol, the port or channel behaves like a WAN connection, and sends its output data over the composite link.

> **The type of cable installed at the port is automatically detected by the NetPerformer, and is displayed at the console during WAN link configuration. For complete cabling instructions, consult the** *Hardware Installation Guide* **or** *Quick Setup Guide* **(legacy products) for your product, available on the** *NetPerformer Documentation CD***.**

A WAN connection can be configured on a serial port (including ports built into the base unit and ports on the Dual Serial Port interface card) or a channel on a digital interface card. The **PVCR** protocol is used.

The **PORT** or **SLOT** submenu of the **SETUP** console command includes all parameters required to configure a WAN connection. If you are using SNMP, all WAN configuration variables are grouped under the *ifwan* category. For text-based configuration the *[ifwan#]* heading is used, where # represents the number of the port or channel.

Console	SNMP	Text-based Config
SE/PORT (serial port) SE/SLOT (digital channel or dual serial port)	*ifwan* **(category)**	*[ifwan#]* **(heading)**

The following sections describe how to configure:

- A dedicated WAN link for PowerCell connections on a serial port (**SE/PORT,** “Configuring a Dedicated WAN Link” on page 3-3)
- A dedicated WAN link for PowerCell connections on a digital channel (**SE/SLOT/CHANNEL**, “Configuring a Dedicated WAN Link on a Digital Channel” on page 3-4)
- A backup link (“Configuring a Backup Link” on page 3-6)
- A Bandwidth on Demand (BOD) link (“Configuring a Bandwidth on Demand Link” on page 3-9)
- **Backup and BOD links also require Phone profiles.** Refer to “Phones for Backup Links” on page 4-1.
- A Wait-User link (“Configuring a Link for Conditioned Activation” on page 3-12) for conditioned activation based on user port activity
- An inactive link (“Deactivating a WAN Link” on page 3-14).

Turn to “Verifying WAN Link Configuration” on page 3-15 for instructions on how to view the current values of all link parameters.

To configure a time schedule for different link connection scenarios, turn to “Schedule for Automatic Link Activation” on page 5-1.

3.2 Configuring a Dedicated WAN Link

A dedicated WAN link can be configured on a serial port (including ports built into the base unit and ports on the Dual Serial Port interface card) or a channel on a digital interface card.

NOTE: On a digital interface card, a dedicated **PVCR** connection is available with all signaling modes configured on the **LINK**.

3.2.1 Configuring a Dedicated WAN Link on a Serial Port

► To configure a built-in serial port on the base unit as a dedicated WAN link:

1. Enter the menu sequence: **SE** ↵ **PORT**.
2. Select the *Port number*.
3. Set the *Protocol* to **PVCR** and the *Mode* to **DEDICATED**.
4. Change the other port parameters from their default values, if desired.

► To configure a serial port on the Dual Serial interface card as a dedicated WAN link:

1. Enter the menu sequence: **SE** ↵ **SLOT**.
2. Select the *Slot number*.
3. Select the *Channel number*.
4. Set the *Protocol* to **PVCR** and the *Mode* to **DEDICATED**.
5. Change the other port parameters from their default values, if desired.

The parameters presented at the console are identical for the NetPerformer base product and NetPerformer SIP VoIP option.

SE/PORT/#/ PVCR example: in DEDICATED Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def:PPP) ? 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:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

Detailed descriptions of each parameter are provided in the appendix "SE/PORT/#/PVCR Configuration Parameters" on page 8-1.

3.2.2 Configuring a Dedicated WAN Link on a Digital Channel

► To configure a digital channel as a dedicated WAN link:

1. 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. Change the other port parameters from their default values, if desired.

SE/SLOT/#/ CHANNEL/ PVCR example: in DEDICATED Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? SLOT
SLOT> Slot number (1/2/3,def:1) ?
Item (LINK/CHANNEL,def:CHANNEL) ?
SLOT> Channel Number (101-124/ALL,def:115) ?
PORT 115> Protocol (def:PPP) ? PVCR
PORT 115> Timeslot (def:15) ?
PORT 115> Number of consecutive timeslots (1-9,def:1) ?
PORT 115> DS0 speed (bps) (def:64000) ?
PORT 115> Mode (def:DEDICATED) ?
PORT 115> IP address (def:000.000.000.000) ?
PORT 115> Subnet mask (number of bits) (0-32,def:0) ?    {000.000.000.000}
PORT 115> IP RIP (def:V1) ?
```

```
PORT 115> IP RIP TX/RX (def:DUPLEX) ?
PORT 115> OSPF (def:DISABLE) ? ?
PORT 115> IP multicast active (def:NO) ?
PORT 115> IP multicast protocol (def:NONE) ?
PORT 115> NAT enable (def:NO) ?
PORT 115> IPX RIP (def:DISABLE) ?
PORT 115> IPX SAP (def:DISABLE) ?
PORT 115> IPX network number (def:00000000) ?
PORT 115> Compression (def:YES) ?
PORT 115> Remote unit name (def:) ? CHICAGO-9230
PORT 115> Timeout (ms) (1000-30000,def:1000) ?
PORT 115> Number of retransmission retries (1-1000,def:100) ?
PORT 115> Maximum number of voice channels (0-10000,def:10000) ?
PORT 115> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT 115> Cell Packetization (def:YES) ?
PORT 115> Filter (def:ALL) ?
```

For details concerning the *Timeslot*, *Number of consecutive timeslots* and *DS0 speed (bps)* parameters, refer to the *Digital Data* module of this document series.

For details on the other parameters in this example, refer to the appendix “SE/PORT/#/PVCR Configuration Parameters” on page 8-1.

NOTE: Unlike a serial port, a digital channel defined as a WAN link (with the PVCR protocol) cannot be configured in **ANSWER**, **CALL-BKUP**, **CALL-BOD**, or **WAIT USER** mode when the *Signaling mode* on the digital **LINK** contains certain values. Refer to the following sections for details.

3.3 Configuring a Backup Link

A backup link can be established between two **PVCR** ports or channels if one is configured to activate a call when a link goes down (**CALL-BKUP** mode) and the other is configured to answer the call (**ANSWER** mode).

3.3.1 Limitations on Digital Channels

- A digital channel **cannot be used** as either the calling or answering side of a backup link when the *Signaling mode* on the digital **LINK** is configured with **CAS**, **ROB BIT**, transparent (**TRSP-ORIG** or **TRSP-ANSW**) or no signaling (**NONE**).

  Under any of these *Signaling modes*, a **PVCR** channel can be set to be **DEDICATED** or **INACTIVE** mode only.

- For a digital channel, **CALL-BKUP** mode is available only when the *Signaling mode* on the **LINK** is set to **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS**, **DMS100** or **QSIG**.

For further information on configuring the **LINK** of a digital interface card, refer to the *Digital Data* or *Digital Voice* module of this document series.

3.3.2 Calling Side of the Backup Link

► To configure the port or channel on the calling side of the backup link:

1. Set the *Protocol* to **PVCR**
2. Set the *Mode* to **CALL-BKUP**

NOTE: As an alternative, you can define the backup link as part of a Schedule operation, using the *Operating mode* parameter of the **SETUP/SCHEDULE** menu. Refer to “Schedule for Automatic Link Activation” on page 5-1.

---

3. Specify which dedicated WAN link or links this port backs up, using the *Port to back* parameter
4. Set the dialer type with the *Dialer* parameter (see “Dialer” on page 8-33).

NOTE: If you choose a *Dialer* type that requires a dial phone number, configure this number with the **SETUP/PHONE** menu. Refer to “Phones for Backup Links” on page 4-1.

SE/PORT/#/ PVCR example: in CALL-BKUP Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
```

```
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def: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:ANSWER) ? CALL-BKUP
PORT 1> Backup termination mode (def:AUTOMATIC) ?
PORT 1> Delay before call activation (s) (1-1000,def:10) ?
PORT 1> Delay before call deactivation (s)  (1-1000,def:120) ?
PORT 1> Call activation timer (s) (30-1000,def:30) ?
PORT 1> Port to back (def:ANY) ?
PORT 1> Dialer (def:DTR) ?
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

For detailed descriptions of all parameters specific to a CALL-BKUP connection, refer to “CALL-BKUP Mode” on page 8-30 of the appendix *SE/PORT/#/PVCR Configuration Parameters*.

3.3.3 Answering Side of the Backup Link

► To configure the port or channel on the answering side of the backup link:

1. Set the *Protocol* to **PVCR**
2. Set the *Mode* to **ANSWER**
3. Set the *Dialer* to the same value configured on the **CALL-BKUP** port at the other end of the connection (see “Dialer” on page 8-33).

NOTE: Not all digital channels can be configured as the answering side. Refer to “Limitations on Digital Channels” on page 3-6.

NOTE: The *Remote unit name* does not need to be specified on an **ANSWER** port.

The parameters presented at the console are identical for the NetPerformer base product and NetPerformer SIP VoIP option.

SE/PORT/#/PVCR example: in ANSWER Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def: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) ? ANSWER
PORT 1> Dialer (def:DTR) ?
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

NOTE: For details on the parameters in this example, refer to the appendix "SE/PORT/#/PVCR Configuration Parameters" on page 8-1.

3.4 Configuring a Bandwidth on Demand Link

A Bandwidth on Demand (BOD) link can be established between two **PVCR** ports or channels if one is configured to activate a call when traffic becomes heavy (**CALL-BOD** mode) and the other is configured to answer the call (**ANSWER** mode).

NOTE: Bandwidth On Demand can only be used to supplement a **dedicated WAN link**.

3.4.1 Limitations on Digital Channels

- A digital channel **cannot be used** as either the calling or answering side of a BOD link when the *Signaling mode* on the digital **LINK** is configured with CAS, **ROB BIT**, transparent (**TRSP-ORIG** or **TRSP-ANSW**) or no signaling (**NONE**).

  Under any of these *Signaling modes*, a **PVCR** channel can be set to be **DEDICATED** or **INACTIVE** mode only.
- For a digital channel, **CALL-BOD** mode is available only when the *Signaling mode* on the **LINK** is set to **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS**, **DMS100** or **QSIG**.

For further information on configuring the **LINK** of a digital interface card, refer to the *Digital Data* or *Digital Voice* module of this document series.

3.4.2 Calling Side of the BOD Link

► To configure the port or channel on the calling side of the BOD link:

1. Set the *Protocol* to **PVCR**
2. Set the *Mode* to **CALL-BOD**

NOTE: As an alternative, you can define the BOD link as part of a Schedule operation, using the *Operating mode* parameter of the **SETUP/SCHEDULE** menu. Refer to “Schedule for Automatic Link Activation” on page 5-1.

3. Specify which dedicated WAN link or links this port backs up, using the *Port to back* parameter
4. Set the *Dialer* to either DTR or X21-L1 (see “Dialer” on page 8-33). **Phone number dialing cannot be used to raise a BOD link.**

The parameters presented at the console are identical for the NetPerformer base product and NetPerformer SIP VoIP option.

SE/PORT/#/PVCR example: in CALL-BOD Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def: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:CALL-BKUP) ? CALL-BOD
PORT 1> Delay before BOD call activation (s)  (1-1000,def:120) ?
PORT 1> Delay before BOD call deactivation (s)  (1-1000,def:120) ?
PORT 1> BOD level (%) (5-95,def:80) ?
PORT 1> Delay before call activation (s) (1-1000,def:10) ?
PORT 1> Delay before call deactivation (s)  (1-1000,def:120) ?
PORT 1> Call activation timer (s) (30-1000,def:30) ?
PORT 1> Port to back (def:ANY) ?
PORT 1> Dialer (def:DTR) ?
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

For detailed descriptions of all parameters specific to a CALL-BOD connection, refer to "CALL-BOD Mode" on page 8-35 of the appendix *SE/PORT/#/PVCR Configuration Parameters*.

3.4.3 Answering Side of the BOD Link

► **To configure the port or channel on the answering side of the BOD link:**

1. Set the *Protocol* to **PVCR** and the *Mode* to **ANSWER**, as described for the answering side of a backup link (see “Answering Side of the Backup Link” on page 3-7)
2. Set the *Dialer* parameter to the same value as the *Dialer* on the **CALL-BOD** port at the other end of the connection (see “Dialer” on page 8-33).

NOTE: Not all digital channels can be configured as the answering side. Refer to “Limitations on Digital Channels” on page 3-9.

3.5 Configuring a Link for Conditioned Activation

The activation of a NetPerformer WAN link can be conditioned by the presence of active modem signals on a transparent user port (*Protocol* set to **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**) that sends data via this link.

- For a DCE connection, the **DCD** signal must be present.
- For a DTE connection, the **DTR** signal must be present.

► To configure a port or channel as a conditioned link:

1. Set the *Protocol* to **PVCR**
2. Set the *Mode* to **WAIT USER**
3. Change the other parameters from their default values, if desired. These are the same parameters as those for **DEDICATED** mode (see "Configuring a Dedicated WAN Link" on page 3-3).

If a WAN link is configured in **WAIT USER** mode, you can bring the link up by activating the modem signals on the transparent user port. When the NetPerformer detects the modem signals, it immediately activates the link required to transmit the data to its destination. When you deactivate the modem signals, the NetPerformer responds by disconnecting the link.

3.5.1 Limitations on Digital Channels

- A digital channel **cannot be used** as a **WAIT USER** conditioned link when the *Signaling mode* on the digital **LINK** is configured with CAS, **ROB BIT**, transparent (**TRSP-ORIG** or **TRSP-ANSW**) or no signaling (**NONE**).

  Under any of these *Signaling modes*, a **PVCR** channel can be set to be **DEDICATED** or **INACTIVE** mode only.
- For a digital channel, **WAIT USER** mode is available only when the *Signaling mode* on the **LINK** is set to **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS**, **DMS100** or **QSIG**.

For further information on configuring the **LINK** of a digital interface card, refer to the *Digital Data* or *Digital Voice* module of this document series.

SE/PORT/#/ PVCR example: in WAIT USER Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def: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:INACTIVE) ? WAIT USER
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

For details on the parameters in this example, refer to “DEDICATED Mode” on page 8-2 of the appendix *SE/PORT/#/PVCR Configuration Parameters*.

3.6 Deactivating a WAN Link

In *Inactive* mode the PVCR link is turned off. This mode can be useful when setting up the NetPerformer Schedule function. For further information, refer to "Schedule for Automatic Link Activation" on page 5-1.

► To deactivate a WAN port:

- Set the port *Protocol* to **PVCR**
- Set the *Mode* to **INACTIVE**.

The parameters listed are the same as those for **DEDICATED** mode (see "Configuring a Dedicated WAN Link" on page 3-3). If you define them fully, you can activate the link at a later time by simply changing the value of the *Mode* parameter from **INACTIVE** to **DEDICATED**. This can also be done automatically through the Schedule function.

SE/PORT/#/ PVCR example: in INACTIVE Mode

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PORT
Port number (ETH1/ETH2/CSL/1,def:1) ?
PORT 1> Protocol (def: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:CALL-BOD) ? INACTIVE
PORT 1> IP address (def:000.000.000.000) ?
PORT 1> Subnet mask (number of bits) (0-32,def:0) ?    {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> IP multicast protocol (def:NONE) ?
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) ?
```

NOTE: For details on the parameters in this example, see to "DEDICATED Mode" on page 8-2 .

3.7 Verifying WAN Link Configuration

The Display Parameters (**DP**) command provides a complete list of current values for all configuration parameters.

