NetPerformer®
System Reference

Digital Data

COMTECH EF DATA

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redefining network efficiency

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Memotec Inc.
7755 Henri Bourassa Blvd. West
Montreal, Quebec
Canada H4S 1P7
Tel.: (514) 738-4781
FAX: (514) 738-4436
www.memotec.com

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NetPerformer Support of Digital Connections

1.1 About Digital Connection Support

The following trends are commonly experienced by enterprise networks:

- a growing interest for integrating voice and data traffic,
- an ever increasing need for greater bandwidth.

As a result, these networks tend to require faster, more flexible WAN links and voice connections. T1 and E1 lines provide the throughput required. In addition to greater speed, they also provide greater flexibility, as they can be subdivided into channels of varying sizes. T1 and E1 lines have become one of the most common interfaces in public voice/data networks. With the development of Q.SIG signaling for E1, interoperability between products from different vendors is also a possibility.

Because of its great popularity in Europe, ISDN has also become very important. This protocol provides even more flexibility by adding dialup capabilities over digital lines. While ISDN does support a full T1/E1 line it offers a lower bandwidth solution with only two user channels (ISDN-BRI). This, coupled with the quick call establishment procedure, can be interesting as a backup link or for small branch offices that cannot justify a full T1/E1 line.

The NetPerformer optionally provides T1, E1 and ISDN-BRI channelized digital connections that can be used to connect a central site to multiple remote locations. Each channelized interface module supplies a number of individual channels, each of which can be terminated in a separate digital circuit at a different remote site. No external CSU/DSUs or associated cabling are required at the central site.

1.2 NetPerformer Digital Interfaces

A channelized digital connection on the NetPerformer can be established using a T1, E1, ISDN-BRI or E1/T1 (Dual Framer) interface. On most NetPerformer products these interfaces are provided on optional interface cards which are installed in slots on the base unit. For further information on these cards, refer to the *Hardware Installation Guide* for your particular NetPerformer model.

1.2.1 T1 Interface

This is a 1.544 Mbps interface supporting up to 24 timeslots per port, with one RJ-45 connector per port.

1.2.2 T1 Channel Assignment

T1 has 24 timeslots in its data service, each at 64 Kbps (or 56 Kbps when Rob Bit Signaling is used). The same timeslot repeated over multiple frames constitutes a channel. Each 64 Kbps channel can accommodate, for example, a PCM-encoded voiceband signal or data information at 64 Kbps. Channel assignment may vary on a call by call basis, although a fixed timeslot allocation to form channels may be required.

The T1 transmission structure is usually used to support 23 B-channels. These provide for the bidirectional transmission of independent B-channel signals, each having a bit rate of 64 Kbps. A B-channel may be assigned timeslots 1 to 23 in the frame.

1.2.3 T1 Error Detection

In the T1 multiframe structure of 24 193-bit frames, the first bit of each frame is the F-bit, which is used for synchronization and other management purposes. F-bits are given specific functions, depending on their location in the multiframe and the type of framing used (ESF or D4).

- **Frame Alignment Signal (FAS):** *(ESF framing only)* 6 of the 24 F-bits are used to create FAS code 001011, which repeats in every multiframe. The FAS provides a synchronization function, that is, it identifies where each particular frame is located within the multiframe. If the receiver goes out of alignment with the transmitter by one or more bits, the receiver no longer detects the FAS code, causing a misalignment error.
- **Frame Synchronization Bit Error:** *(D4 framing only)* A path code violation occurs for each frame synchronization bit error, determined by the Ft bits.
- **Cyclic Redundancy Check (CRC):** *(ESF framing only)* A 6-bit CRC can be created from the F-bits.
- Other F-bits in the multiframe can be used for maintenance and operational information.

The 1.544 Mbps multiframe format provides a data channel, called the Data Link (DL), which is derived from the framing overhead. The DL carries both control signals and

performance data. It is comprised of m-bits that occur in every second frame, producing an available resource of 4 Kbps that can be used for various purposes, including:

- Loopback activation and deactivation. Loopbacks are maintenance tools that can be used to locate network and installation problems.
- Remote Alarm Indication (RAI), used to indicate loss of layer 1 capability. RAIs may also be used to indicate loss of signal or loss of framing, excessive CRC errors (ESF framing only) or loopbacks applied in the network. For ESF framing the RAI is composed of a series of 8 ones alternating with 8 zeroes. For D4 framing the RAI sets bit 2 of each timeslot to zero. Refer also to “PVCR Link Management” on page 1-11.
- Alarm Indication Signal (AIS), used to indicate loss of layer 1 capability on the network side. AIS may indicate a loss of signal, or that the timing provided to the user side is not the network clock. AIS is composed of all ones, and is non-framed.
- Regular reporting of CRC check sum calculations (ESF framing only), the occurrence of controlled slip events and other operational data.

1.2.4 T1 Coding Scheme

The standard coding scheme of the T1 interface is called “bipolar with 8-zeros substitution”, or B8ZS. With this code a binary 0 is represented by no line signal, and a binary 1 is represented by a positive or negative pulse. To be valid, the binary 1 pulses must alternate in polarity.

This code creates the possibility of long strings of zeros, which can produce a loss of synchronization. To prevent this, the encoding was amended with the following rules:

- If an octet of all zeros occurs, and the last pulse preceding this octet was positive, then the zeros are replaced with 000+–0–+
- If the last pulse was negative, then the zeros are replaced with 000–+0+–

Each of these rules has the effect of violating the bipolar code twice, since the pulses no longer alternate in polarity. This kind of violation is unlikely to be caused by noise or other transmission problems, so it does not cause a transmission error. Instead, the receiver recognizes the replacement pattern and interprets the octet as consisting of all zeros.

On the NetPerformer, the B8ZS scheme can be turned off or replaced with a 7-zeros substitution scheme through a configurable parameter.

NOTE: These zero suppression coding schemes should not be confused with PCM encoding methods, which are used to digitize analog voice into digital voice. The NetPerformer supports both µ-law (mu-law) for installations in North America (typically T1), and A-law for installations in Europe (typically E1).

1.2.5 E1 Interfaces

The NetPerformer supports E1 at 75 and 120 Ohms:

- **E1-75 Interface:** A 2.048 Mbps interface at 75 Ohms supporting up to 32 timeslots per port, with two coaxial BNC connectors per port
- **E1-120 Interface:** A 2.048 Mbps interface at 120 Ohms supporting up to 32 timeslots per port, with one RJ-45 connector per port.

1.2.6 E1 Channel Assignment

E1 has 32 channels in its data service, each at 64 Kbps. Of these channels, only 30 are used: channels 1 to 15 and 17 to 31. A channel occupies an integer number of timeslots, and the same timeslot positions in every frame. Each of channels 1 to 15 and 17 to 31 can accommodate, for example, a PCM-encoded voiceband signal or a 64 Kbps digital data signal.

The D-channel, when present, is assigned timeslot 16 (which is reserved for this purpose). Contiguous HDLC flags are transmitted on the D-channel when there are no frames to send.

1.2.7 E1 Error Detection

The following functions are available for E1 transmissions:

- **Multiframe Alignment Signal:** In E1 transmissions, a multiframe is made up of 16 consecutive frames numbered from 0 to 15. The multiframe alignment signal is 0000, which occupies bits 1 to 4 of channel 16 in frame 0.
- **Signaling Channels:** Channels 1 to 15 and 17 to 31 are assigned to telephone channels numbered from 1 to 30.
- **Frame Alignment Signal (FAS):** Channel 0 carries the FAS, which is used for alignment purposes. It occupies positions 2 to 8 in timeslot 0 of every frame. In order to have synchronization the FAS code, 0011011, alternates with the Non-FAS byte, which contains a x1xxxxxx.
- **Cyclic Redundancy Check (CRC):** A 4-bit CRC can be created from other bits in timeslot 0.
- **PVCR Link Management:** The detection and retransmission of RAI and AIS alarm signals over an E1/T1 interface if the PVCR (WAN) link is down. Refer to “PVCR Link Management” on page 1-11 for details and configuration requirements.

1.2.8 E1 Coding Scheme

The coding scheme of the E1 interface is called “high-density bipolar - 3 zeros”, or HDB3. As with the T1 coding scheme described earlier, HDB3 is based on bipolar encoding. The scheme replaces strings of four zeros with sequences containing one or two pulses. In each case, the fourth zero is replaced with a code violation.

To avoid introducing a DC component, another rule ensures that successive violations are of alternate polarity. Before replacing the zero sequence, the scheme determines whether the number of pulses since the last violation is even or odd, then determines the polarity of the last pulse before the occurrence of the four zeros.

Codes are also specified for idle channels and idle slots. A pattern including at least three binary ones in an octet must be transmitted in every timeslot that is not assigned to a channel. These are timeslots that may be awaiting channel assignment on a per-call basis, residual slots on an interface that is not fully loaded, and so on. The same pattern must appear in every timeslot of a channel that is not allocated to a call in both directions.

On the NetPerformer, the HDB3 scheme can be turned off through a configurable parameter.

NOTE: These zero suppression coding schemes should not be confused with PCM encoding methods, which are used to digitize analog voice into digital voice. The NetPerformer supports both µ-law (mu-law) for installations in North America (typically T1), and A-law for installations in Europe (typically E1).

1.2.9 ISDN-BRI S/T Interface

An ISDN-BRI S/T interface card is available on some NetPerformer products for support of voice/data connections. This interface card provides:

- Dual S/T Basic Rate Interface for connection of 2 separate ISDN lines
- 2 B-(bearer) channels at 64 Kbps and one D-channel at 16 Kbps on each physical port
- Each port can be configured with 3 Multiple Subscriber Numbers on which incoming ISDN connections can be accepted
- Supports digital voice and data at 128 Kbps using ISDN-BRI (ETSI, North America and Japan), QSIG, transparent and customized signaling
- Each ISDN line configurable as NT (Network Termination) or TE (Terminal Equipment) through hardware strapping at the electrical level with one jumper per port for termination, and soft strapping for the upper layer protocols
- Software configurable Phantom power.

For a detailed description of the ISDN-BRI S/T interface card and its installation, consult the *Hardware Installation Guide* for your NetPerformer product.

1.3 Types of Digital Connections Supported

The NetPerformer supports a variety of digital connections, including:

- Trunk connections
- Drop & Insert mode
- Transparent signaling
- Channel Associated Signaling (CAS) signaling
- Common Channel Signaling (CCS), including ISDN and QSIG
- Circuit Emulation Services (CES) over Packet/PVCR
- SS7 support.

1.3.1 Trunk Connections over Digital Interfaces

You can configure trunk connections over digital interfaces using a variety of protocols:

- **Frame Relay**: One or more Frame Relay connections can be configured on a digital link (T1 or E1) by configuring a certain number of timeslots with the FR-USER protocol. PVCs can then be assigned to these virtual Frame Relay ports for access to remote units. Frame Relay over a digital link provides an increased number of possible Frame Relay connections on the NetPerformer unit.
- **Voice Connection**: A voice connection to the public network can be configured on a digital link by configuring a certain number of timeslots with a voice compression algorithm. ACELP-CN, G.729 (Available only when SIP license activated on the unit), and PCM64K are the currently available compression algorithms.
- **PowerCell (PVCR)**: The PVCR protocol can also be configured to operate over a T1 or E1 connection.

1.3.2 Drop & Insert Mode

The digital Passthrough mode is used to provide a drop and insert functionality on digital links. In Passthrough mode, the traffic from certain timeslots on one digital interface is transferred without interpretation to other timeslots on another digital interface. T1/E1 to T1/E1 passthrough is supported when no signaling (data only) or CAS signaling is configured on the digital link.

Drop & Insert allows for information to be exchanged from one physical digital port (or LINK) to an other with minimal software involvement. It can be used in a digital PBX application where timeslots need to be divided between:

- Timeslots that will be compressed and passed through Frame Relay, and
- Others timeslots that must be routed directly to the PSTN.

1.3.3 Transparent Signaling

Transparent signaling is used when two PBXs have to communicate using any kind of CCS signaling. It can be configured on T1 and E1 interfaces. This feature takes the timeslot that contains the signaling and passes it transparently to the remote unit. For E1 this is timeslot 16, and for T1 it is timeslot 24. The data contained in the signaling timeslot can be passed as either uncompressed or compressed, depending on the configuration.