► To display the current values of WAN link configuration parameters:

1. Enter **DP** at the console command prompt
2. At the *Item* prompt, enter the name of the submenu of parameters you want to inspect:
   - **PORT:** To view the parameters for a built-in serial port. Enter the specific *Port number* at the prompt.
   - **SLOT:** To view the parameters for the digital channels or dual serial ports on a specific slot. Enter the *Slot number* at the prompt.
   - **ALL:** To view all configuration parameters. With this option, all ports and channels are listed. Enter **YES** at the prompt *Wait for <ENTER> after each screen* if you would like to view this display one screen at a time.

NOTE: The ALL option also lists all currently active extended parameters.

DP example: with backup link

```
SDM-9230>DP
DISPLAY PARAMETERS
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PVC/SCHEDULE/SLOT/USER/VLAN/ALL,def:GLOBAL) ? PORT
Port number (ETH/CSL/1/2/3,def:ETH) ? 1
PORT 1> Protocol.............................PVCR
PORT 1> Interface............................UNDEFINE
PORT 1> Clocking mode........................INTERNAL
PORT 1> Port speed (bps).....................56000
PORT 1> Mode.................................CALL-BKUP
PORT 1> Backup termination mode..............AUTOMATIC
PORT 1> Delay before call activation (s).....10
PORT 1> Delay before call deactivation (s) .....120
PORT 1> Call activation timer (s)............30
PORT 1> Port to back.........................ANY
PORT 1> Dialer...............................DTR
PORT 1> IP address...........................000.000.000.000
PORT 1> Subnet mask (number of bits).....0   {000.000.000.000}
PORT 1> IP RIP...............................V1
PORT 1> IP RIP TX/RX.........................DUPLEX
PORT 1> OSPF.................................DISABLE
PORT 1> IP multicast active..................NO
PORT 1> IP multicast protocol................NONE
PORT 1> NAT enable...........................NO
PORT 1> IPX RIP..............................DISABLE
PORT 1> IPX SAP..............................DISABLE
PORT 1> IPX network number...................00000000
PORT 1> Compression..........................YES
PORT 1> Remote unit name.....................
```

```
PORT 1> Timeout (ms).............................1000
PORT 1> Number of retransmission retries........100
PORT 1> Maximum number of voice channels........10000
PORT 1> Maximum Voice Channels If High Priority Data  10000
PORT 1> Cell Packetization......................YES
PORT 1> Filter..................................ALL
```

4

Phones for Backup Links

4.1 Phone Profiles

PVCR ports and channels defined as the calling side of a backup link (*Mode* set to **CALL-BKUP**) require phone profiles if their *Dialer* mode involves dialing a phone number to activate the link. Refer to “Dialer” on page 8-33.

- The phone profile contains all information required to execute the call correctly
- The NetPerformer will automatically dial the phone number that is associated with the desired remote unit
- Both modem and ISDN phone connections are supported.

For example, in Figure 4-1, NetPerformer unit A.3 is configured to back up both unit B.1 and unit B.2 using the **AT-19200** *Dialer* mode. To accomplish this, unit A.3 must be configured with two phone profiles, as shown in Table 4-1

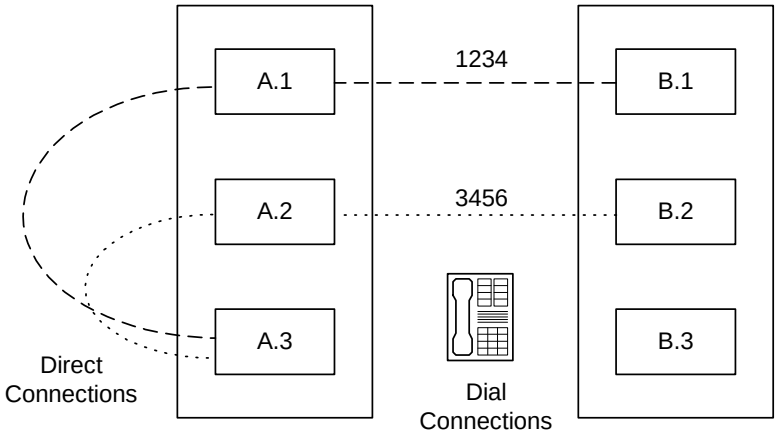

Figure 4-1: Phone Profiles for Backup Links

Profile Number	Remote Unit	Next Hop	Cost	Phone Number
1	B.1	A.1	1	1234
2	B.2	A.2	1	3456

Table 4-1 Example Phone Profile – NetPerformer A.3

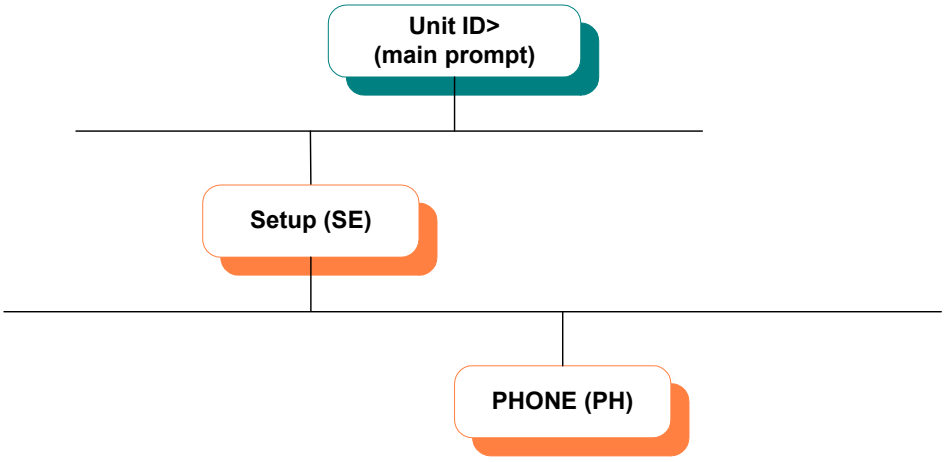

Figure 4-2: SETUP/PHONE Path on the CLI Tree

The **PHONE** submenu of the **SETUP** console command includes all parameters required to configure a phone profile. If you are using SNMP, all phone profile configuration variables are grouped under the *phone* category. For text-based configuration the *[phone#]* heading is used, where # represents the number of the phone profile.

Console	SNMP	Text-based Config
SE/PHONE	*phone* (category)	*[phone#]* (heading)

Table 4-2 Console Parameters

4.2 Configuring a Modem Connection

To configure a phone profile for a modem connection:

1. Enter the menu sequence: **SE** ↵ **PHONE**
2. Select the *Profile number*
3. Enter the *Remote unit* name
4. Leave the *Dialer type* at its default value, **MODEM**
5. Enter the dial *Phone number*.

SE/PHONE example: with MODEM Dialer type

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PHONE
Define phone profile for BACKUP links
PHONE> Profile number (1-64,def:1) ?
PHONE 1> Remote unit (def:) ? CHICAGO-9230
PHONE 1> Next hop (def:) ? MONTREAL-9220
PHONE 1> Cost (0-65534,def:1) ? 2
PHONE 1> Dialer type (def:MODEM) ?
PHONE 1> Phone number (def:) ? 4505551212
```

For details on the other parameters in this example, refer to the appendix “SE/PHONE Configuration Parameters” on page 9-1.

4.3 Configuring an ISDN Connection

ISDN phone profiles define the call setup required for link backup and Bandwidth On Demand over a digital ISDN channel. Each profile includes information specific to a particular call setup scenario.

NOTE: ISDN phone profiles are used to complete ISDN connections on both WAN and transparent user data channels (see the *Legacy Data* module of this document series). **They are not required in an ISDN voice application.**

To configure a phone profile with an ISDN connection:

1. Enter the menu sequence: **SE** ↵ **PHONE**
2. Select the *Profile number*
3. Enter the *Remote unit* name
4. Set the *Dialer type* to **ISDN**.

SE/PHONE example: with ISDN Dialer type

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? PHONE
Define phone profile for BACKUP links
PHONE> Profile number (1-64,def:1) ? 2
PHONE 2> Remote unit (def:) ? CHICAGO-9230
PHONE 2> Next hop (def:) ? MONTREAL-9220
PHONE 2> Cost (0-65534,def:1) ?
PHONE 2> Dialer type (def:MODEM) ? ISDN
PHONE 2> Remote number (def:) ? 5145551212
PHONE 2> Remote subaddress (def:) ? 01
PHONE 2> Local number (def:) ? 6595090
PHONE 2> Local subaddress (def:) ? 01
PHONE 2> Number of links (1-64,def:1) ?
```

For information on parameters specific to the ISDN *Dialer type*, refer to “ISDN Dialer” on page 9-5.

4.3.1 Backup ISDN Phone

You can configure two ISDN phones to connect to the same place, and one of these phones will back up the other. The *Type* parameter of the **SE/PHONE** submenu is used to distinguish the dedicated phone from the backup phone.

NOTE: Backup phones are available for ISDN phones only (*Dialer type* set to ISDN).

For example, if an ISDN phone over PVCR has its *Type* parameter set to **DEDICATED**, it can be backed up with another ISDN phone that is set to **BACK-UP**. The phone connection is made using either ISDN-PRI or ISDN-BRI.

Caution

The *Local number* and *Local subaddress number* parameters in the SETUP/SLOT/LINK configuration much match the parameters of the same name in the SETUP/PHONE configuration. Otherwise, the link will not go up.

SE/PHONE example, with backup ISDN phone

```
NP2>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/SVC/USER/VLAN,
def:BRIDGE) ? PHONE
Define phone profile for BACKUP links
PHONE> Profile number (1-64,def:1) ?
PHONE 1> Remote unit (def:) ? QUEBEC
PHONE 1> Next hop (def:) ? MTL
PHONE 1> Cost (0-65534,def:1) ?
PHONE 1> Dialer type (def:MODEM) ? ISDN
PHONE 1> Type (def:DEDICATED) ? BACK-UP
PHONE 1> Remote number (def:) ? 8198667553
PHONE 1> Remote subaddress (def:) ? 02
PHONE 1> Local number (def:) ? 5146448091
PHONE 1> Local subaddress (def:) ? 01
PHONE 1> Number of links (1-64,def:1) ?
```

5

Schedule for Automatic Link Activation

5.1 Configuring a Schedule

The **SCHEDULE** submenu of the **SETUP** command lets you configure all parameters for setting up time periods that govern the WAN link operating modes (data port configured with the PVCR protocol).

- For the console, enter **SE** followed by **SCHEDULE**.
- For SNMP, the schedule category includes all variables affecting schedule configuration.
- For text-based configuration the *[schedule#]* heading is used.

You can configure a schedule that defines a range of different link connection scenarios for automatic time-of-day connect. An example of how this works is provided in the section "Schedule Operation" on page 2-9.

Console	SNMP	Text-based Config
SE/SCHEDULE	*schedule* (category)	*[schedule#]* (heading)

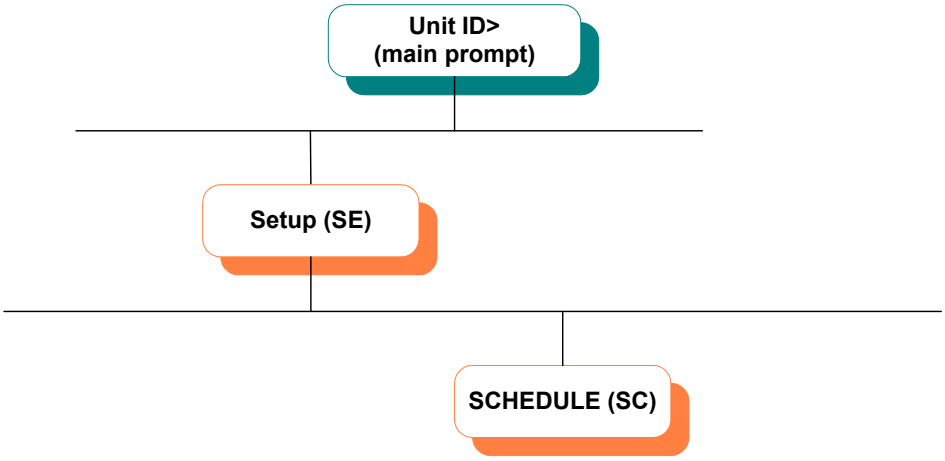

Figure 5-1: SETUP/SCHEDULE Path on the CLI Tree

When you access the **SETUP/SCHEDULE** submenu the following parameters appear for selecting and defining a specific period.

SE/SCHEDULE example

```
SDM-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/PHONE/
PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/USER/VLAN,
def:BRIDGE) ? SCHEDULE
PERIOD number (1-10,def:1) ?
PERIOD 1> PORT 1 Operating mode (def:INACTIVE) ? DEDICATED
PERIOD 1> PORT 2 Operating mode (def:INACTIVE) ? CALL-BKUP
PERIOD 1> PORT 3 Operating mode (def:INACTIVE) ? CALL-BOD
PERIOD 1> Day (def:ALL) ?
```

```
PERIOD 1> Begin time (def:00:00) ? 08:00
PERIOD 1> End time (def:23:59) ? 17:00
PERIOD 1> Enable (def:NO) ? YES
```

NOTE: You must define the *Day*, *Begin Time* and *End Time* of each **SCHEDULE** period carefully to avoid overlapping periods. If a period is active when the Begin Time of a second period is reached, the second period will not start until the first period is over.

For example, Schedule period #1 is defined to begin at 13:00 and end at 14:00. Schedule period #2 is defined to begin at 13:30 and end at 17:00, but cannot start at the configured time due to the continued activation of Schedule period #1. Schedule period #2 will start at 14:00 and end at 17:00.

5.1.1 PERIOD number

Console	SNMP	Text-based Config
PERIOD number	scheduleEntry, schedulePeriod	[schedule#]

The number of the period you want to configure on the console command line. For SNMP, select the *scheduleEntry* table and look under the *schedulePeriod* for the desired period.

Once you select a period, the period number is displayed thereafter at the beginning of each line from the console.

Values: *1 - 10*

Default: *1*

5.1.2 PORT Operating mode

Console	SNMP	Text-based Config
PORT 1 Operating mode • • • PORT *n* Operating mode	schedulePort1 • • • schedulePort*n*	[schedule#] Port 1 • • • Port*n*

Operating mode for the WAN link (port configured in PVCR protocol) when this period is activated. The possible settings for this parameter are the following:

- **DEDICATED**: Communication is carried out over a dedicated line.
- **ANSWER**: The port can receive calls only.
- **CALL-BACKUP**: Call mode using a backup recovery mechanism. The port is activated in case of line failure on the dedicated WAN links.
- **CALL-BOD**: Call mode using Bandwidth On Demand (BOND) processing, which automatically controls both dialing over and hanging up the link.

NOTE: Bandwidth on demand is available for dedicated trunks (WAN links) only, that is, data ports set in the PVCR protocol.

- **INACTIVE**: Deactivation of the link.
- **WAIT USER**: Wait for activity on user port. The link is activated only if active modem signals are detected on a transparent user port (*Protocol* set to **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**) that sends data via this link.

Values: *DEDICATED, ANSWER, CALL-BACKUP, CALL-BOD, INACTIVE, WAIT USER*

Default: *INACTIVE*

5.1.3 Day

Console	SNMP	Text-based Config
Day	scheduleDay	[schedule#] Day

Day(s) of the week during which the period is effective. Select **ALL** to configure the period for all days of the week. Use **WEEKEND** for Saturday and Sunday only. Use **WORKDAY** for Monday to Friday.