NOTE: DSP SIMM modules are required to support this application.

1.3.4 Channel Associated Signaling (CAS)

In this method, signaling bits are allocated throughout the 24-frame multiframe, rather than to a specific timeslot. There are four different signaling bits in the multiframe: A, B, C and D. Channel associated signaling can provide 4-state, 2-state or 1-state signaling, based on the number of independent signaling bits used.

1.3.5 Common Channel Signaling (CCS)

This method uses different channels (either physical or logical) to convey the signaling information and the actual user information to the connected devices. ISDN and QSIG are examples of CCS signaling types.

Refer also to the chapter “Data Transport using ISDN” on page 3-1.

1.3.6 Circuit Emulation Services (CES) over Packet/PVCR

The NetPerformer SDM-9220 and SDM-9230 support Circuit Emulation Service (CES) over a packet/PVCR network using a full E1 line, as shown in Figure 1-1.

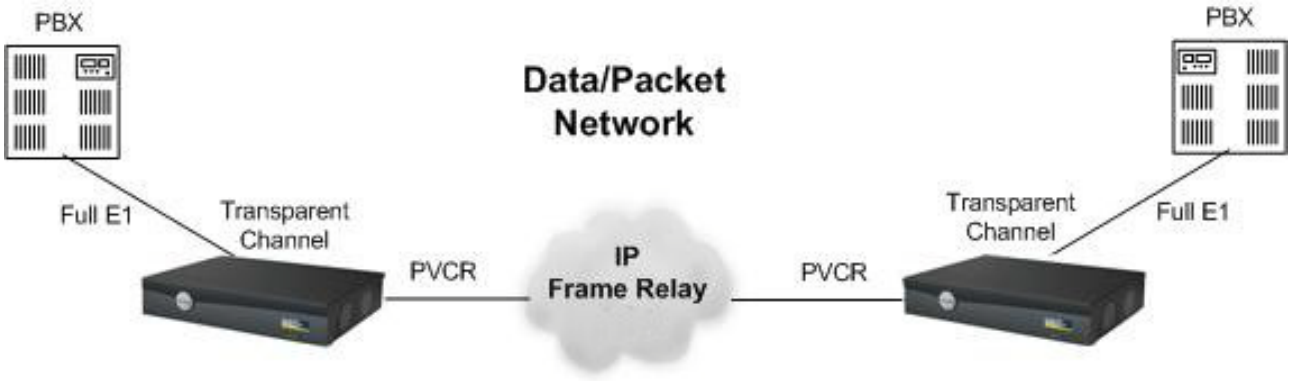

Figure 1-1: CES over Packet/PVCR Application Scenario

In this scenario:

- The data/packet network relies on PowerCell transport, either a point-to-point line or over an IP, or Frame Relay network.
- A full E1 trunk is used to transport all bits of the voice traffic stream between each NetPerformer and the attached PBX or other end device
- No processing of the voice traffic stream takes place in either NetPerformer unit. All bits are transferred transparently from one end device to the other. Therefore no DSP SIMM modules are required to support this application.
- All 31 channels on the E1 interface are configured with the **PASSTHRU** protocol, with the link set to no signalling (value **NONE**)
- PVCR PVCs are also required when interfacing with a Frame Relay network.

1.3.7 SS7 Support

The Common Channel Signaling System No. 7 (SS7) is an ITU-T standard for wireless services. It provides a protocol that allows network elements in the PSTN to carry out call setup, routing and control for cellular phones.

An SS7 network also handles wireless roaming, mobile subscriber authentication, wireline services such as toll-free (800/888) and toll (900) numbers, and supplementary services such as call forwarding, call display and three-way call setup.

Although the SS7 protocol is used to carry voice traffic over a digital channel, it can be configured on the NetPerformer like a digital data channel with no signaling tones. This protocol is primarily used between nodes that support telephony switches, and all traffic is passed transparently between NetPerformer units.

SS7 messages can be transported over the link at 56 or 64 Kbps. Signaling is handled on dedicated channels (out-of-band) rather than over the voice channels (using MF signaling tones), which permits faster call setup, improved bandwidth usage and communication with data-only elements of the network, e.g. Intelligent Network services.

1.4 PVCR Link Management

The NetPerformer is able to send an AIS (Alarm Indication Signal) or RAI (Remote Alarm Indication) alarm signal over an E1/T1 interface if the PVCR (WAN) link goes down. The AIS or RAI alarm indicates that this link cannot be used.

In addition, the NetPerformer can detect an AIS/RAI signal on an interface and transmit it to a remote unit, which is then able to retransmit the AIS or RAI to the user endpoint.

For example, if the remote unit is lost, the NetPerformer will generate an alarm to advise the PBX that it must not continue to transmit on this interface.

This scenario is also supported on an E1 interface between voice switches in any type of DCME application.

- When a WAN link goes down, the NetPerformer disables the E1 interface on the local side if the peer E1 interface is down on the remote NetPerformer.
- In this way there is a propagation of the failure all the way to the E1 interfaces of the central voice switch, which will stop routing calls through that set of E1 channels.

Example: Unit A is connected via PVCR links to Units B and C. The digital interface in slot 1 is configured to reach Unit B and the digital interface in slot 2 is configured to reach Unit C. If the link to Unit B goes down, an alarm will be generated only on the second port of the E1 interface card in slot 1.

1.4.1 Configuring the PVCR Link

The type of signal used (AIS or RAI) is configured on the digital LINK, using the **LINK** option of the **SE/SLOT** command (refer also to “Configuring a T1 Physical Port (LINK)” on page 2-3, and “Configuring an E1 Physical Port (LINK)” on page 2-5).

- Set the *PVCR Link management* parameter to **ENABLE**
- Set the *Link management alarm type* to:
  - **RAI/YELLOW:** For an RAI alarm on an E1 interface or a YELLOW alarm on a T1 interface.

    The **ALM** LED for the interface will turn **yellow** for this type of alarm.
  - **AIS:** For an AIS alarm on either an E1 or T1 interface.

    The **ALM** LED on the interface will turn **red** for this type of alarm.
- Define the *Remote unit* parameter. This determines which remote NetPerformer will be monitored for an alarm signal. Enter the *Unit name* that has been configured on the remote unit.

NOTE: The decision to send or remove an alarm on the E1/T1 interface is based on the loss or recovery of the PVCR link to the unit specified by this parameter.

- Define the *Remote port number* parameter. This determines which remote digital LINK will receive the alarm indication. Enter the port number that corresponds to the LINK configuration on the remote side (**100**, **150**, **200**, **250**, **300**, **350**, **400** or **450**). By default, the same number as the local LINK number is selected.

SE/SLOT/#/ LINK example: with PVCR Link Management

```
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,def:1) ? 1
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? LINK
...
PORT 100> PVCR Link management (def:DISABLE) ? ENABLE
PORT 100> Link management alarm type (def:RAI/YELLOW) ? AIS
PORT 100> Remote unit (def:) ? SDM-9220
PORT 100> Remote port number (def:100) ? 150
```

2

Configuring Digital Data Connections

2.1 Configuration Overview

► **To configure a data connection on a digital interface card you must:**

- Define the physical port (**LINK**) on the interface card using the **SLOT/LINK** submenu of the **SETUP** command. Refer to:
  - “Configuring a T1 Physical Port (LINK)” on page 2-3
  - “Configuring an E1 Physical Port (LINK)” on page 2-5
  - “Configuring an ISDN-BRI S/T Physical Port (LINK)” on page 2-7.
- Define the logical channels that carry digital data traffic on one or more timeslots, using the **SLOT/CHANNEL** submenu of the **SETUP** command. Refer to “Configuring the Digital Data Channels (CHANNEL)” on page 2-9).

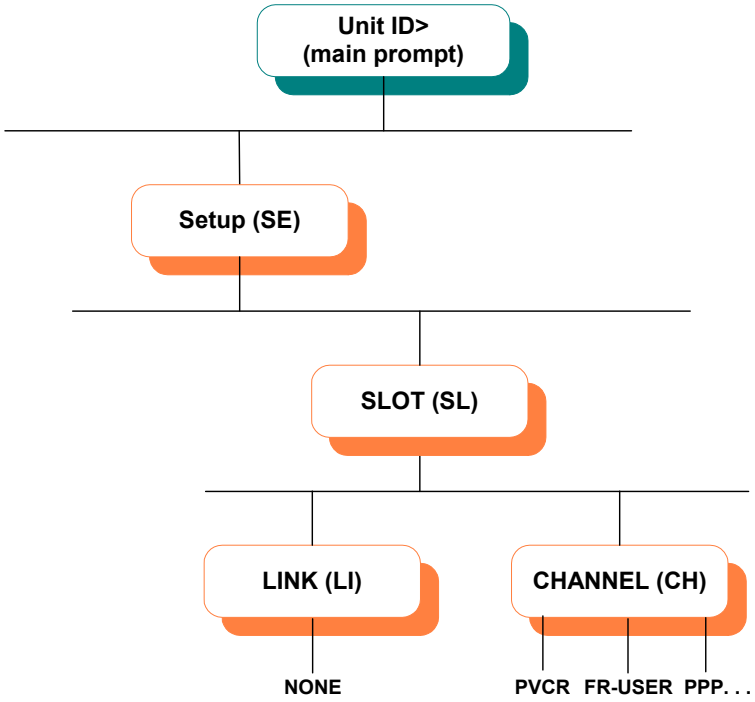

Figure 2-1: SETUP/SLOT Path on the CLI Tree

2.2 Configuring a T1 Physical Port (LINK)

► **To define the physical port on a T1 interface:**

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **LINK**
4. For an E1/T1 interface card only, set the *Framer Type* to **T1**
5. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
6. Set *Clock recovery* to **ENABLE**, if desired
7. The next parameter, *Digital port clock source*, is applied globally to all digital ports on the same NetPerformer unit. Set to a port number for external port clocking, or **INTERNAL** for internal port clocking.
8. Set the *Signaling mode* to:
   - **NONE**, for a data-only connection
   - **ROB BIT** for T1 Robbed-bit signaling
   - **TRSP-ORIG** (originate) or **TRSP-ANSW** (answer), for transparent HDLC-based or PCM64K-based transport (not available with the NetPerformer SIP VoIP option)
   - **NTT** or **KDD**, for ISDN access in Japan
   - **4ESS**, **5ESS**, **DMS100** or **NI2**, for ISDN access in other countries (mainly North America)
   - **QSIG**, for standard PBX access with supplementary services support.

   Additional parameters are presented for an ISDN link. Refer to the chapter "Data Transport using ISDN" on page 3-1 for further information on the ISDN interface.
9. For an E1/T1 interface card only, set the *Interface Mode* to **NT** or **TE**

   On other digital interfaces this mode is set through hardware strapping. For instructions, refer to the *Hardware Installation Guide* for your particular NetPerformer product.
10. Change the other digital link parameters from their default values, if desired.

    PVCR Link Management can be configured on an E1/T1 interface card only. Refer to "PVCR Link Management" on page 1-11 for details.

SE/SLOT/#/ LINK example: on a T1 interface card

```
GWVOIP-9230>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/IP/IPX/MAP/PHONE/PORT/
PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SIP/SLOT/SS7/USER/VLAN,
def:BRIDGE) ? SLOT
SLOT> Slot number (2/3,def:2) ?
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT 200> Status (def:DISABLE) ? ENABLE
PORT 200> Clock recovery (def:DISABLE) ?
GLOBAL  > Digital port clock source (def:INTERNAL) ?
PORT 200> Signaling mode (def:NONE) ?
PORT 200> Pcm encoding law (def:MU-LAW) ?
PORT 200> Idle code (def:7F) ?
PORT 200> Zero suppression mode (def:B8ZS) ?
PORT 200> Gain limit (def:-30DB) ?
PORT 200> Framing mode (def:ESF) ?
PORT 200> Line Build Out (def:0-133FT) ?
PORT 200> Loopback (def:DISABLE) ?
```

SE/SLOT/#/ LINK example: on an E1/T1 interface card set to T1

```
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,def:1) ? 1
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? LINK
PORT 100> Framer Type (def:E1) ? T1
PORT 100> Status (def:DISABLE) ? ENABLE
PORT 100> Clock recovery (def:DISABLE) ?
GLOBAL > Digital port clock source (def:INTERNAL) ?
PORT 100> Signaling mode (def:NONE) ? NONE
PORT 100> Interface Mode (def:TE) ? NT
PORT 100> Pcm encoding law (def:MU-LAW) ?
PORT 100> Hunt Group Sorting (def:RRA) ?
PORT 100> Idle code (def:7F) ?
PORT 100> Zero suppression mode (def:B8ZS) ?
PORT 100> Long Haul (def:NO) ?
PORT 100> Framing mode (def:ESF) ?
PORT 100> Line Build Out (def:0-133FT) ?
PORT 100> Custom Waveform (def:DISABLE) ?
PORT 100> Loopback (def:DISABLE) ?
PORT 100> PVCR Link management (def:DISABLE) ? ENABLE
PORT 100> Link management alarm type (def:RAI/YELLOW) ?
PORT 100> Remote unit (def:) ? SDM-9220
PORT 100> Remote port number (def:100) ?
```

For details on these parameters, consult the appendix “SE/SLOT/#/LINK Configuration Parameters” on page 6-1.