Values: *ALL, SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, WORKDAY, WEEKEND*

Default: *ALL*

5.1.4 Begin time

Console	SNMP	Text-based Config
Begin time	scheduleBeginTime	[schedule#] BeginTime

Time of day at which the period begins on a 24-hour clock. When the period is enabled, the WAN link operating mode defined for the period (see earlier) will commence at this time on the configured day(s).

Values: *00:00 - 23:59*

Default: *00:00*

5.1.5 End time

Console	SNMP	Text-based Config
End time	scheduleEndTime	[schedule#] EndTime

Time of day at which the period ends on a 24-hour clock. When the period is enabled, the WAN link operating mode defined for the period (see earlier) will be disabled at this time on the configured day(s).

If no other period is configured and enabled to commence at this time, the NetPerformer will activate the default operating mode configured with the WAN link parameters.

Values: *00:00 - 23:59*

Default: *00:00*

5.1.6 Enable

Console	SNMP	Text-based Config
Enable	scheduleEnable	[schedule#] Enable

This parameter defines whether the period will be used during the time period it covers. When no periods are enabled, or no enabled period covers the current time, the NetPerformer uses the default operating mode configured with the WAN link parameters.

Values: *NO, YES*

Default: *NO*

6

Manual Link Activation and Deactivation

6.1 About Activation and Deactivation

Manually activate and deactivate a backup or BOD link on the NetPerformer by executing the CALL and HANG commands (see next section). These commands are available from the NetPerformer console only.

- Reset a frozen WAN link by executing the **RP** command (see "Resetting a WAN Link" on page 6-4).

6.2 CALL Command

► To manually activate a backup or BOD link:

1. Enter **CALL** at the console command line.
2. Specify the *Link number*.

> **NOTE:** The port or channel you select **must** be set to **CALL-BKUP** or **CALL-BOD** *Mode*. If it is not, the **CALL** command will not be executed.

3. Enter **YES** to confirm manual activation of the link.

During the calling procedure the console displays the current link state, as in the following example:

```
SDM-9230>CALL
ACTIVATE LINK
Link number (1/2,def:2) ?
Link 2 manual activation, confirm (NO/YES,def:NO) ? YES
Link 2 state: CALL
Link 2 state: TEST
Link 2 state: TEST
Link 2 state: DATA
```

Once the link reaches the **DATA** state, the console returns to the command prompt.

6.3 HANG Command

Use the console **HANG** command to deactivate a backup or BOD link that has been manually activated with the **CALL** command.

NOTE: You **must** execute the **HANG** command to deactivate a backup link whose *Backup termination mode* is set to **MANUAL** (see "Backup termination mode" on page 8-30), **even if it was activated automatically**.

► To manually deactivate a backup or BOD link:

1. Enter **HANG** at the console command line.
2. Specify the *Link number*.

NOTE: The port or channel you select **must** be set to **PVCR** *Protocol*, **CALL-BKUP** or **CALL-BOD** *Mode*, and must be currently active. Otherwise, the **HANG** command will not be executed.

3. Enter **YES** to confirm manual activation of the link.

During link deactivation the console displays the link state, as in the following example.

```
SDM-9230>HANG
DE-ACTIVATE LINK
Link number (1/2,def:2) ?
Link 2 manual de-activation, confirm (NO/YES,def:NO) ? YES
Link 2 state: HANG
Link 2 state: HANG
Link 2 state: DOWN
Link 2 state: DOWN
Link 2 state: OFF
```

Once the link reaches the **DOWN** state, the console returns to the command prompt.

NOTE: The **HANG** command can also be used to hang up a dialup connection used for PPP link backup. Refer to the chapter *PPP Backup Methods* in the *WAN/ Point-to-Point Protocol (PPP)* module of this document series.

6.4 Resetting a WAN Link

If a WAN link on a built-in serial port appears to be frozen, execute the Reset Port (**RP**) command to flush the transmit and receive queues and reinitialize the port.

This command can be executed by users with **FULL** console access only. Refer to the section on *Controlling Access to the NetPerformer* in the *Quick Configuration* module of this document series.

NOTE: When you execute this command the link remains active and no alarms are reported.

► To reset a WAN link (or data port):

1. Enter **RP** at the console command line.
2. Select the *Port number*.

RP example

```
SDM-9230>RP
RESET PORT
Port number (1,def:1) ?
Reset port, please confirm (NO/YES,def:NO) ? YES
Port reset !
```

NOTE: As a result of this command, all port counters are reset to zero (see "Displaying WAN Link Counters" on page 7-3).

7

Checking WAN Link Status

7.1 About NetPerformer WAN link status

NetPerformer WAN link status information includes:

- Current link counters, using the Display Counters (**DC**) command (see “Displaying WAN Link Counters” on page 7-3)
- Number of link errors that have occurred, using the Display Errors (**DE**) command (see “Displaying WAN Link Errors” on page 7-7)
- A static display of current link states, using the Display States (**DS**) command (see “Displaying WAN Link States” on page 7-11)
- Continuous display of link states in real time, using the Display Port States (**DPORT**) command (see “Continuous Display of WAN Link States” on page 7-15)
- PowerCell destinations table, using the Display Destinations (**DD**) command (see “Displaying PowerCell Destinations” on page 7-17)
- Internal PowerCell connections, using the Display Connections (**DX**) command (see “Displaying PowerCell Connections” on page 7-20).

In addition, you can verify the configuration of a WAN link with the Display Parameters (**DP**) command. Turn to “Verifying WAN Link Configuration” on page 3-15.

7.2 Displaying WAN Link Counters

The Display Counters (**DC**) command shows all counters stored in memory, including the mean or peak values of transmitter and receiver rates on all ports.

The NetPerformer takes a snapshot of these counters every 5 seconds, and keeps this information for a maximum of 2 minutes. Mean rates are calculated over the entire 2-minute period, whereas peak rates are obtained by comparing all the snapshots taken. The NetPerformer also keeps statistics on the number of frames and octets transmitted and received on the links.

► To display the counters for the WAN links:

1. Enter **DC** at the console command prompt
2. At the *Item* prompt, enter the type of port you want to inspect:
   - **PORT:** To view the counters for all built-in serial ports
   - **SLOT:** To view the counters for all digital channels or dual serial ports on a particular slot. Enter the *Slot number* at the prompt
3. At the *Counters* prompt, select **MEAN** or **PEAK** counters.

For SNMP, all WAN link statistics are grouped under the *statIfwan* category.

Console	SNMP
DC/PORT (serial port) DC/SLOT (digital channel or dual serial port)	*statIfwan* (category)

The same statistics are displayed for a built-in serial port, a port on the Dual Serial interface card, and a digital channel. Here is an example from the NetPerformer base product console:

```
SDM-9230>DC
DISPLAY COUNTERS
Item (BOOTP/CONFIG/DNS/IP/NAT/PORT/PVC/Q922/Q933/QOS/SLOT/SVC/TIMEP,
def:Q933) ? PORT
Counters (MEAN/PEAK,def:MEAN) ?
Compression rate.............................6.04 (M)
Decompression rate...........................6.18 (M)
PORT ETH> Transmitter rate.....................0    kbps (M)
PORT ETH> Receiver rate........................0    kbps (M)
PORT CSL> Transmitter rate.....................0    % (M)
PORT CSL> Receiver rate........................0    % (M)
PORT 1> Transmitter rate.......................2    % (M)
PORT 1> Receiver rate..........................2    % (M)
PORT 1> Number of frames transmitted............4123392
PORT 1> Number of frames received..............4204532
PORT 1> Number of octets transmitted............422183940
PORT 1> Number of octets received..............446426291
PORT 2> Transmitter rate.......................0    % (M)
PORT 2> Receiver rate..........................0    % (M)
```

```
PORT 2> Number of frames transmitted.....0
PORT 2> Number of frames received.....0
PORT 2> Number of octets transmitted.....0
PORT 2> Number of octets received.....0
```

7.2.1 Compression rate

Console	SNMP
Compression rate	statSystemMeanCompRate statSystemPeakCompRate

The mean (**M**) or peak (**P**) compression rate on traffic sent from this port or channel. This rate is calculated over a period of 2 minutes according to the following formula:

$$CR = \frac{\textit{Number of characters before compression}}{\textit{Number of characters after compression}}$$

This formula excludes small frames on a user port (3 characters or less) as well as cell overhead.

7.2.2 Decompression rate

Console	SNMP
Decompression rate	statSystemMeanDecompRate statSystemPeakDecompRate

The mean (**M**) or peak (**P**) decompression rate for traffic received on this port or channel. This rate is calculated over a period of 2 minutes.

7.2.3 Transmitter rate

Console	SNMP
Transmitter rate	statIfwanMeanTx statIfwanPeakTx

The mean (**M**) or peak (**P**) bandwidth usage for transmissions from this port or channel. This statistic is given as a percentage of the available bandwidth.

7.2.4 Receiver rate

Console	SNMP
Receiver rate	statIfwanMeanRx statIfwanPeakRx

The mean (**M**) or peak (**P**) bandwidth usage for traffic received by this port or channel. This statistic is given as a percentage of the available bandwidth.

7.2.5 Number of frames transmitted

Console	SNMP
Number of frames transmitted	statIfwanFramesTx

The number of frames that this port or channel has transmitted to the attached equipment.

7.2.6 Number of frames received

Console	SNMP
Number of frames received	statIfwanFramesRx

The number of frames that this port or channel has received from the attached equipment.

7.2.7 Number of octets transmitted

Console	SNMP
Number of octets transmitted	statIfwanOctetsTx

The number of octets that this port or channel has transmitted to the attached equipment.

7.2.8 Number of octets received

Console	SNMP
Number of octets received	statIfwanOctetsRx

The number of octets that this port or channel has received from the attached equipment.

7.2.9 Resetting the Counters

Use the Reset Counters (**RC**) command to return the WAN link counters, as well as all other statistics and error counters, to zero.

- Enter **RC** at the console command prompt.

  The date and time of the last counters reset is displayed.
- Enter **YES** at the confirmation prompt to confirm the reset of all counters.

  The counters are reset to zero (**0**), and the *Last Counter Reset* timestamp is updated to the current system date and time.

- If you enter **NO** at the confirmation prompt, the current values of all counters remain unchanged.
- For SNMP management, set the *statSystemResetCounters* variable to **YES**.

Console	SNMP
RC	statSystemResetCounters

NOTE: The **RC** command is available to users with **FULL** console access only. To change access privileges for a particular user, refer to the chapter *Controlling Access to the NetPerformer* in the *Quick Configuration* module of this document series.

RC example

```
SDM-9230>RC
RESET COUNTERS
Last counter reset : THU   2003/10/16 14:18:02
Reset counters, please confirm (NO/YES,def:NO) ? YES
Counters reset !
```

NOTE: The Reset Counters command resets the error counters as well as the statistics counters for all port types.

7.3 Displaying WAN Link Errors

The Display Errors command (**DE**) shows the number of errors that have occurred on all ports for each error type stored in memory. These statistics can be used to diagnose operating problems on the WAN links.

► To display the number of errors that have occurred on the WAN links:

1. Enter **DE** at the console command prompt
2. At the *Item* prompt, enter the type of port you want to inspect:
   - **PORT:** To view the errors on all built-in serial ports
   - **SLOT:** To view the errors on all digital channels or dual serial ports on a particular slot. Enter the *Slot number* at the prompt.

For SNMP, all WAN link statistics are grouped under the *statIfwan* category.

Console	SNMP
DE/PORT (serial port) DE/SLOT (digital channel or dual serial port)	*statIfwan* (category)

Here is an example from the NetPerformer base product console:

DE/PORT example

```
SDM-9230>DE
DISPLAY ERRORS
Item (BOOTP/CHANNEL/DICT/GROUP/NAT/PORT/PU/PVC/Q922/SLOT/SVC/TIMEP,
def:SLOT) ? PORT
PORT ETH> Number of excessive collisions........0
PORT ETH> Number of late TX collision errors....0
PORT ETH> Number of underruns...................0
PORT ETH> Number of late RX collision errors....0
PORT ETH> Number of overruns....................0
PORT ETH> Number of busy conditions.............0
PORT ETH> Number of FCS errors..................0
PORT ETH> Number of alignment errors............0
PORT ETH> Number of carrier sense errors........0
PORT ETH> Number of bad frames..................0       ------
PORT ETH> Number of retries.....................0
PORT ETH> Number of restarts....................0
PORT CSL> Number of bad frames..................0       ------
PORT 1> Number of bad frames....................6       UQFSBA
PORT 1> Number of underruns.....................0
PORT 1> Number of retries.......................0
PORT 1> Number of restarts......................0
PORT 1> Number of frames discarded (overrun)....0
PORT 1> Number of octets discarded (bad)........0
PORT 1> Number of octets discarded (overrun)....0
Bad flags: U:Bad LENGTH  Q:Overflow  F:Flush  S:Overrun  B:Bad CRC
A:Abort
```

NOTE: Use the Reset Counters (**RC**) command to return all error counters to zero. Refer to “Resetting the Counters” on page 7-5 for instructions.

7.3.1 Number of bad frames

Console	SNMP
Number of bad frames	statIfwanBadFlags

Indicates the number of bad frames received and rejected at this port or channel. The flags provided to the right of this figure indicate the types of errors that have occurred:

- **U**: Bad length or invalid cell type. This type of error occurs on a **PVCR** port only.
- **Q**: Overflow; overflow on reception
- **F**: Flush; overflow on reception
- **S**: Overrun; overflow on reception
- **B**: Frame contains a bad CRC
- **A**: Frame contains an abort sequence.

NOTE: When one of these error types has not occurred, the NetPerformer displays a dash (**-**) in the appropriate flag position.

The *Number of bad frames* is incremented by one for:

- Each frame received with a U, B or A flag.
  - On a WAN link (**PVCR** port) these flags are caused by transmission errors on the network.
  - On a transparent user port, the B and A flags are caused by transmission errors on the user side.
- Each frame discarded due to a Q, F or S flag.
  - On a WAN link (**PVCR** port) these flags indicate that the unit was temporarily unable to receive a frame because the input queue was full.
  - On a transparent user port, these flags indicate an overflow on the input queue. Refer to “Fallback on Receive Clock” on page 1-11 for further information.

7.3.2 Number of underruns

Console	SNMP
Number of underruns	statIfwanUnderruns

NOTE: For a WAN link the *Number of underruns* is not relevant, and is displayed as **0**.

Indicates the number of transmission errors that have occurred due to incomplete frames. The *Number of underruns* is incremented when a frame currently in transmission has been aborted because the end of the frame was not received on time. This may be caused by a WAN link error, or improper configuration of the *Transmission start level* parameter on a transparent user port. Refer to "Fallback on Transmit Clock" on page 1-12 for further information.

7.3.3 Number of retries

Console	SNMP
Number of retries	statIfwanRetries

NOTE: For a WAN link the *Number of retries* is not relevant, and is displayed as **0**.

Indicates the number of retries on an SDLC port. It is incremented when there is a retransmission between the NetPerformer and the SNA host or PU.

7.3.4 Number of restarts

Console	SNMP
Number of restarts	statIfwanRestart

Indicates how many times the WAN link returned from **DATA** state to **TEST** state because the receiver did not receive a valid cell within the *Timeout* delay (described on "Timeout (ms)" on page 8-24).

NOTE: For a transparent user port the *Number of restarts* is incremented every time an error on the link caused the port to restart. This indicates how many times the port has had to be resynchronized due to errors on the WAN link.

7.3.5 Number of frames discarded (overrun)

Console	SNMP
Number of frames discarded (overrun)	statIfwanOvrFrames

The number of frames that were discarded due to an overrun on the receive queue for this port or channel.

7.3.6 Number of octets discarded (bad)

Console	SNMP
Number of octets discarded (bad)	statIfwanBadOctets

The number of octets received that were discarded due to transmission errors on this port or channel.

7.3.7 Number of octets discarded (overrun)

Console	SNMP
Number of octets discarded (overrun)	statIfwanOvrOctets

The number of octets that were discarded due to an overrun on the receive queue for this port or channel.

NOTE: Four error counters are not displayed for a WAN link, and pertain to transparent user ports only (described in the *Legacy Data* module of this document series):

- *Number of compressor errors*
- *Number of channel overflow errors*
- *Number of channel abort errors*
- *Number of channel sequence errors*

7.4 Displaying WAN Link States

The Display States (**DS**) command provides current status information concerning the NetPerformer ports and channels. This is a static one-time display.

NOTE: The port and channel status can also be viewed as a continuous real-time display. Refer to "Continuous Display of WAN Link States" on page 7-15.

► To display the current status of all WAN links:

1. Enter **DS** at the console command prompt
2. At the *Item* prompt, enter the type of port you want to inspect:
   - **PORT:** To view the current status of all built-in serial ports
   - **SLOT:** To view the current status all digital channels or dual serial ports on a particular slot. Enter the *Slot number* at the prompt.

For SNMP, all WAN link statistics are grouped under the *statIfwan* category.

Console	SNMP
DS/PORT (serial port) DS/SLOT (digital channel or dual serial port)	*statIfwan* (category)

Here is an example from the NetPerformer base product console:

DS/PORT example

```
SDM-9230>DS
DISPLAY STATES
Item (GLOBAL/PORT/PU/PVC/SLOT/SVC/VLAN,def:GLOBAL) ? PORT
PORT ETH> Protocol.............................ETHERNET
PORT ETH> Interface............................10BASET
PORT ETH> Speed................................10M
PORT ETH> Duplex mode..........................HALF
PORT ETH> Operating mode.......................L-
PORT ETH> State................................OPEN
PORT ETH> Network address......................AAAAAAAAA001
PORT ETH> Burned-in address....................00200AB05825
PORT ETH> Number of deferred transmissions.....430
PORT ETH> Number of collision frames...........2261
PORT CSL> Protocol.............................CSL
PORT CSL> Interface............................DTE-UNDEFINED
PORT CSL> Speed used [bps].....................0
PORT CSL> Modem signals.........................----C-
PORT CSL> State................................DISC
PORT 1> Protocol...............................FR-USER
PORT 1> Interface..............................DTE-V35
PORT 1> Speed used [bps].......................2048k
PORT 1> Modem signals..........................STDRC-
PORT 1> State..................................DATA
Modem signals:  d(S)r  d(T)r  (D)cd  (R)ts  (C)ts  r(I)  (-)off
```

7.4.1 Protocol

Console	SNMP
Protocol	statIfwanProtocol

The protocol currently used on the port. For a WAN link, the *Protocol* is shown as **PVCR**.

7.4.2 Interface

Console	SNMP
Interface	statIfwanInterface

The gender of the port (**DTE** or **DCE**) and its physical interface (V.35/X.21/RS-232/RS-449/RS-530). These are determined from the interface auto-detect function on the port, which reflects the type of cable that has been installed.

NOTE: On legacy NetPerformer products, this field indicates the current soft-strapping for the port.

7.4.3 Speed used

Console	SNMP
Speed used	statIfwanSpeed

The speed of the port or channel.

- If the port *Clocking mode* is **EXTERNAL**, the *Speed used* statistic is the actual speed of the port, which is measured by the NetPerformer every 10 seconds.

NOTE: The speed measured by the NetPerformer may be different from the configured speed if the WAN link has a **DTE** interface.

- If the port *Clocking mode* is **INTERNAL**, the *Speed used* statistic is the speed configured with the *Port speed* parameter.
- For a digital channel the *Speed used* statistic reflects the *Number of consecutive timeslots* times the *DS0 speed (bps)* configured for the channel.

7.4.4 Modem signals

Console	SNMP
Modem signals	statIfwanModemSignal

The modem signal status.

- For an RS-232/RS-449/RS530 or V.35 interface the *Modem signals* statistic is displayed with a six-character field that includes the following flags:
  - **S**: DSR ON
  - **T**: DTR ON
  - **D**: DCD ON
  - **R**: RTS ON
  - **C**: CTS ON
  - **I**: RI ON
- For an X.21 interface the *Modem signals* statistic is displayed with a two-character field that includes the following flags:
  - **C**: COMMAND ON
  - **I**: INDICATION ON

NOTE: When a modem control signal is inactive, the NetPerformer displays a dash (**-**) in the appropriate flag position.

7.4.5 State

Console	SNMP
State	statIfwanState

The current status of the port or channel. The possible states for a WAN link are:

- **OFF**: Link inactive.
- **DOWN**: Waiting for the **DCD** signal to come up. This state is transitory for a WAN link in **DEDICATED** or **ANSWER** mode. For a WAN link in **CALL-BKUP** or **CALL-BOD** mode, it persists as long as the link is not required (calling condition not met).
- **CALL**: Trying to establish a connection. If the WAN link has a **DTE** interface, it will stay in this state until the **DCD** modem signal is detected on the port.
- **TEST**: WAN link in test mode. The test consists of a series of **ENQ/ACK** sequences, used to determine whether the link is up.
- **DATA**: WAN link in operation. Traffic is transmitted across the link in this state, and a **Hello** message is sent during idle periods.

NOTE: If the receiver does not receive a valid cell within the delay configured with the port *Timeout* parameter, the link returns to the **TEST** state. If this situation persists for a period longer than the global *Link timeout delay*, an alarm is logged.

- **HANG**: Disconnecting a call. This state is detected on a WAN link in **CALL-BKUP** or **CALL-BOD** mode only, and lasts for approximately 5 seconds. During that time, all traffic is rerouted before the link is deactivated.

7.5 Continuous Display of WAN Link States

The Display Port States (**DPORT**) command provides a real-time status display of all serial ports and interface card channels (including ports on the dual serial interface card).

► To execute the DPORT command:

1. Enter **DPORT** at the console command prompt.
2. Navigate the display using the **<Home>**, **<End>**, **<Up Arrow>** and **<Down Arrow>** keys.

   The various statistics in the **DPORT** display are updated dynamically and continuously refreshed on the screen. Refer to "Displaying WAN Link States" on page 7-11 for a description of each statistic.

► To quit from the DPORT command:

- Press any key other than the **DPORT** navigation keys.

Here is an example from an SDM-9230:

DPORT example

```
SDM-9230>DPORT
DISPLAY PORT STATES
--------------------------------------------------------------------------
----
|PORT#  PROTOCOL     INTERFACE  SPEED      MODEM      STATE DELAY          |
|                               (BPS)      SIGNALS                         |
--------------------------------------------------------------------------
----
|    1  FR-USER      DTE-V35    2048k      STDRC-      DATA                |
|  101  PVCR          T1-TE      1536k      STDRC-      DATA                |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
| Modem signals:  d(S)r  d(T)r  (D)cd  (R)ts  (C)ts  r(I)  (-)off
|
--Use HOME, END, UP and DOWN arrow keys to scroll. Press any other key to
exit.-
```

In this example:

- Port 1 is the built-in serial port on the SDM-9230 unit and is used as a WAN link (**FR-USER** protocol).
- Port 101 is the first channel on a T1 interface card installed in slot 1. This channel is also a WAN link.

7.6 Displaying PowerCell Destinations

The Display Destination Table (**DD**) command provides a routing table of all NetPerformer PowerCell destinations. This table shows all destinations that can be reached via ports and PVCs configured with the **PVCR** protocol.

The PowerCell destination table is also available from SNMP, using the *statPvcrRouteEntry* table.

Console	SNMP
DD	statPvcrRouteEntry (table)

► To execute the DD command:

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

DD example

```
SDM-9230>DD
DISPLAY DESTINATION TABLE

The destination table has 13 entry(ies)

DESTINATION       VAL  COST    INTRF   NEXT HOP          AGE

BTM1              Y    1       PVC   7   BTM1.80-1         19  d
BTM1.80-1         Y    0       PVC   7   SDM-9230          0   s
BTM2              Y    1       PVC   8   BTM2.60-1         58  s
BTM2.60-1         Y    0       PVC   8   SDM-9230          0   s
FR.60-1           Y    1       PVC   2   FR.60-3           19  d
FR.60-2           Y    2       PVC   2   FR.60-3           19  d
FR.60-3           Y    0       PVC   2   SDM-9230          0   s
FR.60-4           Y    1       PVC   2   FR.60-3           19  d
SDM-9230          Y    0       LOCAL     SDM-9230          0   s
SDM-9230-1        Y    1       PVC   1   SDM-9230-2        19  d
SDM-9230-2        Y    0       PVC   1   SDM-9230          0   s
SDM-9230-3        Y    1       PVC   1   SDM-9230-2        19  d
ISDN              Y    2       PVC   7   BTM1.80-1         19  d
```

- You can also enter a character string as an argument to refine the results of this command.

NOTE: This option is not available if the unit is configured with Unit Routing Version 1.

For example, enter a shortened version of a *Unit name* to view the status of all destinations that match this character string:

```
FR.80-2>DD FR.80
DISPLAY DESTINATION TABLE
```

```
Local search

The matching list with 'FR.80' has 4 entry(ies)

DESTINATION       VALID  COST

FR.80             YES    0
FR.80-1           YES    0
FR.80-2           YES    0
FR.80-3           YES    0
```

NOTE: The **INTRF** (*Interface*), **NEXT HOP** and **AGE** statistics are displayed only when you execute the **DD** command **without** an argument.

- If you enter an argument that is specific to a single NetPerformer unit, that destination alone will be displayed.
- If no *Unit name* matches the argument you enter, the search for a matching list of destinations will time out.

7.6.1 DESTINATION

Console	SNMP
DESTINATION	statPvcrRouteName

The PVCR routing destination. Each destination is identified by its global *Unit name* parameter.

7.6.2 VAL

Console	SNMP
VAL	statPvcrRouteValid

The value of this entry indicates whether the connection to this destination is currently active (**YES**) or inactive (**NO**).

COST

Console	SNMP
COST	statPvcrRouteMetric

This entry provides the hop count, or number of NetPerformer units that must be passed over to reach the destination. When at **0**, it indicates a direct connection to the destination.

NOTE: If a destination is unreachable, the cost is displayed as **32** for Unit Routing Version 2, or **16** for Unit Routing Version 1.

7.6.3 INTRF

Console	SNMP
INTRF	statPvcrRouteIntrf

The interface used to reach the destination. The values in this column correspond to physical connections on the NetPerformer:

- **0 - 1999**: PVCR port. The value shown is equivalent to the port number.
- **2000 - 3999**: PVC. Subtract 2000 from this value to find the PVC number.
- **4000 - 5999**: FireWire (backplane) connection on the rackmount chassis. The third digit gives the Rack ID and the fourth gives the Slot ID.
- **6000**: Identifies the entire unit when Unit Routing Version **2** is used.

7.6.4 NEXT HOP

Console	SNMP
NEXT HOP	statPvcrRouteNextHop

The next unit on the path to the final destination. The next hop is identified by its global *Unit name*.

7.6.5 AGE

Console	SNMP
AGE	statPvcrRouteAge

The aging time since this destination was entered on the PowerCell destination table. This time is displayed in seconds (**s**), minutes (**m**), hours (**h**), days (**d**) or years (**y**), depending on how long the entry has been in the table.

- For a valid connection (**VAL=YES**), the aging time is incremented until an update is received for this entry.
- For an invalid connection (**VAL=NO**), the **AGE** value is incremented for 120 seconds, and then removed from the destination table.
- If a destination is reached through a direct connection (**COST=0**), its **AGE** value remains at 0 seconds, and will increase only when the connection is deactivated.

7.7 Displaying PowerCell Connections

The Display Connections (**DX**) command displays all active internal connections on the NetPerformer unit. These include PowerCell (PVCR link), IP and IPX (LAN port) and console (Relay) connections.

► To execute the DX command:

- Enter **DX** at the console command prompt.

DX example

```
SDM-9230>DX
DISPLAY CONNECTIONS
GROUP to SDM-9230-2 [SDM-9585]
  LINK 1 [pvc]
  CLASS 0
    CHANNEL MGMT1    to SDM-9230-2        : (tx1/rx1) uncompr.
  CLASS 1
    CHANNEL IP       to SDM-9230-2        : (tx2/rx2) compr.
    CHANNEL IPX      to SDM-9230-2        : (tx3/rx3) compr.
GROUP to FR.60-3 [SDM-9120]
  LINK 2 [pvc]
  CLASS 0
    CHANNEL MGMT1    to FR.60-3           : (tx1/rx1) uncompr.
  CLASS 1
    CHANNEL IP       to FR.60-3           : (tx2/rx2) compr.
    CHANNEL IPX      to FR.60-3           : (tx3/rx3) compr.
GROUP to PVC   6 [SDM-0]
  LINK 6 [pvc]
  CLASS 1
    CHANNEL          to PVC   6           : (tx1/rx-1) uncompr.
GROUP to ATM1.80-1 [SDM-9220]
  LINK 7 [pvc]
  CLASS 0
    CHANNEL MGMT1    to BTM1.80-1         : (tx1/rx1) uncompr.
  CLASS 1
    CHANNEL IP       to BTM1.80-1         : (tx2/rx2) compr.
    CHANNEL IPX      to BTM1.80-1         : (tx3/rx3) compr.
GROUP to PVC   5 [SDM-0]
  LINK 5 [pvc]
  CLASS 1
    CHANNEL          to PVC   5           : (tx1/rx-1) uncompr.
GROUP to BTM2.60-1 [SDM-9230]
  LINK 8 [pvc]
  CLASS 0
    CHANNEL MGMT1    to BTM2.60-1         : (tx1/rx1) uncompr.
  CLASS 1
    CHANNEL IP       to BTM2.60-1         : (tx2/rx2) compr.
    CHANNEL IPX      to BTM2.60-1         : (tx3/rx3) compr.
```

The **DX** display includes:

- **GROUP**: Indicates the *Unit name* and product identification of the destination NetPerformer unit.

- **LINK**: The active WAN link. More than one link may be listed.
- **CLASS**: The classes sharing the bandwidth of the WAN link connection. Class 0 represents internally routed connections, which are always uncompressed.
- **CHANNEL**: The individual connections made via the NetPerformer for each class. These are identified as **IP**, **IPX**, routing (**MGMT1**) or console (**RELAY**) connections. The destination *Unit name*, transmission channel (**tx**), receiving channel (**rx**) and compression status are indicated for each connection.

If different types of **LINKs** go to the same destination, the PowerCell links will supersede all other types, which are left offline. This ensures that two inconsistent **LINKs** cannot belong to the same **GROUP** of links, which would prevent the destination name from appearing in the PowerCell destination table (described on “Displaying PowerCell Destinations” on page 7-17).

7.8 Display Commands for IP Header Compression

Following are the various display commands providing information on IP Header compression status.