2.3 Configuring an E1 Physical Port (LINK)

► **To define the physical port on an E1 interface card:**

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **LINK**
4. For an E1/T1 interface card only, set the *Framer Type* to **E1**
5. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
6. Set *Clock recovery* to **ENABLE**, if desired
7. The next parameter, *Digital port clock source*, is applied globally to all digital ports on the same NetPerformer unit. Set to a port number for external port clocking, or **INTERNAL** for internal port clocking.
8. Set the *Signaling mode* to:
   - **NONE**, for a data-only connection
   - **TRSP-ORIG** (originate) or **TRSP-ANSW** (answer), for transparent HDLC-based or PCM64K-based transport (not available with the NetPerformer SIP VoIP option)
   - **CAS**, for a data connection using CAS
   - **EURO-ISDN**, for a data connection using ISDN
   - **QSIG**, for standard PBX access with supplementary services support.

   Additional parameters are presented for an ISDN link. Refer to the chapter "Data Transport using ISDN" on page 3-1 for further information on the ISDN interface.
9. For an E1/T1 interface card only, set the *Interface Mode* to **NT** or **TE**

   On other digital interfaces this mode is set through hardware strapping. For instructions, refer to the *Hardware Installation Guide* for your particular NetPerformer product.
10. Change the other digital link parameters from their default values, if desired.

    PVCR Link Management can be configured on an E1/T1 interface card only. Refer to "PVCR Link Management" on page 1-11.

SE/SLOT/#/ LINK example: on an E1 interface card

```
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) ? 3
Item (LINK/CHANNEL,def:LINK) ?
PORT 300> Status (def:DISABLE) ? ENABLE
PORT 300> Clock recovery (def:DISABLE) ?
PORT 300> Digital port clock source (def:INTERNAL) ?
PORT 300> Signaling mode (def:NONE) ? NONE
PORT 300> Pcm encoding law (def:A-LAW) ?
PORT 300> Idle code (def:7E) ?
PORT 300> Zero suppression mode (def:HDB3) ?
PORT 300> Gain limit (def:-12DB) ?
PORT 300> CRC4 mode (def:ENABLE) ?
PORT 300> International bit (def:ENABLE) ?
PORT 300> ETS 300 011 mode (def:DISABLE) ?
PORT 300> Loopback (def:DISABLE) ?
```

SE/SLOT/#/ LINK example: on an E1/T1 interface card set to E1

```
BTS>SE
SETUP
Item (BRIDGE/CALLER ID/CLASS/CUSTOM/FILTER/GLOBAL/HUNT/IP/IPX/MAP/
PHONE/PORT/PU/PPPOE/PPPUSER/PVC/REDUNDANCY/SCHEDULE/SLOT/SS7/USER/VLAN,
def:SCHEDULE) ? SLOT
SLOT> Slot number (1,def:1) ? 1
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT 100> Framer Type (def:E1) ? E1
PORT 100> Status (def:DISABLE) ? ENABLE
PORT 100> Clock recovery (def:DISABLE) ? ENABLE
GLOBAL  > Digital port clock source (def:INTERNAL) ? 1
PORT 100> Signaling mode (def:NONE) ?
PORT 100> Interface Mode (def:TE) ? NT
PORT 100> Pcm encoding law (def:A-LAW) ?
PORT 100> Hunt Group Sorting (def:RRA) ?
PORT 100> Idle code (def:7E) ?
PORT 100> Zero suppression mode (def:HDB3) ?
PORT 100> Long Haul (def:NO) ?
PORT 100> Impedance and Line Build Out (def:120 OHMS) ?
PORT 100> Custom Waveform (def:DISABLE) ?
PORT 100> CRC4 mode (def:ENABLE) ?
PORT 100> International bit (def:ENABLE) ?
PORT 100> Loopback (def:DISABLE) ?
PORT 100> PVCR Link management (def:DISABLE) ?
```

For details on these parameters, consult “E1 Port” on page 6-17.

2.4 Configuring an ISDN-BRI S/T Physical Port (LINK)

► To define a physical port on an ISDN-BRI S/T interface card:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Port number*

   The port number indicator in subsequent parameters is **00** when *Port number* is set to **1**, or **50** when *Port number* is set to **2**. For example, **PORT 300** indicates the physical link on Slot 3, Port 1.
4. Enter **LINK**
5. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
6. Set the *Signaling mode* to:
   - **NONE**, for a data-only connection
   - **EURO-ISDN**, for ISDN access in Europe
   - **INS-NET** or **KDD**, for ISDN access in Japan
   - **NI1**, **NI2**, **5ESS** and **DMS100**, for ISDN access in other countries
   - **QSIG**, for standard PBX access with supplementary services support.
7. Change the other digital link parameters from their default values, if desired.

SE/SLOT/#/ LINK example: on an ISDN-BRI S/T interface card

```
CHICAGO>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 (1/2/3/4,def:2) ? 3
Port number (1/2,def:1) ? 1
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT 300> Status (def:DISABLE) ? ENABLE
PORT 300> Clock recovery (def:DISABLE) ?
PORT 300> Digital port clock source (def:INTERNAL) ? ?
PORT 300> Signaling mode (def:NONE) ? NONE
PORT 300> CCS side (def:USER) ?
PORT 300> Channel selection mode (def:PREFERRED) ?
PORT 300> Local number (def:) ? 6595090
PORT 300> Local subaddress (def:) ? 01
PORT 300> Terminal Endpoint Identifier (TEI) (def:AUTOMATIC) ?
PORT 300> Pcm encoding law (def:A-LAW) ?
PORT 300> Power Mode (def:OFF) ?
PORT 300> Generate ring back locally (def:DISABLE) ?
PORT 300> Loopback (def:DISABLE) ?
```

Most of these parameters behave in the same way as for an ISDN connection on a T1 or E1 link. For details on the *Terminal Endpoint Identifier (TEI)* and *Power Mode* parameters,

turn to “ISDN-BRI S/T Port” on page 6-21.

NOTE: The *Power Mode* parameter is listed **only when the ISDN-BRI S/T port is set to NT termination mode**. If the ISDN-BRI S/T port is set to TE termination mode, the power source is automatically disabled by the hardware.

► To view the current NT/TE termination mode:

1. At the NetPerformer command prompt, enter **DS ↵ SLOT**
2. Select the *Slot number*.

   The *Interface* statistic will read either:

   - **BRI-NT**, for NT termination mode, or
   - **BRI-TE**, for TE termination mode.

DS/SLOT example: showing NT/TE termination mode

```
CHICAGO>DS
DISPLAY STATES
Item (GLOBAL/PORT/PU/PVC/SLOT/SVC/VLAN,def:GLOBAL) ? SLOT
SLOT> Slot number (1/2/3/4/ALL,def:1) ? 3
SLOT 3 - PORT 1>
PORT 300> Protocol.............................ISDN BRI
PORT 300> State................................OUT OF SYNC
PORT 300> D-Channel state......................DOWN
PORT 300> Interface............................BRI-NT

SLOT 3 - PORT 2>
PORT 350> Protocol.............................ISDN BRI
PORT 350> State................................OUT OF SYNC
PORT 350> D-Channel state......................DOWN
PORT 350> Interface............................BRI-TE

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

To change the current NT/TE termination mode for the physical ISDN-BRI S/T port, refer to the *Hardware Installation Guide* for your particular NetPerformer model.

2.5 Configuring the Digital Data Channels (CHANNEL)

The digital channels of a T1, E1 or ISDN-BRI S/T card can transport data or voice, depending on:

- The *Signaling mode* set on the physical link. Refer to "T1 Port" on page 6-2 for T1 signaling modes, "E1 Port" on page 6-17 for E1 signaling modes, and "ISDN-BRI S/T Port" on page 6-21 for ISDN-BRI S/T signaling modes.
- The *Protocol* set on the **CHANNEL**. The protocols that are available depend on the *Signaling mode* set on the **LINK**, as explained below.

► To define a digital data channel:

NOTE: Digital data channels are configured in the same way on all types of digital interface cards. Refer to Figure 2-1.

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **CHANNEL**
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 a data protocol:
   - If the *Signaling mode* is set to **NONE**, **TRSP-ORIG**, **TRSP-ANSW**, **CAS** or **ROB BIT**, the following data protocols are available:

     D&I, FR-NET, FR-USER, HDLC, PASSTHRU, PASSTHRUOFR, PPP, PVCR, SS7, TRANSPARENT
   - The **TRANSPARENT** protocol is used to establish a permanent point-to-point transparent signaling connection between digital interface cards. **It is *not* available on a NetPerformer unit installed with SIP VoIP option**.
   - If the *Signaling mode* is set to **EURO-ISDN**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS**, **DMS100** or **QSIG**, the following data protocols are available:

     D&I, FR-NET, FR-USER, PASSTHRU, PASSTHRUOFR, PPP, PVCR, SS7, TRANSPARENT
6. Select the *Timeslot*
7. Specify the *Number of consecutive timeslots*
8. Change the other digital channel parameters from their default values, if desired.

SE/SLOT/#/CHANNEL 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) ? SLOT
SLOT> Slot number (1/2/3,def:1) ? 1
Port number (1/2,def:1) ? 1
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (101-124/ALL,def:101) ? 115
PORT 115> Protocol (def:OFF) ? 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:8) ?    {255.000.000.000}
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> 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 (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) ?
PORT 180> Use this port as default gateway (def:NO) ?
```

Refer to the appendix "SE/SLOT/#/CHANNEL Configuration Parameters" on page 7-1 for details on these parameters. Refer also to the following modules of this document series for further information on specific protocols:

- *WAN/Leased Lines:* for the **PVCR** protocol
- *WAN/Frame Relay:* for the **FR-NET** and **FR-USER** protocols
- *WAN/Point-to-Point (PPP):* for the **PPP** protocol
- *Legacy Data:* for the **HDLC**, **PASSTHRU** and **PASSTHRUOFR** protocols
- *SkyPerformer Option:* for the **SP** protocol (available with the SkyPerformer licensed software option only).

3

Data Transport using ISDN

3.1 About the ISDN

Integrated Services Digital Network (ISDN) is worldwide telecommunication service that uses digital transmission and switching technology to support voice and digital data communication. It is a Common Channel Signaling (CCS) method that has been designed to integrate voice, fax and data on the same physical line.

The protocols implemented in ISDN devices are based on ITU-T standards, but differ slightly from one country to another. Most European countries, where many flavors of ISDN used to exist, have now migrated toward a single standard. However, there are still differences between the European standard and the types of ISDN used in North America (National) and Japan.

3.1.1 ISDN Features

Integrated Services Digital Network (ISDN) is a set of digital transmission standards and a network infrastructure that allows digital transmission over existing telephone wiring, as provided by public network service providers. It has become a widely accepted standard for digital communications, and is used around the world for digital access to the Public Switched Telephone Network (PSTN). The deployment of ISDN is particularly widespread in Europe.

ISDN provides the network with:

- Enhanced flexibility through the addition of dialup capabilities over digital lines
- Standard access to all network services, allowing voice, data, fax, video and graphics to share the same line
- Quick call establishment procedure
- The error-free performance associated with digital technology.