Display Counter (DC/IPHC) Example

```
9230-WG67>DC
DISPLAY COUNTERS
Last counter reset : THU   2012/07/12 14:23:43
Item (BOOTP/BPLL/CHANNEL/CONFIG/DNS/GROUP/IP/IPHC/NAT/PORT/PVC/QOS/
REDUNDANCY/
SIP/SLOT/SNMP/TIMEP,def:IPHC) ?
Number of active IP/UDP/RTP header comp. contexts...3
Number of active IP/UDP/RTP header decomp. contexts.3
Number of IP/UDP/RTP header compressed frames.......1566
Number of IP/UDP/RTP header decompressed frames.....1566
IP/UDP/RTP Header mean compression rate.............2.70  (M)
IP/UDP/RTP Header peak compression rate.............2.72  (P)
IP/UDP/RTP Header mean decompression rate...........2.70  (M)
IP/UDP/RTP Header peak decompression rate...........2.72  (P)

Number of active IP/TCP header comp. contexts.......0
Number of active IP/TCP header decomp. contexts.....0
Number of IP/TCP header compressed frames...........0
Number of IP/TCP header decompressed frames.........0
IP/TCP Header mean compression rate.................0.00  (M)
IP/TCP Header peak compression rate.................0.00  (P)
IP/TCP Header mean decompression rate...............0.00  (M)
IP/TCP Header peak decompression rate...............0.00  (P)
9230-WG67>
```

Display Counter (DE/IPHC) Example

```
9230-WG67>DE
DISPLAY ERRORS
Item (BOOTP/CHANNEL/DICT/GROUP/IPHC/NAT/PORT/PVC/REDUNDANCY/SLOT/TIMEP,
def:BOOTP) ? IPHC
Number of IP/UDP/RTP Context States sent............0
Number of IP/UDP/RTP Context States received........0
Number of IP/TCP Context States sent................0
Number of IP/TCP Context States received............0
9230-WG67>
```

8

SE/PORT/#/PVCR Configuration Parameters

8.1 DEDICATED Mode

Many of the parameters detailed in this section are also listed when the PVCR port is configured to another mode.

When certain parameters, such as *IP RIP*, *OSPF*, *IP multicast active* and *NAT enable*, are enabled or set to specific values, additional parameters requiring configuration appear on the console. Examples and descriptions of these parameters are provided under the parameter that governs them.

8.1.1 Port number

Console	SNMP	Text-based Config
Port number	ifwanIndex	[ifwan#]

The port that you want to configure. Select an integer value to define a serial port.

Values: *SDM-9220 and SDM-9230: ETH1, ETH2, CSL, 1*

Default: *1*

NOTE: Use **ETH**, **ETH1** or **ETH2** to define a LAN port; refer to the *LAN Connection and IP Networks* module of this document series. Use **CSL** to define the console port; refer to *Getting Started*.

8.1.2 Protocol

Console	SNMP	Text-based Config
Protocol	ifwanProtocol	[ifwan#] Protocol

The operating protocol for the port or channel. Use the **PVCR** value to define the port as a WAN link, including dedicated, backup, BOD, Wait User or inactive links. The other values are for other data traffic connection types.

Values: *OFF, P-SDLC, S-SDLC, HDLC, T-ASYNC, R-ASYNC, BSC, COP, PVCR, PASSTHRU, FR-NET, FR-USER, PPP, X25*

Default: Built-in serial port 1: *FR-USER*
Other serial ports: *PVCR*
Digital channels: *OFF*

8.1.3 Interface

Console	SNMP	Text-based Config
Interface	ifwanInterface	[ifwan#] Interface

This is a *read-only parameter* that indicates the type of cable that is currently connected to a serial port (either built-in or dual serial). This is useful for checking that you have installed the right kind of cable on the port. The value of this parameter cannot be changed, as the type of interface is detected automatically.

The *Interface* parameter is a *configurable parameter* on legacy NetPerformer products, which use the interface auto-detect function only when this parameter is set to **AUTO**.

A serial port connection may have a *V.35*, *X.21*, *RS-232*, *RS-449* or *RS-530* interface, with **DTE** or **DCE** gender strapping.

- A **DTE** setting is displayed for a cable that connects to a DCE device, such as a modem or line-sharing device
- A **DCE** setting is displayed for a cable that connects to a host, FEP, PU or PVC. WAN links (PVCR protocol) are usually **DTE**, whereas transparent user ports are usually **DCE**.

Complete information on NetPerformer interfaces is available in the *Hardware Installation Guide* or *Quick Setup Guide* (legacy products) for your NetPerformer product, available on the *NetPerformer Documentation CD*.

NOTE: If no cable is attached to the port, the *Interface* parameter indicates **UNDEFINE**.

Values: *UNDEFINE, DCE-RS232, DTE-RS232, DCE-V35, DTE-V35, DCE-X21, DTE-X21, DCE-RS530, DTE-RS530, DCE-RS449, DTE-RS449*

AUTO setting also available on legacy products

Default: The current interface detected on the port

Legacy products: DCE-V35

8.1.4 Clocking mode

Console	SNMP	Text-based Config
Clocking mode	ifwanClocking	[ifwan#] Clocking

NOTE: The *Clocking mode* parameter is not configured on a digital channel

The clock source for a serial port (either built-in or dual serial). The clock source is automatically selected by the NetPerformer based on the *Interface* type. You can change the default setting if required for your application, for example, if a cross-over cable is installed on the port.

For a WAN link, the *Clocking mode* may be **INTERNAL** or **EXTERNAL**.

- **INTERNAL**: This is the usual setting when DCE cables are installed on the serial port.
  - For a DTE interface, the unit supplies a clock signal on RS-232D pin 24 (V.35 pins U-W) and uses this clock to transmit data. The unit also accepts a clock signal on RS-232D pin 15 (V.35 pins V-X) to clock the received data.
  - For a DCE interface, the unit provides two independent clock signals: one on RS-232 pin 15 (V.35 pins V-X) to clock the data going out and one on RS-232 pin 17 (V.35 pins Y-AA) to clock the data coming in.
- **EXTERNAL**: This is the usual setting when DTE cables are installed on the serial port.
  - For a DTE interface, the unit accepts two clock signals: one on RS-232 pin 15 (V.35 pins V-X) to clock the received data and one on RS-232 pin 17 (V.35 pins Y-AA) to clock the transmitted data.
  - For a DCE interface, the unit accepts one clock signal on RS-232 pin 24 (V.35 pins U-W). This clock signal is used to clock both transmitted and received data and is returned on RS-232 pins 15 and 17 (V.35 pins V-X and Y-AA).

Values:	PVCR protocol:	*INTERNAL, EXTERNAL*
Default:	DCE interface:	*INTERNAL*
	DTE interface:	*EXTERNAL*

8.1.5 Port speed (bps)

Console	SNMP	Text-based Config
Port speed (bps)	ifwanSpeed-bps (built-in serial port or digital channel) ifwanSpeedDualSerial (Dual Serial port)	[ifwan#] Speed-bps [ifwan#] SpeedDualSerial

The internal operating speed of the port. Enter the speed in bits per second (bps) for a built-in serial port, or kilobits per second (kbps) for a dual serial port.

NOTE: This parameter is not displayed at the console when you configure a digital channel as a PVCR connection. Instead, the NetPerformer calculates the speed automatically from the *Number of consecutive timeslots* and *DS0 speed (bps)* parameters. For details, refer to the *Digital Data* or *Digital Voice* module in this document series.

The actual throughput that can be achieved on a WAN link depends on whether *Compression* **and** *Cell packetization* **are activated.**

- **Although data compression improves throughput, higher speeds are available when *Compression* is turned off.** Refer to "Payload Compression" on page 8-23.
  - Each WAN link on the NetPerformer can operate at speeds up to 2 Mbps without data compression, or up to 6 Mbps on built-in serial ports on the SDM-9220, SDM-9230 and SDM-8400.

With compression, the maximum link speed is reduced. Refer to the *NetPerformer Network Design Guide* **for specific speeds.**

- ***Cell packetization* is best turned off if your application requires** high transmission speeds. Refer to "Cell Packetization" on page 8-28.

When you select a port speed greater than 2 Mbps (2048 Kbps), the actual speed that is generated will be either 3072 Kbps or 6144 Kbps, whichever is closer to the clock compensation calculated on the port. This has an effect on WAN port speed autodetection. On the DTE side of the connection, the NetPerformer may detect a port speed different from what is configured on the DCE side. For example:

- A PVCR WAN connection configured to 4096 Kbps (4 Mbps) on the DCE side will be detected as 3072 Kbps (3 Mbps) on the DTE side
- If the configured speed is raised to 4608 Kbps (4.5 Mbps), the detected speed will be 6144 Kbps (6 Mpbs).

Caution

The total speed of both ports on a Dual Serial card must not exceed **1536** Kbps.

NOTE: The *Port Speed* parameter is not used for a port in **EXTERNAL** clocking mode.

	Type	Value
Values:	Built-in serial port on SDM-9220, SDM-9230, SDM-8400:	*1200 to 6144000 (bps)*
	Dual serial port:	*1200 to 2048000 (bps)*
	Digital channel:	Automatically calculated from the *Number of consecutive timeslots* and *DS0 speed (bps)* parameters
Default:	Built-in serial port:	*56000 (bps)*

Table 8-1: Port Speeds and Default Values

Type	Value
Dual serial port:	*56000 (bps)*
Digital channel:	Current value of *DS0 speed (bps)* parameter (default *64000 bps*)

Table 8-1: Port Speeds and Default Values

8.1.6 Binary Coding

In NetPerformer software v10.4.1 and earlier, some serial WAN protocols allowed the configuration of the binary coding as well as the way to initialize the CRC calculation (all 1 or all 0). With v10.4.2 that configuration is extended to all serial WAN protocols operating in synchronous mode. Also there are now two different parameters for those settings.

Console	SNMP	Text-based Config
WAN / Binary coding	ifwanBinaryCoding	[ifwan #] BinaryCoding

Description: Assign the binary coding to the serial WAN ports. All protocols operating in synchronous mode have this parameter (P-SDLC, S-SDLC, HDLC, BSC, COP, PVCR, PASSTHRU, FR-NET, FR-USER, PPP (in SYNC mode), X.25, SF, HDLC over FR and PASSTHRU over FR).

Values: *NRZ*, *NRZI-M* and *NRZI-S*; default *NRZ* (note: **M** is for Mark and **S** is for Space)

Console	SNMP	Text-based Config
WAN / CRC	ifwanCrc0	[ifwan #] CRC0

Description: Assign the initialization value to use for computing the CRC. All protocols operating in synchronous mode and using a CRC for validation ends have this parameter (P-SDLC, S-SDLC, HDLC, PVCR, FR-NET, FR-USER, PPP (in SYNC mode), X.25, SF and HDLC over FR).

Values: *NO* and *YES*; default *NO*

8.1.7 Link quality parameters

Link quality monitoring is activated on the PVCR links (Ports or PVCs) using the following parameters.

Console	SNMP	Text-based Config
WAN x / Link quality active	ifwanLQActive	[ifwan #] LQActive

Description: Link quality monitoring activation parameter.

Values: *NO*, *YES*. Default is *NO*.

Console	SNMP	Text-based Config
WAN x / Link quality threshold (in percentage)	ifwanLQThreshold	[ifwan #] LQThreshold

Description: This parameter represents the link quality level under which the link will be declared down if the monitored link quality is bellow the set threshold.

Values: *0* to *100*. Default is *100*.

Console	SNMP	Text-based Config
WAN x / Link quality stabilization delay (s)	ifwanLQStabilizationDelay	[ifwan #]LQStabilizationDelay

Description: This timer is used to ensure that the link has been in good state long enough to resume the data transmission by bring the link back UP.

Values: *10-1000*. Default is *120*.

NOTE: This feature works as follows:
In a monitored PVCR link where the feature has been activated, all packets received and transmitted are sequenced. That sequence number helps determine if packets are lost on that link at the quality level of the link. When there is little or no user data to transmit on the PVCR link, special HELLO packets are used to fill up the link to evaluate its integrity or quality as per the threshold configured. For this reason the link utilization will always display close to 100% of utilization.

8.1.8 Mode

Console	SNMP	Text-based Config
Mode	ifwanMode	[ifwan#] Mode

The operating mode of the WAN link. This parameter defines how the WAN link is activated:

- **DEDICATED**: Communication is carried out over a dedicated line, and the WAN link is active as long as the line is up.

NOTE: All parameters described in this section are required to configure a dedicated WAN link.

- **CALL-BKUP**: Call mode using the NetPerformer backup recovery mechanism. The WAN link is activated in case of a line failure on the dedicated WAN links designated to it. Some limitations apply to digital channels. See “Configuring a Backup Link” on page 3-6 for complete information.

NOTE: You can also activate a backup link manually using the **CALL** command. Refer to “Manual Link Activation and Deactivation” on page 6-1.

- **CALL-BOD**: Call mode using Bandwidth On Demand processing (refer to “Bandwidth On Demand” on page 2-7). The WAN link is activated when bandwidth levels reach a critical threshold. Some limitations apply to digital channels. See “Configuring a Bandwidth on Demand Link” on page 3-9 for complete information.

NOTE: You can also activate a BOD link manually using the **CALL** command. Refer to “Manual Link Activation and Deactivation” on page 6-1.

- **ANSWER**: Answer mode using the NetPerformer backup recovery mechanism or Bandwidth On Demand processing. The WAN link is activated when it receives a call from another NetPerformer unit. For complete information refer to “Answering Side of the Backup Link” on page 3-7 or “Answering Side of the BOD Link” on page 3-11 .
- **WAIT USER**: Wait for activity on user port. The link is activated only if active modem signals are detected on a transparent user port (*Protocol* set to **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**) that sends data traffic via this link. Some limitations apply to digital channels. See “Configuring a Link for Conditioned Activation” on page 3-12 for complete information.
- **INACTIVE**: The link is not activated under any circumstances (see “Deactivating a WAN Link” on page 3-14).

Values: *DEDICATED, ANSWER, CALL-BKUP, CALL-BOD, WAIT USER, INACTIVE*

Default: *DEDICATED*

NOTE: On a digital channel, only the **DEDICATED** and **INACTIVE** modes are available when the **LINK** is defined with the *Signaling mode* set as follows:

- On a T1 LINK: **NONE**, **ROB BIT**, **TRSP-ORIG**, **TRSP-ANSW**
- On an E1 LINK: **NONE**, **CAS**, **TRSP-ORIG**, **TRSP-ANSW**

The **DEDICATED**, **ANSWER**, **CALL-BKUP**, **CALL-BOD** and **INACTIVE** modes are available on a digital channel when the **LINK** is defined with the *Signaling mode* set as follows:

- On a T1 LINK: **NTT**, **KDD**, **4ESS**, **5ESS**, **DMS100**, **NI2**, **QSIG**
- On an E1 LINK: **EURO-ISDN**, **QSIG**

WAIT USER mode is **not** available on a digital channel. For further information, refer to "Configuring a Dedicated WAN Link on a Digital Channel" on page 3-4.

8.1.9 IP address

Console	SNMP	Text-based Config
IP address	ifwanIpAddress	[ifwan#] IpAddress

The IP address for this port or channel. The *IP address* is a 4-byte value in dotted decimal notation, with a maximum value of 255 for each byte.

- If you leave the *IP address* at its default value (**000.000.000.000**) it is considered **not defined**. In this case, the *Default IP address* configured for the unit will be used. Refer to the appendix *SE/GLOBAL Configuration Parameters* in the *Quick Configuration* module of this document series.

NOTE: The NetPerformer supports unnumbered IP routing when IP addresses are not defined on the WAN.

- If you configure the *IP address* to a non-zero value, the *Default IP address* parameter is ignored for this port or channel.

For further information about IP addressing, refer to the *LAN Connection and IP Networks* module of this document series.