There are two distinct ISDN access types available for both Europe and Japan:

- Basic Rate Interface (BRI):
  - Provides 2 bearer channels (B-channels) at 64 Kbps for user information exchange and 1 D-channel at 16 Kbps for signaling. Refer to “ISDN Channels” on page 3-3.
  - Typically used by individuals, home offices and small businesses that cannot justify a full T1/E1 line
  - Also ideal for backup and Bandwidth On Demand purposes
  - Offered on the NetPerformer when installed with the ISDN-BRI S/T interface card.
- Primary Rate Interface (PRI):
  - Provides up to 23 B-channels at 64 Kbps through a T1 interface for both Japanese and National ISDN.
  - Provides up to 30 B-channels at 64 Kbps on an E1 interface.

- Used in larger applications that require a large number of simultaneous connections, for example, businesses that use PBXs and high-capacity applications such as remote LAN access services
- Offered on the NetPerformer when installed with the T1, E1-120 or E1-75 interface card.

3.1.2 ISDN Channels

ISDN is characterized by a unique transmission structure which divides the digital line between subscriber and service provider into multiple communication channels:

- **B-Channel:** A 64 Kbps user channel for carrying digital data, and PCM-encoded digital voice.
  - For ISDN-BRI there are two B-channels at 64 Kbps.
  - ISDN-PRI has 23 B-channels at 64 Kbps in North America and Japan, and 30 B-channels at 64 Kbps in Europe and most other countries.
  - For voice calls, NetPerformer B-channels act as voice pipes for calls that are set up via an ISDN protocol. Voice calls are routed through a switch to a DSP when a call comes up.
  - For data support, NetPerformer B-channels individually carry WAN data.
  - The B channel can be used for voice and data; the compressed voice requires the DSP, but not the data channel. The type of data supported: FR-USER, FR-NET, PVCR, SDLC, and HDLC. The type of data not supported: transparent 64K, CBR, and bonding on switched data calls.
- **D-Channel:** A channel that is reserved for signaling purposes.
  - Contains a WAN-based stream of messages that control call setup and teardown
  - Carries all control information for managing circuit switched calls on the associated B-channels
  - For both ISDN-BRI and ISDN-PRI only one D-channel is used. However, the D-channel runs at 16 Kbps for an ISDN-BRI interface, and at 64 Kbps for an ISDN-PRI interface.

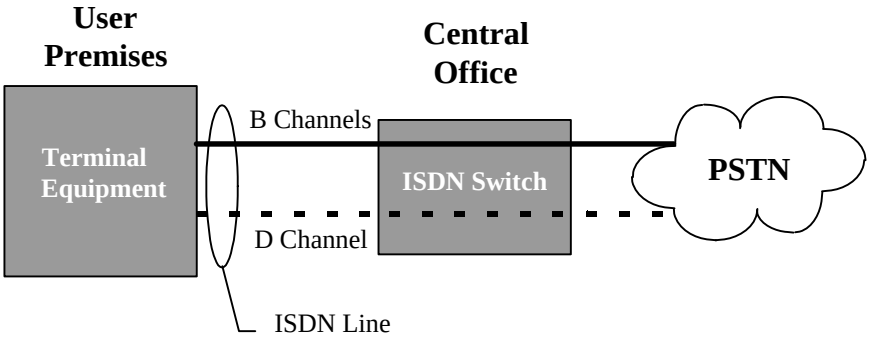

Figure 3-1: ISDN Interfaces to the PSTN

3.1.3 Reference Points and Functional Groupings

ISDN functions are defined by a classification of reference points and functional groupings, as shown in Figure 3-2.

NOTE: The representation of non-ISDN devices connecting to an ISDN network is not included in this diagram, and is beyond the scope of this document.

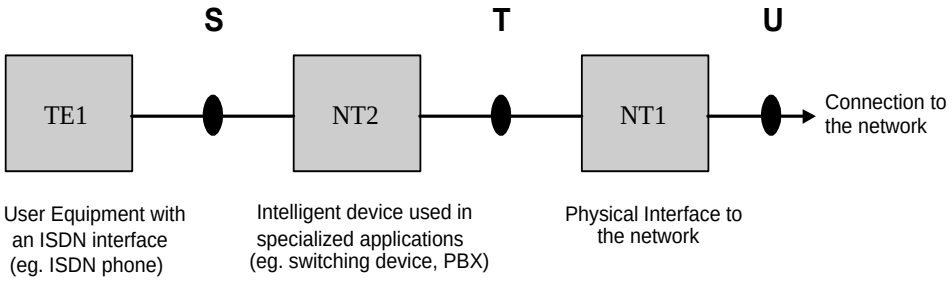

Figure 3-2: ISDN-BRI Reference Points and Functional Groupings

The functional groupings of ISDN-BRI are:

- **TE:** Terminal Equipment. Refers to subscriber equipment that uses ISDN. TE1 (Type 1) refers to devices that support standard ISDN, for example, an ISDN phone, ISDN fax or ISDN card in a personal computer.
- **NT1:** Network Termination 1. The NT1 handles functions associated with the physical and electrical termination of ISDN at the user premises. This includes functions that may be regarded as belonging to OSI Layer 1 (see "D-channel Layers" on page 3-5).
- **NT2:** Network Termination 2. An NT2 is an intelligent device that can perform switching and concentration functions. It may include up to OSI Layer 3 functionality, depending on the requirement. A digital PBX is an example of an NT2 that can provide OSI Layer 1, 2 and 3 functionality.

The reference points of ISDN-BRI are:

- **S:** System. Corresponds to individual ISDN terminals. It supplies user terminal equipment with network-related communication functions.
- **T:** Terminal. Corresponds to a minimal ISDN network termination at the user premises. It connects the user equipment to the network provider equipment.

NOTE: In simple ISDN applications where an NT2 is not required, the S and T reference points are combined as an S/T reference point.

- **U:** User. Describes the full-duplex data signal on the subscriber line.

3.1.4 D-channel Layers

The ISDN D-channel protocol corresponds to the ISO model as follows:

- **Layer 1 (Physical Layer):** Defined by I.430 and I.431. Specifies the physical interface for both basic and primary access.
- **Layer 2 (Data Link Layer):** Defined by an WAN-like layer protocol specific to ISDN called LAPD. All transmissions on the D-channel are in the form of LAPD messages that are exchanged between the user equipment and the ISDN switching equipment.
- **Layer 3 (Network Layer):** Specifies the call control protocol that establishes and manages connections over the B-channels. The call control messages are exchanged between the user equipment and the network.

3.2 NetPerformer Support of ISDN Signaling

ISDN support is available for both voice and data traffic on a NetPerformer installed with an E1, T1 or ISDN-BRI S/T interface card. For data applications, the NetPerformer provides WAN connectivity to the Telco infrastructure using digital interfaces. For voice applications it provides connectivity to user PBX equipment using standardized signaling methods.

NOTE: WAN connectivity using ISDN is based on the **FR-USER**, **FR-NET**, **PVCR** and **PPP** protocols.

3.2.1 Signaling Types Supported

The NetPerformer supports the following ISDN signaling types on its digital interface cards:

ISDN Type (Location)	NetPerformer Interface Card	LINK *Signaling mode* Parameter Values
European ISDN	E1 (PRI)	*EURO-ISDN*
	ISDN-BRI S/T	*EURO-ISDN*
Japanese ISDN	T1 (PRI)	*NTT, KDD*
	ISDN-BRI S/T	*INS-NET, KDD*
National ISDN (North American)	T1 (PRI)	*4ESS, 5ESS, DMS100, NI2*
	ISDN-BRI S/T	*NI1, NI2, 5ESS, DMS100*

Table 3-1: NetPerformer Support of ISDN Signaling

3.2.2 European ISDN Support

The NetPerformer supports ISDN used in Europe on both the E1 (PRI) and ISDN-BRI S/T interface cards. It can handle both voice applications and data connectivity using the same hardware interfaces.

To configure the physical port (LINK) with European ISDN signaling, execute the **SLOT/LINK** submenu of the **SETUP** command, and set the *Signaling type* on the LINK to **EURO-ISDN**.

3.2.3 Japanese ISDN Support

The NetPerformer supports ISDN used in Japan on both the T1 (PRI) and ISDN-BRI S/T interface cards. It can handle both voice applications and data connectivity using the same hardware interfaces.

To configure the physical port (LINK) with Japanese ISDN signaling, execute the **SLOT/LINK** submenu of the **SETUP** command, and set the *Signaling type* on the LINK to **NTT** (on T1 card only), **INS-NET** (on ISDN-BRI S/T card only), or **KDD**.

3.2.4 National ISDN Support

The NetPerformer supports National ISDN used in North America on both the T1 (PRI) and ISDN-BRI S/T interface cards. It can handle both voice applications and data connectivity using the same hardware interfaces.

To configure the physical port (LINK) with National ISDN signaling, execute the **SLOT/LINK** submenu of the **SETUP** command, and set the *Signaling type* on the LINK to **4ESS** (on T1 card only), **NI1** (on ISDN-BRI S/T card only), **5ESS**, **DMS100**, or **NI2**.

3.2.5 Installation Requirements

To permit connection to multiple remote locations using ISDN, you must install the interface card appropriate to your application and location (see Table 3-3-1) in a slot on the unit chassis. For complete instructions, consult the *Hardware Installation Guide* for your product.

- Each interface card supplies a number of individual channels, each of which can be terminated in a separate digital circuit at a different remote site (refer to "ISDN Features" on page 3-2):
  - **ISDN-BRI S/T interface card:** Provides two ISDN-BRI connections with a total of 4 bearer channels
  - **E1-75 or E1-120 interface card:** Provides one ISDN-PRI connection with up to 30 B-channels and 1 D-channel
  - **T1 interface card:** Provides one ISDN-PRI connection with up to 23 B-channels and 1 D-channel.
- Both ISDN-PRI and CAS signaling are supported on the same interface cards. However, the two signaling types cannot coexist on a single interface.
- No external CSU/DSUs or associated cabling are required at the NetPerformer site.

3.3 ISDN Applications

3.3.1 The Home Office Environment

A typical home office ISDN environment is shown in Figure 3-3, in which an ISDN phone, a personal computer and a fax are connected to the ISDN network. Normally, a BRI connection is sufficient to support this type of configuration.

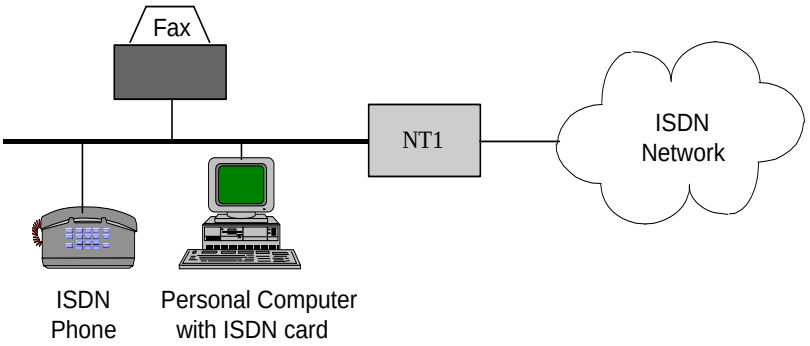

Figure 3-3: ISDN Application for the Home Office

- In this application, communication from the local ISDN device (phone, fax or personal computer) is entirely digital.
  - The personal computer communicates with the network without the need for digital-to-analog conversion via a modem, which would be required if using an analog telephone line.
  - Note that it is also possible to connect non-ISDN devices, such as an analog phone, to an ISDN network using a Terminal Adapter (TA).
- Circuit switched connections through ISDN are almost exclusively used in environments such as the one shown in Figure 3-3.
  - This means that while the digital connection is established, a path is set up which will be used to exchange the associated information (voice, fax or data) for the duration of the connection.
  - Once a phone call is established, the digitized conversation is carried from one end to the other through a B-channel.

3.3.2 ISDN Backup

The NetPerformer supports a backup capability through the ISDN port using switched ISDN connections. Figure 3-4 shows a typical backup application.