Values: *000.000.000.000 - 255.255.255.255*

Default: *000.000.000.000*

8.1.10 Subnet mask (number of bits)

Console	SNMP	Text-based Config
Subnet mask (number of bits)	ifwanSubnetMask	[ifwan#] SubnetMask

The subnet mask associated with the *IP address* for this port. The *Subnet mask* identifies which bits of the *IP address* correspond to the physical network, and which bits correspond to host identifiers. For example, in IP address **255.255.000.000** all network bits are set to **1** and all host bits are set to **0**.

To change the value of the subnet mask using the console, enter the number of bits of that mask.

- For example, select **17** bits to define the mask 255.255.128.000; select **23** bits to define 255.255.254.000
- When you enter the number of bits at the console, the NetPerformer provides the resulting mask in dotted decimal notation to the right of the bits value
- If the value of the subnet mask is not valid for the configured *IP address*, it will be rejected by the NetPerformer and the *IP address* will be invalid.

NOTE: As of V10.2 the NetPerformer supports super-netting as well as subnetting. To accommodate this the subnet mask of any IP address can now be set to any whole integer value from **0** to **32**.

Values: *0 - 32* (equivalent to *000.000.000.000 - 255.255.255.255*)

Default: *8* (equivalent to *255.000.000.000*)

8.1.11 IP RIP

Console	SNMP	Text-based Config
IP RIP	ifwanIpRip	[ifwan#] IpRip

Enables or disables the Routing Information Protocol (RIP) on the WAN link. Enter one of the following:

- **V1**: Enables IP RIP on the WAN link using RIP Version 1.
  - In RIP Version 1 the subnet mask for an IP address in a routing table entry is determined from the subnet mask of the port on which the frame was received.
- **V2 BROADCAST**: Enables IP RIP on the WAN link using RIP Version 2 in Broadcast mode.
  - In Version 2 a subnet mask is transmitted for each address contained in the RIP frame.

For details on how RIP Version 1 differs from RIP Version 2, consult the description of *IP Routing with RIP Version 2* in the *LAN Connection and IP Networks* module of this document series.

  - In Broadcast mode each RIP V2 frame is sent with IP address 255.255.255.255, which permits routers running RIP Version 1 to receive and analyze those frames.

- **V2 MULTICAST**: Enables IP RIP on the WAN link using RIP Version 2 in Multicast mode.
  - In Multicast mode each RIP V2 frame is sent with IP address 224.000.000.009, which prevents routers running RIP Version 1 from receiving those frames.
- **DISABLE:** Disables IP RIP on the WAN link.
  - Select this setting to prevent the NetPerformer from transmitting or receiving RIP frames over this WAN link. The NetPerformer will discard all RIP frames received.

NOTE: If you disable IP RIP on the NetPerformer, but require IP routing to a specific destination (for management under SNMP, for example) you can configure a static IP address using the **SETUP/IP/STATIC** menu. Refer to the *LAN Connection and IP Networks* module of this document series.

Values: *DISABLE, V1, V2 BROADCAST, V2 MULTICAST*

Default: *V1*

When the *V2 BROADCAST* or *V2 MULTICAST* value is selected for the *IP RIP* parameter, additional *IP RIP* parameters are also available, as shown in this example:

```
PORT 1> IP RIP (def:V1) ? V2 BROADCAST
PORT 1> IP RIP TX/RX (def:DUPLEX) ?
PORT 1> IP RIP Authentication (def:NONE) ?
PORT 1> IP RIP Password (def:) ?
```

8.1.12 IP RIP TX/RX

Console	SNMP	Text-based Config
IP RIP TX/RX	ifwanIpRipTxRx	[ifwan#] IpRipTxRx

The directionality of the RIP version used on this port.

- **DUPLEX:** Two-way IP RIP routing. The NetPerformer can generate IP routing tables, and both receive and transmit RIP frames on this port.
- **TX ONLY:** IP RIP is enabled for transmission of RIP frames only. The NetPerformer will discard all RIP frames received at this port.

- **RX ONLY:** IP RIP is enabled for reception of RIP frames only. The port cannot transmit a RIP frame.

Values: *DUPLEX, TX ONLY, RX ONLY*

Default: *DUPLEX*

8.1.13 IP RIP Authentication

Console	SNMP	Text-based Config
IP RIP Authentication	ifwanIpRipAuthType	[ifwan#] IpRipAuthType

NOTE: Presented at the console only if *IP RIP* is set to **V2 BROADCAST** or **V2 MULTICAST**.

Enables or disables password authentication for RIP Version 2 frames sent and received over this port.

- **SIMPLE:** Enables password authentication. The *IP RIP Password* (see next parameter) is included in all RIP Version 2 frames sent from this port. Password-protected frames that are received at this port are accepted only if the password is valid.
- **NONE:** Disables password authentication for RIP Version 2 frames.

Values: *NONE, SIMPLE*

Default: *NONE*

8.1.14 IP RIP Password

Console	SNMP	Text-based Config
IP RIP Password	ifwanIpRipPassword	[ifwan#] IpRipPassword

NOTE: Presented at the console only if *IP RIP* is set to **V2 BROADCAST** or **V2 MULTICAST**.

Defines the password for authentication of RIP Version 2 frames sent and received over this port. This password allows the authentication procedure to generate and/or verify the authentication field in the RIP header.

NOTE: The *IP RIP Password* **must** be the same on both sides of the WAN connection.

Values: any alphanumeric string, maximum 8 characters

Default: none

8.1.15 OSPF

Console	SNMP	Text-based Config
OSPF	ifwanOspfEnable	[ifwan#] OspfEnable

Enables or disables the OSPF protocol on the interface.

NOTE: By default, OSPF is **disabled** on all NetPerformer slots, ports and PVCs.

- **ENABLE:** Enables OSPF on this port. Each slot, port and PVC must be enabled separately.
  - If OSPF is enabled, the WAN link will be advertised as an internal route to an area of the Autonomous System (AS).
  - You must also define the following parameters, which are presented on the console immediately after the OSPF parameter:

```
PORT 1> OSPF (def:DISABLE) ? ENABLE
PORT 1> OSPF Area ID (def:000.000.000.000) ?
PORT 1> OSPF Transit delay (1-360,def:1) ?
PORT 1> OSPF Retransmit interval (1-360,def:5) ?
PORT 1> OSPF Hello interval (1-360,def:10) ?
PORT 1> OSPF Dead interval (1-2000,def:40) ?
PORT 1> OSPF Authentication type (def:NONE) ?
PORT 1> OSPF Metric cost (1-65534,def:10) ?
```

  These additional OSPF parameters are detailed further below.

- **DISABLE:** Disables OSPF on this port. Select this value if you do not want the WAN link to participate in an OSPF network.
  - In this case, the other parameters related to OSPF configuration are not presented on the console.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

8.1.16 OSPF Area ID

Console	SNMP	Text-based Config
OSPF Area ID	ifwanOspfAreaId	[ifwan#] OspfAreaId

Identifies the area to which this interface belongs. This parameter requires a 4-byte value in dotted decimal representation, with a maximum value of 255 for each byte. All routing protocol packets originating from the interface are labelled with this Area ID.

The value of this parameter must be the same as the Area ID of the area to which the attached network belongs. If you want to define subnetted networks as separate areas, you can use the IP network number as the Area ID. Refer to the chapter on *OSPF Network Support* in the *LAN Connection and IP Networks* module of this document series.

NOTE: Area ID 000.000.000.000 indicates that this interface is included in the OSPF backbone.

Values: *000.000.000.000 - 255.255.255.255*

Default: *000.000.000.000*

8.1.17 OSPF Transit delay

Console	SNMP	Text-based Config
OSPF Transit delay	ifwanOspfTransitDelay	[ifwan#] OspfTransitDelay

The estimated number of seconds required to transmit a Link State Update packet over this interface. Link state advertisements contained in the Link State Update packet will have their age incremented by this amount before transmission.

When configuring the *OSPF Transit delay*, take into account the transmission and propagation delays that occur on this port/PVC. For example, you should increase the value of the *OSPF Transit delay* for low-speed serial connections. The default value, 1 second, is appropriate for a LAN connection.

Values: *1 - 360*

Default: *1*

8.1.18 OSPF Retransmit interval

Console	SNMP	Text-based Config
OSPF Retransmit interval	ifwanOspfRetransmitInt	[ifwan#] OspfRetransmitInt

The number of seconds that elapse between retransmissions of link state advertisements. This parameter is used for adjacencies that belong to this interface, and for retransmissions of OSPF Database Description and Link State Request packets.

Set this parameter to a value that is higher than the expected round-trip delay between any two routers on the network attached to this port/PVC. Otherwise, needless retransmissions will occur. The default value, 5 seconds, is appropriate for a LAN connection. Low-speed links require a higher value.

Values: *1 - 360*

Default: *5*

8.1.19 OSPF Hello interval

Console	SNMP	Text-based Config
OSPF Hello interval	ifwanOspfHelloInt	[ifwan#] OspfHelloInt

The length of time, in seconds, between the Hello Packets that the NetPerformer sends on this interface. The value of the Hello Interval parameter is advertised in Hello Packets sent out from this interface, and must be the same on all other routers having a connection with the network attached to this interface.

If you set the Hello Interval to a short length of time, changes to the OSPF topological database will be detected more quickly. However, a short Hello Interval creates more OSPF routing protocol traffic. The default value, 10 seconds, is appropriate for a LAN connection, whereas a PVC may require a Hello Interval of 30 seconds.

Values: *1 - 360*

Default: *10*

8.1.20 OSPF Dead interval

Console	SNMP	Text-based Config
OSPF Dead interval	ifwanOspfDeadInt	[ifwan#] OspfDeadInt

The length of time, in seconds, before neighboring routers declare a router down when they stop hearing its Hello Packets. The value of the Dead Interval parameter is advertised in Hello Packets sent out from this interface, and must be the same on all other routers having a connection with the network attached to this interface.

Set the Dead Interval to a multiple of the Hello Interval (described above).

Values: *1 - 2000*

Default: *40*

8.1.21 OSPF Authentication type

Console	SNMP	Text-based Config
OSPF Authentication type	ifwanOspfAuthType	[ifwan#] OspfAuthType

Determines the type of authentication that will be performed to generate and/or verify OSPF protocol packets sent over this link.

- **SIMPLE:** The *OSPF Password* (see "OSPF Password" on page 8-18) is used for all OSPF packets sent on the network. All OSPF packets sent on this network must contain this value in the *Authentication* field of the OSPF header. The remaining contents of each OSPF packet are also verified with a checksum operation.

Caution

The **SIMPLE** authentication type does not protect the OSPF routing domain from passive attacks via the Internet, as anyone with physical access to the network can learn the *OSPF Password* that is used.

- **CRYPTOGRAPHIC:** A shared secret key, configured with the *OSPF Cryptographic auth. key* parameter (see "OSPF Cryptographic auth. key" on page 8-18), is used to generate and/or verify a one-way *message digest* that is appended to each OSPF packet sent over this link. **CRYPTOGRAPHIC** authentication also includes the use of:
  - The MD5 algorithm, to generate the message digest
  - A sequence number in the *Authentication* field of each OSPF packet, to protect against replay attacks.

NOTE: This is a more secure authentication method, as the *OSPF Cryptographic auth. key* itself is never sent over the link.

- **NONE:** No authentication is performed on OSPF protocol packets.

Values: *NONE, SIMPLE, CRYPTOGRAPHIC*

Default: *NONE*

When the *OSPF Authentication type* parameter is set to **CRYPTOGRAHPHIC**, two additional parameters are displayed at the console (described below):

```
...
PORT 1> OSPF Authentication type (def:NONE) ? CRYPTOGRAPHIC
PORT 1> OSPF Cryptographic auth. ID (0-255,def:1) ?
PORT 1> OSPF Cryptographic auth. key (def:) ?
```

When the *OSPF Authentication type* parameter is set to **SIMPLE**, one additional parameter is displayed at the console (described on “OSPF Password” on page 8-18):

```
...
PORT 1> OSPF Authentication type (def:NONE) ? SIMPLE
PORT 1> OSPF Password (def:) ?
```

8.1.22 OSPF Cryptographic auth. ID

Console	SNMP	Text-based Config
OSPF Cryptographic auth. ID	ifwanOspfCryptoAuthId	[ifwan#] OspfCryptoAuthId

For CRYPTOGRAPHIC Authentication type only

Identifies which algorithm and shared secret key will be used to create the message digest appended to an OSPF packet. This ID is particular to this link only.

Values: *0 - 255*

Default: *1*

8.1.23 OSPF Cryptographic auth. key

Console	SNMP	Text-based Config
OSPF Cryptographic auth. key	ifwanOspfCryptoAuthKey	[ifwan#] OspfCryptoAuthKey

For CRYPTOGRAPHIC Authentication type only

Defines the value of the shared secret key that will be used to create the message digest for OSPF packets sent over this link.

Values: maximum 16-character string

Default: no value

8.1.24 OSPF Password

Console	SNMP	Text-based Config
OSPF Password	ifwanOspfPassword	[ifwan#] OspfPassword

For SIMPLE Authentication type only

Defines the 64-bit value that will appear in the authentication field of all OSPF packets sent or received on this interface. The *OSPF Password* allows the authentication procedure to generate and/or verify the *Authentication* field in the OSPF header.

Caution

The value of the *OSPF Password* parameter must be the same as that configured on all other routers having a connection with the network attached to this interface. In other words, all routers in the same area must have the same password (or no authentication at all).

NOTE: Since the *OSPF Password* is configured separately for each interface, there can be a separate password for each network in the AS.

Values: Maximum 8-character string

Default: none

8.1.25 OSPF Metric cost

Console	SNMP	Text-based Config
OSPF Metric cost	ifwanOspfMetricCost	[ifwan#] OspfMetricCost

The cost of sending a packet on this interface, expressed in the link state metric. The value of this parameter is determined from:

100,000,000 ÷ *interface speed*

The metric cost is advertised in the router links advertisement as the link cost for this interface.

Values: *1 - 65534*

Default: *10*

8.1.26 IP multicast active

Console	SNMP	Text-based Config
IP multicast active	ifwanIpMulticastActive	[ifwan#] IpMulticastActive

Enable (**YES**) or disable (**NO**) IP Multicast on this WAN link. When *IP multicast active* is enabled, the WAN link becomes an IP Multicast client. All link ports (**PVCR**) and PVCs (**PVCR** and **RFC1490**) that will participate in the multicast route must be defined in this way.

Values: *NO, YES*

Default: *NO*

NOTE: You must also configure the IP Multicast parameters on the LAN connection, including the IP addresses of all multicast groups that will be recognized by the LAN port. Refer to the *LAN Connection and IP Networks* module of this document series.

When the *IP multicast active* parameter is set to **YES**, the following parameter, *IP multicast protocol*, is presented at the console **only if *IGMP* is currently set to ENABLE on the LAN port:**

8.1.27 IP multicast protocol

Console	SNMP	Text-based Config
IP multicast protocol	ifwanIpMulticastProtocol	[ifwan#] IpMulticastProtocol

Selects the IP multicast protocol.

- **PIMDM:** Protocol Independent Multicast - Dense Mode. This routing algorithm was designed for multicast groups that are densely distributed across the network.
- **NONE:** No IP multicast protocol is used.

Values: *NONE, PIMDM*

Default: *NONE*

8.1.28 NAT enable

Console	SNMP	Text-based Config
NAT enable	ifwanNatEnable	[ifwan#] NatEnable

Enables (**YES**) or disables (**NO**) Network Address Translation (NAT) on this WAN link.