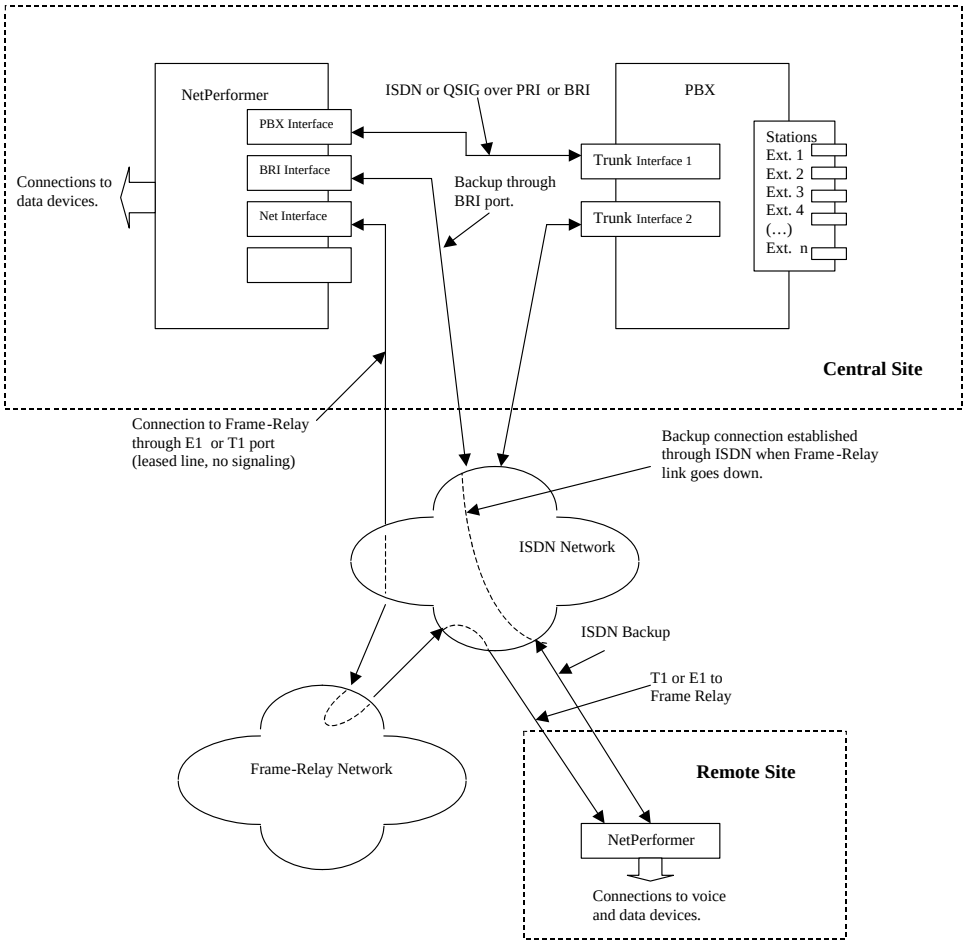

Figure 3-4: Backup Using ISDN

The central site NetPerformer shown in Figure 3-4 has the following connections:

- PBX Interface: an ISDN or QSIG connection to Trunk Interface 1 on the PBX.
  - Although this connection could be accomplished via an E1 CAS link or an E&M interface, the typical application will use E1 with CCS signaling.
- Network Interface: leased line, digital access to the Frame Relay network via an E1 port.
  - No signaling is involved on this interface, since the connection is established through a channelized E1 link.
  - In countries where ISDN is widely deployed, the digital connection to the Frame Relay network could be configured as a permanent link through the ISDN network (see “Leased ISDN-BRI” on page 3-12).

- BRI or PRI Interface: a connection to the ISDN network via an ISDN-PRI port or a connection to the ISDN network via an ISDN-BRI port. The BRI or PRI interface provides a backup for the Network Interface (Frame Relay).
  - If the Frame Relay link gets disconnected, the two NetPerformer units can no longer communicate with each another.
  - After a configurable delay a B-channel on the PRI Interface is established with the remote unit using a switched ISDN connection.
  - This implies that both units require an installed ISDN interface and complete ISDN configuration.

The typical NetPerformer configuration required for an ISDN backup application is provided in the example “ISDN Backup Application” on page 5-2. Configuration details are given in the section “Configuring the NetPerformer for ISDN Signaling” on page 3-14.

3.3.3 ISDN Bandwidth On Demand

The NetPerformer supports Bandwidth-On-Demand through the ISDN port using switched ISDN connections. Bandwidth On Demand allows switched ISDN channels to be activated or deactivated based on link usage levels.

In the context of ISDN, the initial (leased-line) bandwidth may be provided using a PowerCell™ (PVCR) dedicated leased line connection, and additional bandwidth added during peak traffic times using one or more ISDN B-channels (see Figure 3-5).

- During low to medium link usage periods, all traffic for the WAN link goes through the dedicated leased line.
- As soon as the configured link usage level is exceeded for a predefined amount of time, the NetPerformer establishes one or more ISDN connections with the remote unit to increase the connection bandwidth. (see Figure 3-6).
- As bandwidth requirements decrease, these ISDN connections are disconnected, bringing the allocated bandwidth back to its original size.
- With Bandwidth On Demand the costs associated with switched ISDN connections are kept to a minimum, since they are used only when required for peak traffic situations.

The typical NetPerformer configuration required for an ISDN Bandwidth On Demand application is provided in the example “ISDN Bandwidth On Demand Application” on page 5-7. To configure the NetPerformer for ISDN, turn to “Configuring the NetPerformer for ISDN Signaling” on page 3-14.

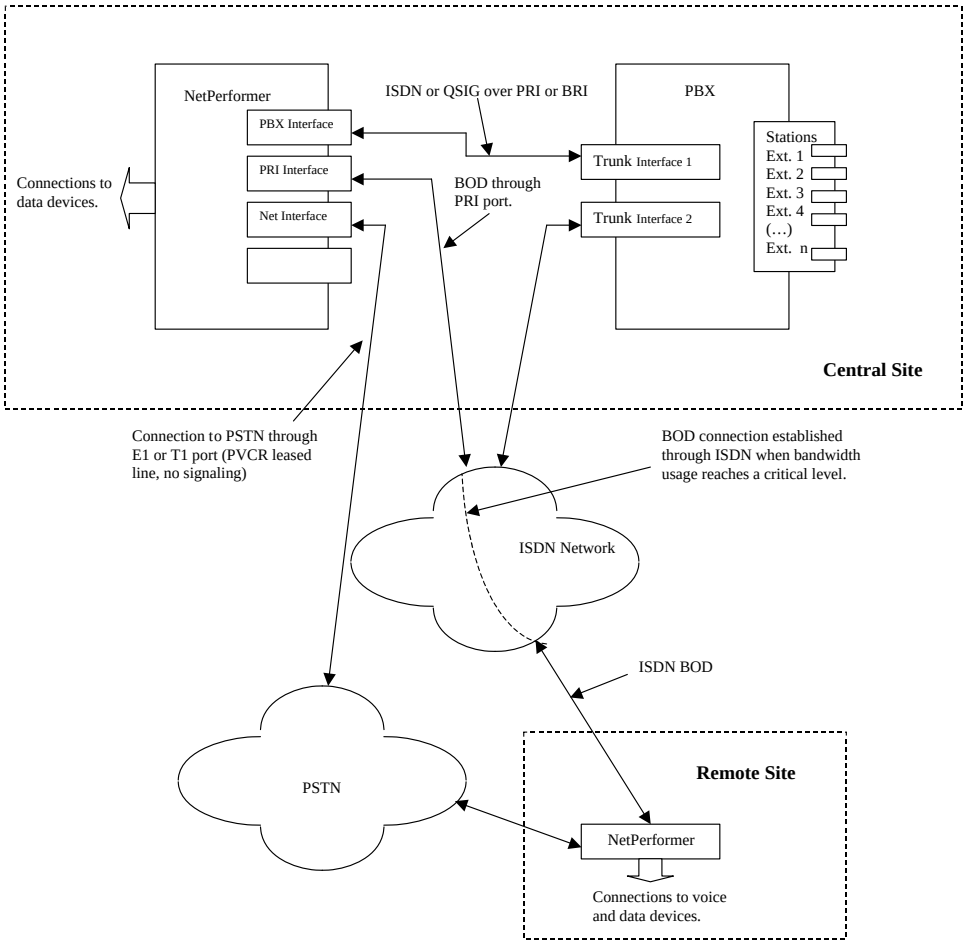

Figure 3-5: Bandwidth On Demand Using ISDN

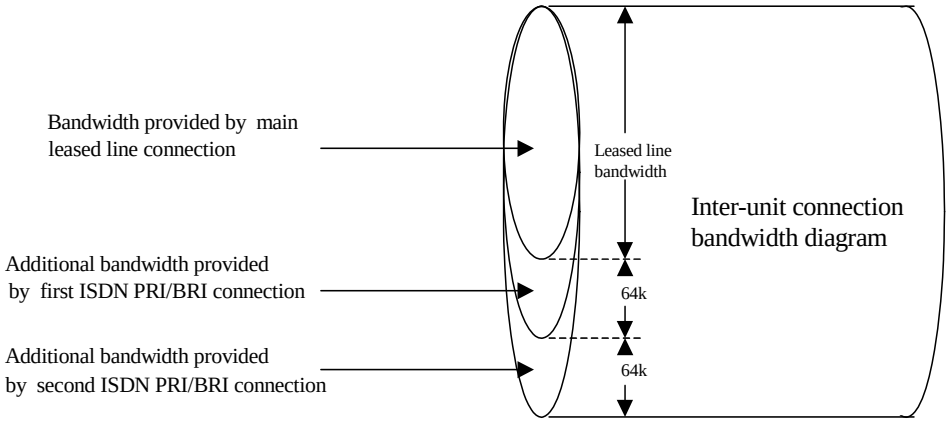

Figure 3-6: How Bandwidth is Added to the Primary Connection

3.3.4 Leased ISDN-BRI

An ISDN-BRI interface can be used in a leased-line environment. In this application, the carrier provides a permanently defined connection between two locations. Signaling procedures are not required to establish the connection.

The support of leased ISDN-BRI links is very similar to the NetPerformer T1/E1 WAN capability.

- In this case, however, only two timeslots are available for data channels on each ISDN-BRI port.
- These timeslots can be used as individual 64 Kbps channels or combined as a single 128 Kbps data channel.

  In countries where ISDN-BRI is widely deployed, this can provide digital access up to 128 Kbps at a very affordable price.

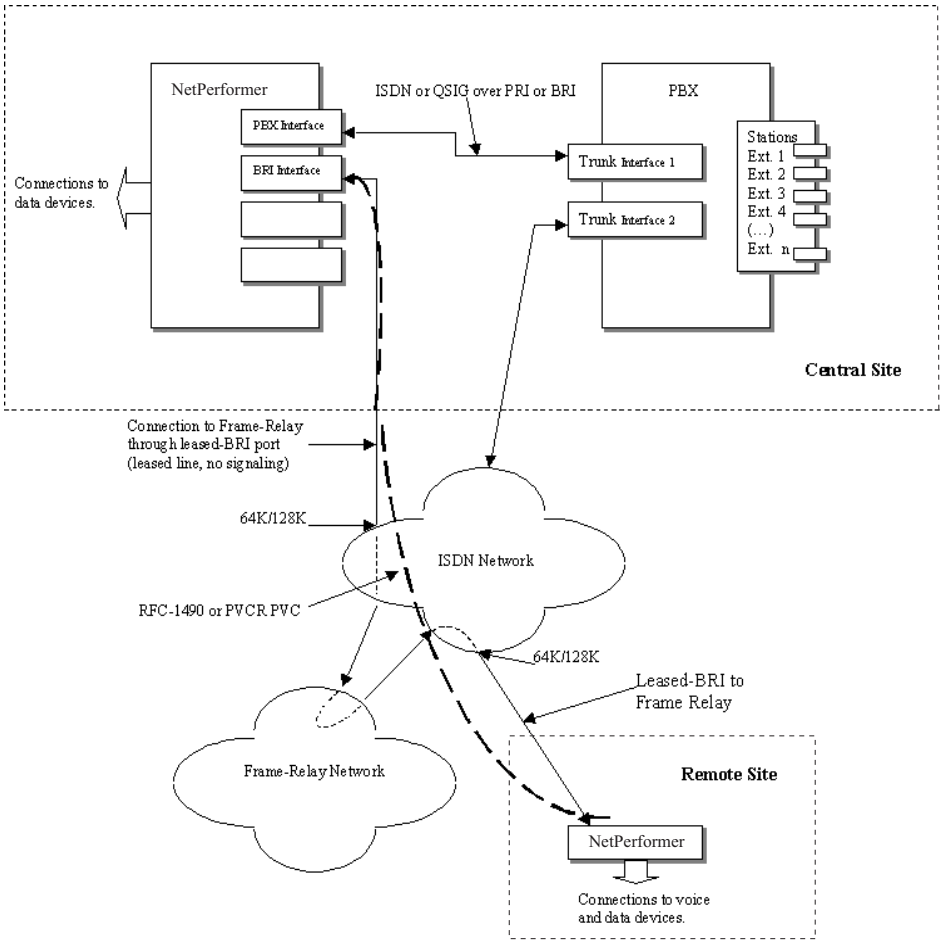

Figure 3-7: Leased ISDN-BRI Application

The NetPerformer units shown in Figure 3-7 access the Frame Relay network through leased ISDN-BRI connections at the central and remote sites.

- The ISDN-BRI interface is used as the main WAN connection.
- In this type of application, access to the Frame Relay network via ISDN could also be accomplished from one side only.

NOTE: Frame Relay (User and Network) over ISDN and PVCR should be used only with leased ISDN-BRI connections or in environments where long-term switched ISDN costs are minimal.

The typical NetPerformer configuration required for a leased ISDN-BRI application is provided in the example “Leased ISDN-BRI Application” on page 5-14. Configuration details may be found in “Configuring the NetPerformer for ISDN Signaling” on page 3-14.

3.4 Configuring the NetPerformer for ISDN Signaling

► **To configure the NetPerformer for a digital data application using ISDN:**

1. Configure the physical port using the **LINK/SLOT** option of the **SETUP** command.
   - **The *Signaling mode* parameter on the physical port (LINK) must be set to an ISDN signaling type, rather than NONE.**
   - The other parameters listed at the console are slightly different for the three digital interface cards (T1, E1 or ISDN-BRI S/T). Refer to the configuration procedures provided in the chapter "Configuring Digital Data Connections" on page 2-1.
   - ISDN-specific parameters also appear under the **SETUP** command listing for the **LINK** configuration (see next section).
2. Set up all required data channels using the **LINK/CHANNEL** option of the **SETUP** command. See "Configuring the Data Channels" on page 3-18.
3. Define all required phone numbers for call setup, call backup and Bandwidth On Demand requirements, using the **PHONE** submenu of the **SETUP** command. See "Configuring the Phone Profiles" on page 3-19.
4. (Optional) Define the IDs for ISDN callers with the **CALLER ID** submenu of the **SETUP** command. This provides for increased security by validating all incoming calls. See "Configuring the Caller IDs" on page 3-21.

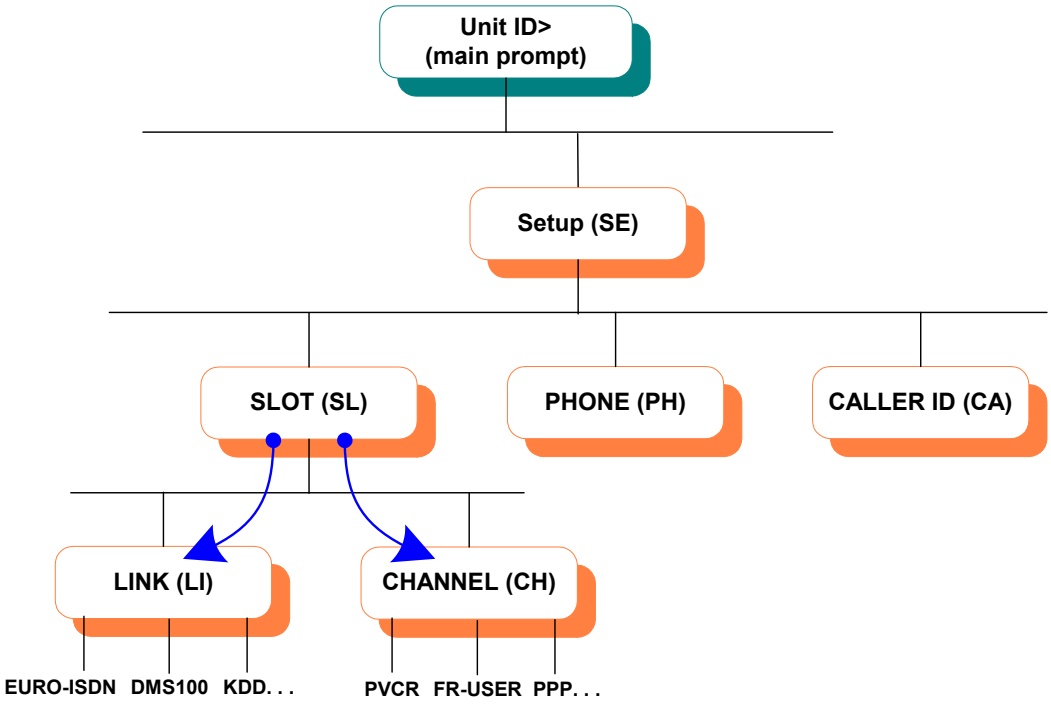

Figure 3-8: SETUP Command Paths in the CLI Tree for Data Transport Using ISDN

3.4.1 Configuring theT1 Interface Card

► To define the physical port on a T1 interface card for ISDN:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **LINK**
4. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
5. Set the *Signaling mode* to:
   - **NTT** or **KDD** for Japan
   - **4ESS**, **5ESS**, **DMS100** or **NI2** for North America (National ISDN)
6. Change the other digital link parameters from their default values, if desired.

SE/SLOT/#/ LINK example: for ISDN on a T1 interface card

```
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:LINK) ? LINK
PORT 100> Status (def:DISABLE) ? ENABLE
PORT 100> Clock recovery (def:DISABLE) ?
PORT 100> Digital port clock source (def:INTERNAL) ?
PORT 100> Signaling mode (def:NONE) ? NTT
PORT 100> CCS side (def:USER) ?
PORT 100> Channel selection mode (def:PREFERRED) ?
PORT 100> Local number (def:) ?
PORT 100> Local subaddress (def:) ?
PORT 100> Calling number type of network  (def:000 (Unknown)) ? 010
PORT 100> Calling number numbering plan  (def:0000 (Unknown)) ? 1000
PORT 100> Called number type of network  (def:000 (Unknown)) ? 010
PORT 100> Called number numbering plan  (def:0000 (Unknown)) ? 1000
PORT 100> Pcm encoding law (def:MU-LAW) ?
PORT 100> Idle code (def:7F) ?
PORT 100> Zero suppression mode (def:B8ZS) ?
PORT 100> Gain limit (def:-30DB) ?
PORT 100> Framing mode (def:ESF) ?
PORT 100> Line Build Out (def:0-133FT) ?
PORT 100> Generate ring back locally (def:DISABLE) ?
PORT 100> Loopback (def:DISABLE) ?
```

- Most of these parameters are the same as those for a T1 link without signaling. Refer to “Configuring a T1 Physical Port (LINK)” on page 2-3.
- Details on the following parameters can be found in the section “CCS Signaling Modes” on page 6-10: *CCS side*, *Channel selection mode*, *Local number*, *Local*

subaddress, *Calling number type of network*, *Calling number numbering plan*, *Called number type of network* and *Called number numbering plan*.

3.4.2 Configuring the E1 Interface Card

► To define the physical port on an E1 interface card for ISDN:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **LINK**
4. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
5. Set the *Signaling mode* to **EURO-ISDN**
6. Change the other digital link parameters from their default values, if desired.

SE/SLOT/#/ LINK example: for ISDN on an E1 interface card

```
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) ? 2
Item (LINK/CHANNEL,def:LINK) ? LINK
PORT 200> Status (def:DISABLE) ? ENABLE
PORT 200> Clock recovery (def:DISABLE) ?
PORT 200> Digital port clock source (def:INTERNAL) ?
PORT 200> Signaling mode (def:CAS) ? EURO-ISDN
PORT 200> CCS side (def:USER) ?
PORT 200> Channel selection mode (def:PREFERRED) ?
PORT 200> Local number (def:) ?
PORT 200> Local subaddress (def:) ?
PORT 200> Calling number type of network  (def:000 (Unknown)) ?
PORT 200> Calling number numbering plan  (def:0000 (Unknown)) ?
PORT 200> Called number type of network  (def:000 (Unknown)) ?
PORT 200> Called number numbering plan  (def:0000 (Unknown)) ?
PORT 200> Pcm encoding law (def:A-LAW) ?
PORT 200> Hunt Group Sorting (def:RRA) ?
PORT 200> Idle code (def:7E) ?
PORT 200> Zero suppression mode (def:HDB3) ?
PORT 200> Gain limit (def:-12DB) ?
PORT 200> CRC4 mode (def:ENABLE) ?
PORT 200> International bit (def:ENABLE) ?
PORT 200> ETS 300 011 mode (def:DISABLE) ?
PORT 200> Generate ring back locally (def:DISABLE) ?
PORT 200> Loopback (def:DISABLE) ?
```

- Most of these parameters are the same as those for an E1 link without signaling. Refer to "Configuring an E1 Physical Port (LINK)" on page 2-5

- Details on the following parameters can be found in the section "CCS Signaling Modes" on page 6-10: *CCS side*, *Channel selection mode*, *Local number*, *Local subaddress*, *Calling number type of network*, *Calling number numbering plan*, *Called number type of network* and *Called number numbering plan*
- The *Hunt Group Sorting* parameter is used in voice applications only. For details, refer to the chapter *Hunt Forwarding* in the *Advanced Voice Features* module of this document series
- The *Generate ring back locally* parameter is used in voice applications that require **Ring Back** at the local unit. For data applications, leave it at its default setting, **DISABLE**.

3.4.3 Configuring the ISDN-BRI S/T Interface Card

► To define a physical port on an ISDN-BRI S/T interface card for ISDN:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Select the *Port number*

   The port number indicator in subsequent parameters is **00** when *Port number* is set to **1**, or **50** when *Port number* is set to **2**. For example, **PORT 300** indicates the physical link on Slot 3, Port 1.
4. Enter **LINK**
5. Set the *Status* to **ENABLE** to activate the physical link

   If the physical link is disabled, all data channels associated with this port are disabled as well. You can continue with channel configuration, and then enable the link at a later time.
6. Set the *Signaling mode* to:
   - **EURO-ISDN** for Europe
   - **INS-NET** or **KDD** for Japan
   - **NI1**, **NI2**, **5ESS**, or **DMS100** for North America (National ISDN)
7. Change the other digital link parameters from their default values, if desired.

SE/SLOT/#/ LINK example: for ISDN on an ISDN-BRI S/T interface card

```
CHICAGO>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) ? 3
Port number (1/2,def:1) ? 1
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT 300> Status (def:DISABLE) ? ENABLE
PORT 300> Clock recovery (def:DISABLE) ?
PORT 300> Digital port clock source (def:INTERNAL) ? 1
PORT 300> Signaling mode (def:NONE) ? EURO-ISDN
PORT 300> CCS side (def:USER) ?
PORT 300> Channel selection mode (def:PREFERRED) ?
```

```
PORT 300> Local number (def:) ? 6595090
PORT 300> Local subaddress (def:) ? 01
PORT 300> Calling number type of network (def:000 (Unknown)) ?
PORT 300> Calling number numbering plan (def:0000 (Unknown)) ?
PORT 300> Called number type of network (def:000 (Unknown)) ?
PORT 300> Called number numbering plan (def:0000 (Unknown)) ?
PORT 300> Terminal Endpoint Identifier (TEI) (def:AUTOMATIC) ?
PORT 300> Pcm encoding law (def:A-LAW) ?
PORT 300> Hunt Group Sorting (def:RRA) ?
PORT 300> Power Mode (def:OFF) ?
PORT 300> Generate ring back locally (def:DISABLE) ?
PORT 300> Loopback (def:DISABLE) ?
```

- Most of these parameters are the same as those for an ISDN-BRI link without signaling. Refer to "Configuring an ISDN-BRI S/T Physical Port (LINK)" on page 2-7.
- Details on the following parameters can be found in the section "NONE Signaling Mode (on ISDN-BRI S/T)" on page 6-21: *Terminal Endpoint Identifier (TEI)* and *Power Mode*.
- The *Hunt Group Sorting* and *Generate ring back locally* parameters are used in voice applications only. For data applications, leave them at their default settings.
- When the *Signaling mode* is set to **NI1**, **NI2**, **5ESS** or **DMS100**, two additional parameters are presented to define the local Service Profile Identifiers (SPIDs) that are included with the call setup message: *Local SPID 1* and *Local SPID 2.* See "CCS Signaling Modes" on page 6-22 for details.