Values: *NO, YES*

Default: *NO*

When the *NAT enable* parameter is set to **YES**, the following additional parameters are also available:

```
PORT 1> NAT enable (def:NO) ? YES
PORT 1> NAT rule (1-10) (def:) ?
PORT 1> NAT side (def:INTERNAL) ?
```

8.1.29 NAT rule

Console	SNMP	Text-based Config
NAT rule	ifwanNatRule	[ifwan#] NatRule

Selects the NAT rule or rules to be used to translate address information for traffic to and from this WAN link. A rule defines the correspondence between internal IP addresses and external, globally unique NAT IP addresses. Select multiple rules by entering a comma between the rule numbers, for example: **1,3,4**.

Define all NAT rules with the **SETUP/IP/NAT** submenu. For details, refer to the chapter *Network Address Translation (NAT)* in the *LAN Connection and IP Networks* module of this document series.

Values: *1 - 10*

Default: none

8.1.30 NAT side

Console	SNMP	Text-based Config
NAT side	ifwanNatSide	[ifwan#] NatSide

Determines which address realm this WAN link is associated with, and where NAT is carried out.

- **INTERNAL:** NAT is carried out on the internal side of the network. Select this value if the WAN link connects to equipment on the local side (the private network).
- **EXTERNAL:** NAT is carried out on the external side of the network. Select this value if the WAN link connects to equipment on the remote side.

Values: *INTERNAL, EXTERNAL*

Default: *INTERNAL*

8.1.31 IPX RIP

Console	SNMP	Text-based Config
IPX RIP	ifwanIpxRip	[ifwan#] IpxRip

Enables or disables RIP routing of Internetwork Packet Exchange (IPX) frames on this WAN link.

- **ENABLE:** The NetPerformer can generate IPX routing tables, and both transmit and receive IPX RIP frames on this WAN link. For details, refer to the *LAN Connection and IP Networks* module of this document series.

NOTE: If you set this parameter to **ENABLE**, you must also configure the *IPX network number* (see "IPX network number" on page 8-22).

- **DISABLE:** The NetPerformer cannot transmit IPX RIP frames over this WAN link, and discards all IPX RIP frames received on this WAN link.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

8.1.32 IPX SAP

Console	SNMP	Text-based Config
IPX SAP	ifwanIpxSap	[ifwan#] IpxSap

Enables or disables the Service Advertising Protocol (SAP) for IPX frames. IPX SAP frames are exchanged between routers to indicate the nature and location of services available on a Novell network.

- **ENABLE:** The NetPerformer can generate IPX SAP routing tables, and both transmit and receive IPX SAP frames on this WAN link. For details, refer to the *LAN Connection and IP Networks* module of this document series.

NOTE: If you set this parameter to **ENABLE**, you must also configure the *IPX network number* (see "IPX network number" on page 8-22).

- **DISABLE:** The NetPerformer cannot transmit IPX SAP frames over this WAN link, and discards all IPX SAP frames received on this WAN link.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

8.1.33 IPX network number

Console	SNMP	Text-based Config
IPX network number	ifwanIpxNetNum	[ifwan#] IpxNetNum

The network number of the IPX node that is connected to this WAN link. The NetPerformer uses IPX network numbers to forward frames to their final destination. Enter a 4-byte value in hexadecimal notation.

Caution

If you leave the *IPX network number* at its default value, 00000000, the local network node is unknown. In this case, you must define an internal IPX network number to allow the NetPerformer to forward IPX frames, using the SETUP/IPX menu. For details, consult the *LAN Connection and IP Networks* module of this document series.

Values: *00000000 - FFFFFFFF*

Default: *00000000*

8.1.34 Payload Compression

Console	SNMP	Text-based Config
Payload compression	ifwanCompression	[ifwan#] Compression

Enable (**YES**) or disable (**NO**) compression on the WAN link connection to the remote NetPerformer. With compression, the available bandwidth is used more efficiently and throughput on the WAN link is increased. **However, higher speeds are available on the port when *Compression* is disabled.**

Caution

When the value of this parameter is changed, the WAN link is immediately restarted in order to apply the change. A break in the traffic flow is normal in this case.

NOTE: To view current compression and decompression rates, use the Display Counters (**DC**) command. Refer to "Verifying WAN Link Configuration" on page 3-15.

Values: *NO, YES*

Default: *YES*

8.1.35 IP Header Compression

IP Header compression is activated on the PVCR links (Ports or PVCs) using the following parameter:

Console	SNMP	Text-based Config
WAN x / IP Header compression	ifwanIpHeaderCompression	[ifwan #]IpHeaderCompression

Description: IP Header compression activation parameter.

Values: *NO*, *YES*. Default is *NO*.

NOTE: The above parameter shows up on the PVCR link ports or PVCs only after the IP header compression license has been installed in the unit using the PLS (Product License Status) console command.

The former PVCR links "Compression" parameter has been renamed "Payload compression" to better reflect what this parameter does.

8.1.36 Remote unit name

Console	SNMP	Text-based Config
Remote unit name	ifwanRemoteUnit	[ifwan#] RemoteUnit

The remote NetPerformer to which traffic from this WAN link will be directed. Enter the *Unit name* of the remote NetPerformer unit.

NOTE: The *Unit name* is defined on the remote unit using the **SETUP/GLOBAL** submenu. Refer to the appendix *SE/GLOBAL Configuration Parameters* in the *Quick Configuration* module of this document series.

For a dedicated WAN link, the *Remote unit name* can be left undefined (the default value). As soon as the link comes up the connection will be made automatically.

Values: Maximum 32-character alphanumeric string

Default: no value

8.1.37 Timeout (ms)

Console	SNMP	Text-based Config
Timeout (ms)	ifwanTimeout	[ifwan#] Timeout

The Wait for ACK timeout, in milliseconds, before retransmitting a frame over this WAN link. If no response is received, the WAN link is declared down at the end of the *PVCR Timeout*, which is calculated as twice the value of the *Timeout* parameter.

This parameter is required for an SNA/SDLC application only, when at least one PU with a **LINKS** connection is configured, for example, **LLC-LINKS**. For details, refer to the chapter *SNA/SDLC Support* in the *Legacy Data* module of this document series.

NOTE: If the *Timeout* parameter has different values at opposite ends of the WAN link, the higher value is used.

Values: *1000 - 30000*

Default: *1000*

8.1.38 Send keepalive packets

The send keepalive packets parameter prevents the DAMA/BoD system from reserving time slots for “keepalives” when user applications are idle by disabling NetPerformer from sending keepalives packets in those cases. With this parameter, NetPerformer can keep the site logically connected for the applications even when they are idle, without using any satellite bandwidth.

Console	Text-based Config
WAN x / Send keepalive packets	[ifwan #] Keepalive =value

Values: *NO*, *YES*. Default is *YES*.

8.1.39 Verify the link integrity

The Verify the link integrity parameter provides the ability for NetPerformer to ensure that the DAMA/BoD satellite system has the time to wake up and activate effective connections for applications that are requesting bandwidth before starting transmission. This improves efficiency of DAMA/BoD systems that are slow with their bandwidth allocation by preventing lost of user data.

Console	Text-based Config
WAN x / Verify the link integrity	[ifwan #] LinkIntegrity =value

Values: *NO*, *YES*. Default is *NO*.

8.1.40 Number of retransmission retries

Console	SNMP	Text-based Config
Number of retransmission retries	ifwanRetry	[ifwan#] Retry

Maximum number of successive retries before the WAN link is declared down. This parameter is required for an SNA/SDLC application only, when at least one user port is configured in primary or secondary SDLC protocol (**P-SDLC** or **S-SDLC**).

Values: *1 - 1000*

Default: *100*

8.1.41 Maximum number of voice channels

Console	SNMP	Text-based Config
Maximum number of voice channels	ifwanMaxChannels	[ifwan#] MaxChannels

Maximum number of incoming and outgoing voice channels permitted at one time on this WAN link and all other links serving the same destination (specified by the *Remote unit name*).

NOTE: Other links may include PVCR and FR-USER ports and channels, as well as PVCR PVCs.

Caution

If the *Maximum number of voice channels* is set to **0** and no other link to the specified destination is currently active, all voice calls to that destination will be blocked.

If the *Maximum number of voice channels* is left at its default value (**10000**), **no call blocking is performed on this link**. If no other link serving the same destination is configured with a lower value, NetPerformer Voice Traffic Control is disabled on voice calls to that destination. For further information on Voice Traffic Control, refer to the *Advanced Voice Features* module of this document series.

How it works: Two voice channels are opened when a voice call is relayed through a NetPerformer unit: one to reach the originator of the call, and the other to reach the receiver of the call. When the two channels pass through the same port or PVC, the bandwidth taken is twice that taken by one channel. The *Maximum number of voice channels* serves to limit the bandwidth that can be taken up by voice calls.

The actual maximum number of voice calls that can be placed to a particular destination is the cumulative total of the *Maximum number of voice channels* on all currently active links to that destination. For example, on one NetPerformer unit the *Maximum number of voice channels* is set to **16** on a dedicated WAN link to unit **CHICAGO**, and **8** on a BOD link to the same destination. When the BOD link goes up, the number of voice calls permitted to unit **CHICAGO** goes from **16** to **24**.

If you change the value of the *Maximum number of voice channels* parameter, there is no effect on voice calls that have already been established. If required, you can disconnect these calls using the **MODEMCALLCLEAR** extended parameter. Refer to the *Extended Parameters* module of this document series.

Caution

For any new voice calls, the lower call blocking limit will take effect, either the *Maximum number of voice channels* or the *Maximum Voice Channels if High Priority Data* (see next parameter). **To avoid unexpected results, it is best to configure these two parameters with the same value.**

Values: *0 - 10000*

Default: *10000* (no call blocking)

8.1.42 Maximum Voice Channels If High Priority Data

Console	SNMP	Text-based Config
Maximum Voice Channels If High Priority Data	ifwanLowMaxChannels	[ifwan#] LowMaxChannels

Maximum number of incoming and outgoing voice channels permitted at one time on this WAN link when one or more a transparent user ports (*Protocol* set to **HDLC**, **T-ASYNC**, **R-ASYNC**, **BSC**, **COP** or **PASSTHRU**) are set to high priority. The *Maximum Voice Channels If High Priority Data* parameter has the effect of ensuring sufficient bandwidth for the high priority data traffic, while allowing a reasonable number of voice calls to be placed at the same time.

NOTE: The priority of transparent data ports is configured with the port *Class* parameter. Refer to the *Legacy Data* module of this document series.

- The **DSR**, **DCD**, **DTR** and **RTS** modem signals (**RI** and **RL** in X.21) must be active on the high priority transparent data port for call blocking to take place. The modem signals on the remote unit must also be active.

NOTE: You can assume that the remote modem signals are active if the transparent data port modem signals are up, and its *Modem control signal* parameter is set to **STATPASS** or **DYNAPASS**.

- If the *Maximum Voice Channels If High Priority Data* is left at its default value (**10000**), **no call blocking is performed on this link**.
- If you change the value of the *Maximum Voice Channels if High Priority Data* parameter, there is no effect on voice calls that have already been established. If required, you can disconnect these calls using the **MODEMCALLCLEAR** extended parameter. Refer to the *Extended Parameters* module of this document series.

Caution

For any new voice calls, the lower call blocking limit will take effect, either the *Maximum number of voice channels* (see previous parameter) or the *Maximum Voice Channels if High Priority Data*. **To avoid unexpected results, it is best to configure these two parameters with the same value.**

NOTE: If the NetPerformer has been configured for Frame Relay over IP, the *Maximum Voice Channels if High Priority Data* parameter is not required, since bandwidth limitation is not a problem for this type of application.

Values: *0 - 10000*

Default: *10000* (no call blocking)

8.1.43 Cell Packetization

Console	SNMP	Text-based Config
Cell Packetization	ifwanCellPacketization	[ifwan#] CellPacketization

Enable (**YES**) or disable (**NO**) cell packetization on this WAN link. This determines whether several packets of Frame Relay traffic will be combined before transmission.

Packetization accommodates networks that do not support a rapid sequence of several small cells. **However, with cell packetization there is a slight increase in the transmission delay. Set *Cell Packetization* to NO for transmission of Frame Relay traffic without packetization. *Cell Packetization* should also be disabled if your application requires high transmission speeds.**

When *Cell Packetization* is enabled, the number of cells that can be combined depends on the total number of bytes contained in those cells. To adjust the maximum number of bytes allowed in a Frame Relay application, use the **PVCRFS** extended parameter. Refer to the *Extended Parameters* module of this document series.

NOTE: This parameter can have different values on opposite sides of the link.

Values: *NO, YES*

Default: *YES*

8.1.44 Filter

Console	SNMP	Text-based Config
Filter	ifwanFilter	[ifwan#] Filter

WAN traffic filters can be fine tuned on a port-by-port basis. The *Filter* parameter lets you select which filters you would like to apply to this WAN link.

- Enter **ALL** to apply all traffic filters that have been defined with the SETUP/FILTER command.

NOTE: Use **DP/FILTER** to view the current listing. Refer to the *Quality of Service (QoS)* module of this document series.

- Enter **NONE** to disable filtering on this WAN link.
- Enter a specific filter number (from 1 to 32) or a set of filter numbers to select a subset of the filters that have been defined for this NetPerformer unit.

NOTE: When selecting more than one filter, separate each filter number with commas, for example:

```
PORT 1> Filter (def:ALL) ? 2,21,10
```

The filters you select are applied to the port traffic **in the order you specify** for this parameter. In the above example, Filter 21 will be applied before Filter 10.

Values: An automatically generated list of filter numbers

Default: *ALL*

8.2 CALL-BKUP Mode

NOTE: CALL-BKUP mode parameters that are common to other PVCR modes are listed under “DEDICATED Mode” on page 8-2.

8.2.1 Backup termination mode

Console	SNMP	Text-based Config
Backup termination mode	ifwanBackupTermination-Mode	[ifwan#] BackupTerminationMode

Determines how the backup function will be terminated on this backup link.

- **AUTOMATIC:** The backup link automatically hangs up if the failed link comes back up and stays up for the time defined with the *Delay before call deactivation* parameter (see “Call activation timer (s)” on page 8-31).
- **MANUAL:** The backup link stays up after the dedicated WAN link is restored, and remains up until the **HANG** command is executed from the NetPerformer console (see “HANG Command” on page 6-3).

Values: *AUTOMATIC, MANUAL*

Default: *MANUAL*

8.2.2 Delay before call activation (s)

Console	SNMP	Text-based Config
Delay before call activation (s)	ifwanDelayBeforeCall-Activation-s	[ifwan#] DelayBeforeCall-Activation-s

NOTE: On legacy NetPerformer products this parameter is referred to as *Backup call (sec)* on the console, and *ifwanBackupCall-s* in SNMP.

The delay, in seconds, before activating this backup link when the dedicated WAN (PVCR) link fails. This allows some time for the dedicated link to recover in case of a brief or non-fatal failure.

NOTE: The dedicated PVCR link is specified with the *Port to back* parameter, described on "Port to back" on page 8-32.

Values: *1 - 1000*

Default: *10*

8.2.3 Delay before call deactivation (s)

Console	SNMP	Text-based Config
Delay before call deactivation (s)	ifwanDelayBeforeCall-Deactivation-s	[ifwan#] DelayBeforeCall-Deactivation-s

NOTE: On legacy NetPerformer products this parameter is referred to as *Backup hang (sec)* on the console, and *ifwanBackupHang-s* in SNMP.