3.4.4 Configuring the Data Channels

Digital data channels are configured in the same way on all types of digital interface cards.

► To define a digital data channel for ISDN:

1. Enter the menu sequence: **SE** ↵ **SLOT**
2. Select the *Slot number*
3. Enter **CHANNEL**
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 **D&I**, **FR-NET**, **FR-USER**, **PASSTHRUOFR**, **PPP**, **PVCR**, **SS7** or **TRANSPARENT**
6. Select the *Timeslot*
7. Specify the *Number of consecutive timeslots*
8. Change the other digital channel parameters from their default values, if desired. Refer to "SE/SLOT/#/CHANNEL Configuration Parameters" on page 7-1.

SE/SLOT/#/CHANNEL 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) ? SLOT
```

```
SLOT> Slot number (1/2/3,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (101-123/ALL,def:122) ? 123
PORT 123> Protocol (def:OFF) ? FR-USER
PORT 123> Timeslot.............................23
PORT 123> Number of consecutive timeslots.......1
PORT 123> DS0 speed (bps) (def:64000) ?
PORT 123> Management interface (def:LMI) ?
PORT 123> Congestion flow control (def:ON) ?
PORT 123> Enquiry timer (s) (1-30,def:10) ?
PORT 123> Report cycle (1-256,def:6) ?
PORT 123> CLLM function (def:OFF) ?
PORT 123> Cell Packetization (def:YES) ?
PORT 123> Maximum number of voice channels (0-10000,def:10000) ?
PORT 123> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT 123> Drop signals on LMI down (def:NO) ?
PORT 123> SVC address type (def:NONE) ?
PORT 123> Delay before call activation (s) (1-1000,def:10) ?
PORT 123> Call activation timer (s) (30-1000,def:30) ?
PORT 123> Phone entry index (1-64,def:1) ?
```

- All data channels except a **PVCR** channel in **ANSWER** mode require definition of the *Delay before call activation (s)* and *Call activation timer (s)* parameters.

  These parameters are identical to those used to configure Link Backup and Bandwidth On Demand on non-ISDN PVCR ports. Refer to the section *CALL-BKUP Mode* in the appendix *SE/PORT/#/PVCR Configuration Parameters* of the *WAN/Leased Lines* module of this document series.

Caution A PVCR channel should not be configured in **DEDICATED** mode for use on standard switched ISDN connections, as it will generate high connection costs. **On the NetPerformer, this is the default mode for PVCR channels with ISDN signaling.**

- **FR-NET**, **FR-USER** and **PPP** channels also require a *Phone entry index* (SNMP: *ifwanPhoneEntryIndex*), which refers to the number of the Phone profile used to establish connectivity with the Frame Relay network. Refer to the next section for details.

NOTE: On PVCR channels, the *Phone entry index* parameter is not required, since the *Remote unit name* is matched with the Phone profile defined for the same destination.

3.4.5 Configuring the Phone Profiles

Phone profiles permit the call setup required for switched ISDN connections, WAN channel backup and Bandwidth On Demand.

NOTE: Phone profiles are defined for data connections using ISDN. **They are not required in an ISDN voice application.**

Each profile includes information specific to a specific call setup scenario.

► **To configure a phone profile:**

1. Enter the menu sequence: **SE** ↵ **PHONE**
2. Select a *Profile number*
3. Define the *Remote unit*, *Next hop* and *Cost*

   These parameters should be configured in the same way as for WAN backup connections on a PVCR port. For details, consult the *WAN/Leased Lines* module of this document series.

   The *Next hop* and *Cost* parameters are required for backup links only. In the case of a Frame Relay, PPP or dedicated PVCR (WAN) connection the values of these two parameters are ignored.
4. Select **ISDN** as the *Dialer type*
5. Change the other ISDN Phone parameters from their default values, if desired.

SE/PHONE example: with ISDN Dialer type

```
9230-ISDNPRI>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? BOSTON-ISDNPRI
PHONE> #1> Next hop (def:) ? 9230-ISDNPRI
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5551234
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ?
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

- Details on parameters specific to ISDN phones are provided in the *ISDN Dialer* section of the appendix *SE/PHONE Configuration Parameters* in the *WAN/Leased Lines* module of this document series.
- For non-PVCR data connections using ISDN, the *Phone entry index* parameter for the data channel identifies which Phone profile will be used to establish the connection.

- For a PVCR connection using ISDN, the *Remote unit name* of the data channel is compared with the value of the *Remote unit* parameter of the phone profile. If a match is found, call setup can take place.

For a PVCR connection using ISDN it is very important that the remote unit be properly identified on both the data channel (SETUP/SLOT/#/CHANNEL) and the phone profile (SETUP/PHONE). Otherwise, call setup cannot take place.

3.4.6 Configuring the Caller IDs

An ISDN configuration can include a list of callers that are authorized to access the NetPerformer unit. A maximum of 64 distinct caller ID profiles can be defined on each unit.

The presence of a caller ID list triggers caller ID validation, which provides for increased security for data connections by filtering all incoming calls. Caller ID profiles can thus be used to restrict access to the NetPerformer in ISDN data mode.

NOTE: Caller IDs can be optionally defined for data connections using ISDN. **They are not required in an ISDN voice application. The term *caller ID*, when used to refer to caller validation on a data connection, must not be confused with the Caller ID (ANI) on voice channels.**

- If an entry in the caller ID list matches the received caller ID, the connection is accepted.

  For the validation process to work properly, the caller identification number must be present in the initial setup message that the NetPerformer receives. In some networks this is not the default situation.
- If no caller ID profile is configured, all ISDN calls are accepted. In other words, any setup message received at the ISDN interface will be accepted unconditionally. This is the default situation.
- If you define one or more caller IDs, the NetPerformer will validate all incoming calls. **The only calls that will be accepted are those with a calling *ISDN number/Subaddress* equivalent to values configured in the caller ID profiles.**

► To configure a caller ID profile:

1. Enter the menu sequence: **SE** ↵ **CALLER ID**
2. Select a *Profile number*
3. Enter the *ISDN number* from which an incoming call will be accepted
4. Enter the *Subaddress* of the caller, if required.

5. Repeat these steps for each caller ID that you want to register for authorized access to the unit.

Caution

If you decide to use caller ID profiles, it is very important to create an exhaustive list of caller IDs for **all callers requiring access to the unit**.

SE/CALLER ID example

```
9230-ISDNPRI>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) ? CALLER ID
Define authorized ISDN callers
CALLER ID> Profile number (1-64,def:1) ?
CALLER ID #1> ISDN Number (def:) ? 5556666
CALLER ID #1> Subaddress (def:) ? 01
```

3.4.7 Configured Unframed E1

Unframed E1 data support (Bundled TS 0 to 31) for full 2,048 kbps transport

Version 10.5.0 R1 introduced support of unframed E1 data (bundled of TS 0 to 31) for full 2,048 kbps utilization and transport by NetPerformer. This provides the ability for NetPerformer to transport a full structured E1 (2,048 Kbps), coming from the user side, in uncompressed or lossless compressed (data) mode, as well as the ability for NetPerformer to use a full structured E1 on its WAN link.

Prior to that, NetPerformer was restricted, in both cases, with using only framed E1 with a maximum of 31 consecutive bundled timeslots (1,984 Kbps).

How to set unframed E1 on the E1 link

```
HUB>SE
SETUP
Item  ...  (def:PORT) ? SLOT
SLOT> Slot number (1/2/3,def:1) ?
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? LINK
PORT 100> Framer Type (def:E1) ?
PORT 100> Status (def:ENABLE) ?
...
PORT 100> Signaling mode (def:NONE) ? ?
CHOICE: NONE         NONE (30 TS) CAS          EURO-ISDN    QSIG
        TRSP-ORIG    TRSP-ANSW    UNFRAMED
PORT 100> Signaling mode
        (Default value:NONE, Current value:NONE) ? UNFRAMED
```

Result: Ability to configure of 32 consecutive timeslot on that E1 port

```
Result: 32 Consecutive timeslots
HUB>SE
SETUP
Item  ...  (def:PORT) ? SLOT
SLOT> Slot number (1/2/3,def:1) ?
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? CHA
SLOT> Channel Number (101-131/ALL,def:101) ?
PORT 101> Protocol (def:OFF) ? PVCR
PORT 101> Timeslot.................................0
PORT 101> Number of consecutive timeslots...........32
PORT 101> DS0 speed (bps)..........................64000
PORT 101> Link quality active (def:NO) ?
```

4

Monitoring Digital Data Connections

4.1 About the Digital Data Connections

Several commands are available from the console to view the status of digital data connections on the NetPerformer:

- The Signaling Engine Information (**SEI**) command identifies what kind of interface cards are installed in the slots
- Use the **SLOT** option of the Display Counters (**DC**) command to view the traffic counters for the digital channels
- The **SLOT** option of the Display Errors (**DE**) command shows the values of the error counters
- Current status information can be viewed using the **SLOT** option of the Display States (**DS**) command
- The Display Port States (**DPORT**) command provides a real-time display of port and channel status
- View any alarms that may have occurred using the Display Alarms (**DA**) command.

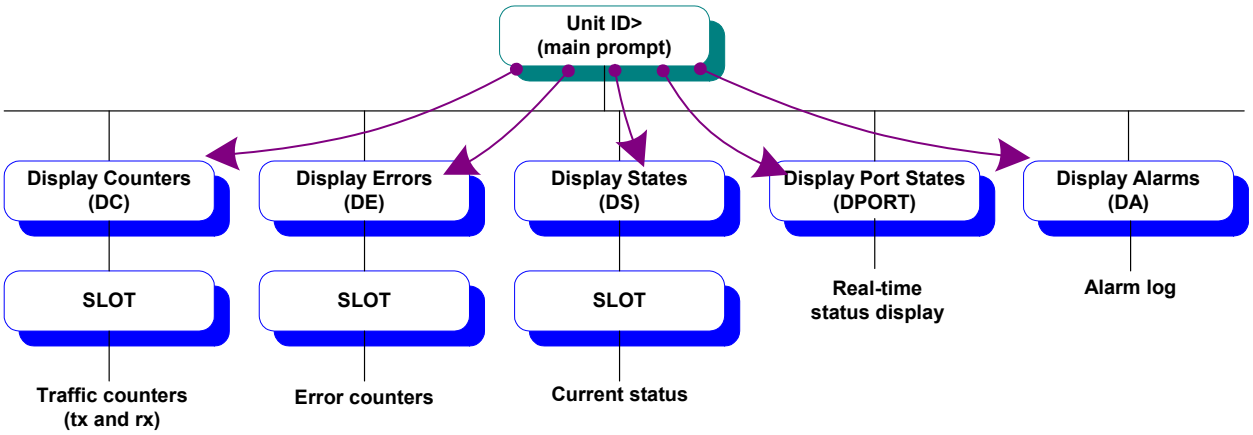

Figure 4-1: Digital Connection Display Commands in the CLI Tree

4.2 Identifying the Interface Cards

► To view what interface cards are installed in the unit:

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

  The available slots and their contents are listed after the Signaling Engine software information.

SEI example

```
SDM-9230>SEI
SIGNALING ENGINE INFORMATION

SIGNALING ENGINE SOFTWARE:
 Signaling Engine vX.X.X
 State: RUNNING

 SLOT 1> Dual E1/T1 Interface
 SLOT 2> No interface installed
 SLOT 3> No interface installed

  DSP SIMM 1
1 Running(ACELP)     7  Ready to load    13 Ready to load    19 Ready to load
2 Running(ACELP)     8  Ready to load    14 Ready to load    20 Ready to load
3 Ready to load    9  Ready to load    15 Ready to load    21 Ready to load
4 Ready to load    10 Ready to load    16 Ready to load    22 Ready to load
5 Ready to load    11 Ready to load    17 Ready to load    23 Ready to load
6 Ready to load    12 Ready to load    18 Ready to load    24 Ready to load
```

4.3 Displaying the Traffic Counters

► **To view all traffic counters for the digital channels:**

- At the console command prompt, enter the menu sequence: **DC ↵ SLOT**

  All counters for all slots are displayed at the console screen. Press **<Enter>** to scroll through the display.