The delay, in seconds, before deactivating this backup link when the dedicated WAN link returns to normal operation. This prevents unnecessary fluctuation of the backup link in case of a brief **LINK UP** state on the dedicated link.

Values: *1 - 1000*

Default: *120*

8.2.4 Call activation timer (s)

Console	SNMP	Text-based Config
Call activation timer (s)	ifwanCallActivationTimers	[ifwan#] CallActivationTimers

NOTE: On legacy NetPerformer products this parameter is referred to as *Dial timeout (sec)* on the console, and *ifwanDialTimeout* in SNMP.

The wait time, in seconds, that is provided to allow the NetPerformer to dial the phone number to establish this backup link. This parameter takes effect only when the *Dialer* parameter (see "Dialer" on page 8-33) is set to a dialing mode that requires a dial phone number.

If the *Call activation timer* expires, the connection procedure is aborted and the backup link returns to **LINK DOWN** status. An extended delay may be necessary when modem signals are required to raise the backup link.

Values: *30 - 1000*

Default: *30*

8.2.5 Port to back

Console	SNMP	Text-based Config
Port to back	ifwanPortToBack	[ifwan#] PortToBack

The dedicated WAN link or links that this backup link will back up.

- **Numeric value:** Enter the number of a specific serial port or digital channel configured as a dedicated WAN link. The backup link will be activated when the specified dedicated WAN link is down.
- **ALL:** The backup link will be activated when all links going to a particular destination are down.

  The *Port to back* parameter **must be set to ALL if phone number dialing will be used** to activate the backup link. Refer to the *Dialer* parameter ("Dialer" on page 8-33) for a list of dialer modes that require a dial phone number.
- **ANY:** The backup link will be activated when at least one link going to a particular destination is down.

NOTE: You can leave the *Remote unit name* unspecified on a backup link if you specify the *Port to back* parameter as **ANY** (or **ALL** if phone number dialing is used).

Caution

If you specify both the *Port to back* and the *Remote unit name* on this backup link, make sure they identify the same destination.

The following diagram provides some examples of where the *Remote unit name* can be left unspecified on dedicated and backup links.

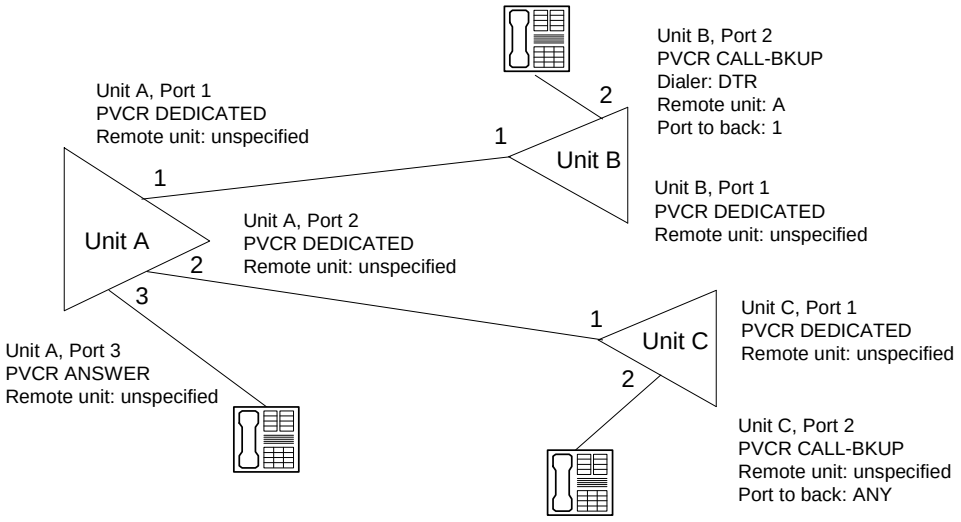

Figure 8-1: Specifying the Remote Unit on Dedicated and Backup Links

Values: *ANY, ALL*, numeric value

Default: *ANY*

8.2.6 Dialer

Console	SNMP	Text-based Config
Dialer	ifwanDialer	[ifwan#] Dialer

The dialer mode on this backup link. If the backup link is required, the NetPerformer activates it using the selected dialer mode:

- **DTR:** The NetPerformer activates this backup link by raising the **DTR** signal (RS-232 and V.35). Choose this setting when the link uses a dedicated line or a modem that activates as soon as **DTR** is raised.
- **X21-L1:** The NetPerformer activates this backup link by raising the X.21 **COMMAND** signal (X.21 level 1).
- **V25-H:** The NetPerformer activates this backup link by sending the V25bis dial command with a dial phone number to the modem, using the HDLC protocol.
- **V25-B:** The NetPerformer activates this backup link by sending the V25bis dial command with a dial phone number to the modem, using the IBM BSC protocol.
- **AT-9600:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 9600 bps, followed by the ATD command with the dial phone number.

- **AT-19200:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 19200 bps, followed by the ATD command with the dial phone number.
- **AT-28800:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 28800 bps, followed by the ATD command with the dial phone number.
- **AT-38400:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 38400 bps, followed by the ATD command with the dial phone number.
- **AT-57600:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 57600 bps, followed by the ATD command with the dial phone number.
- **AT-115200:** The NetPerformer sends the ATE0V1 command to the modem in asynchronous mode at 115200 bps, followed by the ATD command with the dial phone number.

All *Dialer* modes need a constant CTS (Clear To Send) signal from the modem to be able to establish communication. **Ensure that the modem is set to always provide the CTS signal.**

NOTE: If you choose a *Dialer* mode that requires a dial phone number, you must specify this number using the **SETUP/PHONE** menu, described in "Phones for Backup Links" on page 4-1.

Values: *DTR, X21-L1, V25-H, V25-B, AT-9600, AT-19200, AT-28800, AT-38400, AT-57600, AT-115200*

Default: *DTR*

8.3 CALL-BOD Mode

NOTE: CALL-BOD mode parameters that are common to other PVCR modes are listed under "DEDICATED Mode" on page 8-2 and "CALL-BKUP Mode" on page 8-30.

8.3.1 Delay before BOD call activation (s)

Console	SNMP	Text-based Config
Delay before BOD call activation (s)	ifwanDelayBeforeBodCall-Activation-s	[ifwan#] DelayBeforeBodCall-Activation-s

NOTE: On legacy NetPerformer products this parameter is referred to as *BOD call (sec)* on the console, and *ifwanBodCall-s* in SNMP.

The period of time, in seconds, during which the combined WAN link usage must be at the *BOD level* (or higher) before this BOD link will be activated. This prevents excessive fluctuation of the number of links used.

Values: *1 - 1000*

Default: *120*

8.3.2 Delay before BOD call deactivation (s)

Console	SNMP	Text-based Config
Delay before BOD call deactivation (s)	ifwanDelayBeforeBodCall-Deactivations	[ifwan#] DelayBeforeBodCall-Deactivations

NOTE: On legacy NetPerformer products this parameter is referred to as *BOD hang (sec)* on the console, and *ifwanBodHang-s* in SNMP.

The minimum period of time, in seconds, during which this BOD link will remain activated if the traffic level drops below the *BOD level*. This parameter improves the overall efficiency of BOD adjustments to rapid changes in traffic flow.

Values: *1 - 1000*

Default: *120*

8.3.3 BOD level

Console	SNMP	Text-based Config
BOD level (%)	ifwanBodLevel	[ifwan#] BodLevel

The combined WAN link usage level, given as a percentage of the total bandwidth used, at which this BOD link should be activated. The *BOD level* reflects the degree of traffic congestion that must occur before the BOD link will be added to improve the traffic flow.

Values: *5 - 95*

Default: *80*

9

SE/PHONE Configuration Parameters

9.1 MODEM Dialer

9.1.1 Profile number

Console	SNMP	Text-based Config
Profile number	phoneEntry, phoneIndex	[phone#]

The number of the phone profile that you want to configure. You can configure 64 distinct phone profiles on each NetPerformer unit.

- For SNMP, select the *phoneEntry* table and look under the *phoneIndex* for the desired phone profile.
- For text-based configuration, include the phone profile number, **#**, in the section heading.
- At the console, the *Profile number* you select will be displayed before each of the remaining phone profile parameters.

Values: *1 - 64*

Default: *1*

9.1.2 Remote unit

Console	SNMP	Text-based Config
Remote unit	phoneRemoteUnit	[phone#] RemoteUnit

The remote NetPerformer that is reached using this phone profile. Enter the *Unit name* of the remote NetPerformer unit.

The *Unit name* is defined on the remote unit using the **SETUP/GLOBAL** submenu. Refer to the appendix *SE/GLOBAL Configuration Parameters* in the *Quick Configuration* module of this document series.

The *Remote unit* you specify must appear as an entry in the PowerCell routing table on the local NetPerformer (see “Displaying PowerCell Destinations” on page 7-17).

If the local NetPerformer has dial backup links to more than one remote NetPerformer, each *Remote unit* must be specified in a separate phone profile. **Only one phone profile should be created for each destination.**

Caution

On an SDM-9500 chassis that contains more than one card configured with backup links, you must define a particular *Remote unit* only once in all phone profiles for all cards in the rack. For example, if unit A.1 is selected as the *Remote unit* in the phone profiles of card A.2, it must not also appear in the phone profiles of card A.3. If it does, both cards will try to establish a backup link to A.1. Only one card will succeed, and the other will continuously try to dial out until the dedicated line comes back.

Values: Maximum 32-character alphanumeric string

Default: no value

9.1.3 Next hop

Console	SNMP	Text-based Config
Next hop	phoneNextHop	[phone#] NextHop

The NetPerformer unit that provides the next hop, using PowerCell, on the path to the *Remote unit*. This unit must appear as an entry in the PowerCell routing table on the local NetPerformer (see “Displaying PowerCell Destinations” on page 7-17).

- Set the *Next hop* to the *Unit name* of the next NetPerformer unit on the path to the *Remote unit*.

NOTE: The *Unit name* is defined on the intermediate unit using the **SETUP/GLOBAL** submenu. Refer to the appendix *SE/GLOBAL Configuration Parameters* in the *Quick Configuration* module of this document series.

- If there is a direct connection to the remote unit, set the *Next hop* to the local *Unit name*, or leave it undefined (the default value).

Values: Maximum 32-character alphanumeric string

Default: no value

9.1.4 Cost

Console	SNMP	Text-based Config
Cost	phoneCost	[phone#] Cost

The number of hops between the local NetPerformer and the *Remote unit*. This indicates the number of NetPerformers that the traffic passes through from source to destination.

NOTE: The zero value (**0**) indicates a direct connection, for example, between two cards in an SDM-9500 chassis.

Values: *0 - 65534*

Default: *1*

9.1.5 Dialer type

Console	SNMP	Text-based Config
Dialer type	phoneDialerType	[phone#] DialerType

The type of device used to dial the number and complete the call to the answering side.

- **MODEM:** The destination unit is reached via modem connection.
- **ISDN:** The destination unit is reached via ISDN connection, using an ISDN phone. Parameters specific to an ISDN connection are described on "ISDN Dialer" on page 9-5.

Values: *MODEM, ISDN*

Default: *MODEM*

9.1.6 Phone number

Console	SNMP	Text-based Config
Phone number	phonePhoneNumber	[phone#] PhoneNumber

The phone number that the NetPerformer will dial to reach the destination unit specified by the *Remote unit* parameter of this phone profile.

Values: Maximum 16-character string: *0-9*, *D* (pulse dialing), *T* (tone dialing), **,** (pause), (space), **-** (hyphen), ***** (asterisk)

Default: no value

9.2 ISDN Dialer

ISDN Dialer parameters that are common to the Modem Dialer are listed under "MODEM Dialer" on page 9-2.

9.2.1 Type

Console	SNMP	Text-based Config
Type	phoneType	[phone#] Type

Controls whether the ISDN phone will be a permanent (**DEDICATED**) connection or a **BACK-UP** connection that is made when the **DEDICATED** connection goes down. Refer to "Backup ISDN Phone" on page 4-6.

Caution

The *Local number* and *Local subaddress number* parameters in the SETUP/SLOT/LINK configuration much match the parameters of the same name in the SETUP/PHONE configuration, described below. Otherwise, the link will not go up.

NOTE: The NetPerformer does not validate that these parameter values are identical.

Values: *DEDICATED, BACK-UP*

Default: *DEDICATED*

9.2.2 Remote number

Console	SNMP	Text-based Config
Remote number	phoneRemoteNum	[phone#] RemoteNum

Defines the phone number that must be dialed to reach the *Remote unit*. This number is sent with the call **SETUP** message, and must be defined for call setup to work.

Values: Maximum 20-character string: *0-9*

Default: none

9.2.3 Remote subaddress

Console	SNMP	Text-based Config
Remote subaddress	phoneRemoteSubAddr	[phone#] RemoteSubAddr

Defines the ISDN subaddress of the *Remote unit*.

NOTE: The *Remote subaddress* is **optional**.

When configured, the value of this parameter is used to identify the specific end device or service, if multiple devices or services are available at the same number.

Values: Maximum 20-character string: *0-9*

Default: none

9.2.4 Local number

Console	SNMP	Text-based Config
Local number	phoneLocalNum	[phone#] LocalNum

Defines the local ISDN number of the channel, which can be used at the remote destination to validate the calling party.

NOTE: The *Local number* is **optional**.

- Normally, the network automatically adds the local number to the setup message before it routes the message to its destination. However, the *Local number* may be required by the carrier for billing or other purposes.

NOTE: If you are using several numbers for ISDN connection, you may wish to have the *Local number* sent during call setup for single-number billing purposes.

- The ISDN network can also use value of the *Local number* to establish the phone number of the *originator* in Multiple Subscriber Number (MSN) environments.
- When configured, the *Local number* is added to the **SETUP** message when the ISDN connection is established.

NOTE: To validate the calling party on incoming calls to the NetPerformer, you can set up a list of authorized callers using the **SETUP/CALLER ID** submenu. Caller IDs are validated on ISDN data connections only. For details, refer to the *Digital Voice* module of this document series.

Values: Maximum 20-character string: *0-9*

Default: none

9.2.5 Local subaddress

Console	SNMP	Text-based Config
Local subaddress	phoneLocalSubAddr	[phone#] LocalSubAddr

Defines the local subaddress of the channel, used at the remote destination to validate the calling party.

NOTE: The *Local subaddress* is **optional**.

When configured, the value of this parameter is used to identify the specific end device or service, if multiple devices or services are available at the same number. The *Local subaddress* is added to the **SETUP** message when the ISDN connection is established.

Values: Maximum 20-character string: *0-9*

Default: none

9.2.6 Number of links

Console	SNMP	Text-based Config
Number of links	phoneNbrLinks	[phone#] NbrLinks

Determines how many ISDN channels will be activated when using this phone profile. This number determines the speed of the backup or BOD connection.

For example, backing up a 1 Mbps link with only 1 ISDN channel at 64 Kbps represents a huge drop in performance. If you set the *Number of links* to 6 or 7, the backup will be much more efficient.

NOTE: When setting the value of the *Number of links* parameter, you must ensure that at least this number of ISDN digital channels has been configured with:

- *Mode* set to **CALL-BKUP** or **CALL-BOD**
- *Port to back* set to **ANY** or **ALL**
- The *Remote unit name* properly identified for a BOD connection. It may be left blank for backup channels.

For example, if you set the *Number of links* parameter to 5, make sure to configure at least 5 ISDN channels for backup purposes.

Values: *1 - 64*

Default: *1*

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