DC/SLOT example

```
SDM-9230>DC
DISPLAY COUNTERS
Item (BOOTP/CONFIG/DNS/IP/NAT/PORT/PVC/Q922/Q933/QOS/SLOT/SVC/TIMEP,
def:BOOTP) ? SLOT
Counters (MEAN/PEAK,def:MEAN) ?
SLOT 3>
PORT 303> Transmitter rate.....................0    % (M)
PORT 303> Receiver rate........................0    % (M)
PORT 303> Number of frames transmitted.........1313
PORT 303> Number of frames received............0
PORT 303> Number of octets transmitted.........64337
PORT 303> Number of octets received............0

PORT 310> Transmitter rate.....................0    % (M)
PORT 310> Receiver rate........................0    % (M)
PORT 310> Number of frames transmitted.........86
PORT 310> Number of frames received............146
PORT 310> Number of octets transmitted.........1118
PORT 310> Number of octets received............16352

PORT 314> Transmitter rate.....................0    % (M)
PORT 314> Receiver rate........................0    % (M)
PORT 314> Number of frames transmitted.........1317
PORT 314> Number of frames received............0
PORT 314> Number of octets transmitted.........64533
PORT 314> Number of octets received............0

PORT 315> Transmitter rate.....................0    % (M)
PORT 315> Receiver rate........................95   % (M)
PORT 315> Number of frames transmitted.........0
PORT 315> Number of frames received............120342
PORT 315> Number of octets transmitted.........0
PORT 315> Number of octets received............11552832

PORT 316> Transmitter rate.....................0    % (M)
PORT 316> Receiver rate........................95   % (M)
PORT 316> Number of frames transmitted.........0
PORT 316> Number of frames received............117878
PORT 316> Number of octets transmitted.........0
PORT 316> Number of octets received............11316288
```

4.4 Displaying the Error Counters

► To view all error counters:

1. At the console command prompt, enter the menu sequence: **DE ↵ SLOT**
2. Select the *Slot number*.

For SNMP access to these statistics, use the variables pertaining to the *statIfwan* category.

DE/SLOT example

```
SDM-9230>DE
DISPLAY ERRORS
Item (BOOTP/CHANNEL/DICT/GROUP/NAT/PORT/PU/PVC/Q922/SLOT/SVC/TIMEP,
def:BOOTP) ? SLOT
SLOT> Slot number (1/2/3/ALL,def:1) ? 3
SLOT 3>
PORT 300> Number of errored seconds.............0
PORT 300> Number of severely errored seconds....0
PORT 300> Number of severely errored frames.....0
PORT 300> Number of unavailable seconds.........922
PORT 300> Number of controlled slip seconds.....0
PORT 300> Number of path code violations........0
PORT 300> Number of line errored seconds........0
PORT 300> Number of bursty errored seconds......0
PORT 300> Number of degraded minutes............0
PORT 300> Number of line code violations........0

PORT 300> Number of CRC errors..................0
PORT 300> Number of frame length errors.........0
PORT 300> Number of abort sequences.............0
PORT 300> Number of non-aligned octets..........0
PORT 300> Number of HDLC framing errors.........0
PORT 300> Number of returned rx buffers.........0
PORT 300> Number of channel restarts............0

PORT 303> Number of bad frames..................0       ------
PORT 303> Number of underruns...................0
PORT 303> Number of retries.....................0
PORT 303> Number of restarts....................35
PORT 303> Number of frames discarded (overrun)..0
PORT 303> Number of octets discarded (bad)......0
PORT 303> Number of octets discarded (overrun)..0

PORT 310> Number of bad frames..................0       ------
PORT 310> Number of underruns...................0
PORT 310> Number of retries.....................0
PORT 310> Number of restarts....................91
PORT 310> Number of frames discarded (overrun)..0
PORT 310> Number of octets discarded (bad)......0
PORT 310> Number of octets discarded (overrun)..0

Bad flags: U:Bad LENGTH  Q:Overflow  F:Flush  S:Overrun  B:Bad CRC
A:Abort
```

4.5 Displaying the Status Information

► To view the current state of the digital link and channels:

1. At the console command prompt, enter the menu sequence: **DS ↵ SLOT**
2. Select the *Slot number*.

For SNMP access to these statistics, use the variables pertaining to the *statIfwan* category.

DS/SLOT example

```
SDM-9230>DS
DISPLAY STATES
Item (GLOBAL/PORT/PU/PVC/SLOT/SVC/VLAN,def:GLOBAL) ? SLOT
SLOT> Slot number (1/2/3/ALL,def:1) ? 3
SLOT 3>
PORT 300> State..............................OUT OF SYNC
PORT 300> Interface..........................E1
PORT 316> Transparent Signaling Channel.....IN SYNC

PORT 303> Protocol...........................PVCR
PORT 303> Speed used [bps]...................64000
PORT 303> Modem signals......................--D---
PORT 303> State..............................TEST

PORT 304> Protocol...........................D&I
PORT 304> Partner channel....................NONE

PORT 305> Protocol...........................PPP
PORT 305> Speed used [bps]...................64000
PORT 305> Modem signals......................--D---
PORT 305> State..............................CALL

PORT 307> Protocol...........................FR-NET
PORT 307> Speed used [bps]...................64000
PORT 307> Modem signals......................------
PORT 307> State..............................WAIT

PORT 308> Protocol...........................SS7
PORT 308> Speed used [bps]...................64000
PORT 308> Modem signals......................------
PORT 308> State..............................CALL

PORT 310> Protocol...........................FR-USER
PORT 310> Speed used [bps]...................64000
PORT 310> Modem signals......................------
PORT 310> State..............................WAIT
PORT 310> Q922 state.........................DOWN

PORT 313> Protocol...........................HDLC
PORT 313> Speed used [bps]...................24000
PORT 313> Modem signals......................------
PORT 313> State..............................CALL

PORT 315> Protocol...........................PASSTH
PORT 315> Speed used [bps]...................64000
```

```
PORT 315> Modem signals.........................------
PORT 315> State.................................CALL
Modem signals:  d(S)r  d(T)r  (D)cd  (R)ts  (C)ts  r(I)  (-)off
```

4.6 Real-time Status Display

► To view a continuously updated display of the digital link and channel states:

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

  The various statistics displayed on the screen are updated dynamically.
- To quit from this command, press any key other than **<Home>**, **<End>** or the up and down arrow keys.

DPORT example

```
BOSTON>DPORT

DISPLAY PORT STATES

--------------------------------------------------------------------------------
|PORT#  PROTOCOL     INTERFACE  SPEED       MODEM      STATE DELAY             |
|                               (BPS)       SIGNALS                            |
--------------------------------------------------------------------------------
|    1  FR-USER      DCE-V35    128k        S-D---      WAIT                   |
|  101  PVCR         T1         1536k       ST-RC-      CALL                   |
|  201  ACELP-CN     T1         NO DSP      ------      IDLE                   |
|  301  ACELP-CN     ANALOG FXS NO DSP      ------      IDLE                   |
|  401  PPP          DTE-V35    0           -T-R--      CALL                   |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| 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.
```

- Ports 1 is the built-in serial port on the SDM-9140 base unit
- Port 101 is the first channel on a T1 interface card installed in slot 1. This channel is configured for data transport
- Port 201 is the first channel on another T1 interface card installed in slot 2. This channel is configured for voice transport
- Port 301 is the first voice channel on an FXS interface card installed in slot 3
- Port 401 is on a single serial interface card installed in slot 4.

4.7 Displaying the Alarms

► To view any alarms that may have occurred on the digital links and channels:

- At the console command prompt, enter **DA**.

DA example

```
SDM-9230>DA
DISPLAY ALARMS
SDM-9230 vX.X.X Memotec Inc. (c) 2004
Signaling Engine vX.X.X Memotec Inc. (c) 2004
DSP code version: X.X.X
Console connected on port CSL
Time> WED   2004/04/14 13:34:22
Alarm>    BACKUP CALL, LINK 101              WED   2004/04/14 12:30:18
Alarm>    SOFT START (RST)                   WED   2004/04/14 12:26:25
Alarm>    SETUP RESET                        WED   2004/04/14 12:25:10
Alarm>    SOFT START (RST)                   WED   2004/04/14  9:49:42
Alarm>    FIRMWARE STORED                    WED   2004/04/14  9:48:20
Alarm>    SOFT START (PWR)                   MON   2004/04/12  9:09:33
Alarm>    LINK 101 DOWN (SDM-9230)           THU   2004/04/12  7:24:43
```

5

Application Examples

5.1 ISDN Backup Application

In this application a backup connection is established using an ISDN-PRI interface. Refer to Figure 3-4 for a diagram of the application requirements for this example.

At both the central site (*Unit name:* **CENTRAL**) and the remote site (*Unit name:* **REMOTE**) the NetPerformer slots are installed with the following interface cards:

- Slot 1: E1-120 ohms interface card, connected to the PBX and used for voice traffic.
- Slot 2: BRI interface card, connected to the ISDN network, 1 channel used for backup of the Frame Relay network.
- Slot 3: E1-120 ohms interface card, providing the primary connection (a dedicated PVCR channel) to the remote unit.

In this application, whenever the primary connection is lost the remote site has the responsibility of establishing a backup connection with the central site over the ISDN network.

The configuration steps are as follows:

- Configure the ISDN link parameters at the central site.
- Configure the ISDN backup channel at the central site to **ANSWER** mode.
- Configure the ISDN link parameters at the remote site.
- Configure the ISDN backup channel at the remote site to **CALL-BKUP** mode.
- Configure the **PHONE** profile at the remote site for call setup.
  - The ISDN channel at the **CENTRAL** site can be reached at **555-1234**.
  - The ISDN channel at the **REMOTE** site can be reached at **555-9876**.

NOTE: By configuring the user channel mode to **CALL-BKUP** in both units, and adding the appropriate **PHONE** entries, the backup connection could be established from either unit. This is because a **CALL-BKUP** channel can receive calls as well as generate them.

5.1.1 Central Site Configuration

Here is how the ISDN-BRI link should be configured at the central site:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Port number (1/2,def:1) ?
```

```
Item (LINK/CHANNEL,def:LINK) ?
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:DISABLE) ? ENABLE
PORT #200> Digital port clock source (def:INTERNAL) ? 3
PORT #200> Signaling mode (def:NONE) ? EURO-ISDN
PORT #200> CCS side (def:USER) ?
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Terminal Endpoint Identifier (TEI) (def:AUTOMATIC) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Generate ring back locally (def:DISABLE) ?
PORT #200> Loopback (def:DISABLE) ?
```

NOTE: Since this is not a bus configuration, the *Local number* and *Local subaddress* parameters do not need to be defined.

The backup channel at the central site is configured as a PVCR channel set to **ANSWER** mode:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-230/ALL,def:201) ? 201
PORT #201> Protocol (def:OFF) ? PVCR
PORT #201> Timeslot.....................1
PORT #201> Number of consecutive timeslots.....1
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Mode (def:DEDICATED) ? ANSWER
PORT #201> IP address (def:000.000.000.000) ?
PORT #201> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #201> IP RIP (def:V1) ?
PORT #201> IP RIP TX/RX (def:DUPLEX) ?
PORT #201> OSPF (def:DISABLE) ?
PORT #201> IP multicast active (def:NO) ?
PORT #201> IP multicast protocol (def:NONE) ?
PORT #201> NAT enable (def:NO) ?
PORT #201> IPX RIP (def:DISABLE) ?
PORT #201> IPX SAP (def:DISABLE) ?
PORT #201> IPX network number (def:00000000) ?
PORT #201> Compression (def:YES) ?
PORT #201> Remote unit name (def:) ?
PORT #201> Timeout (ms) (1000-30000,def:1000) ?
PORT #201> Number of retransmission retries (1-1000,def:100) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
```

```
PORT #201> Cell Packetization (def:YES) ?
```

5.1.2 Remote Site Configuration

Here is how the ISDN-BRI link should be configured at the remote site:

```
REMOTE>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 (1/2/3/4,def:1) ? 2
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ?
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:DISABLE) ? ENABLE
PORT #200> Digital port clock source (def:INTERNAL) ? 3
PORT #200> Signaling mode (def:NONE) ? EURO-ISDN
PORT #200> CCS side (def:USER) ?
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Terminal Endpoint Identifier (TEI) (def:AUTOMATIC) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Generate ring back locally (def:DISABLE) ?
PORT #200> Loopback (def:DISABLE)
```

The primary link, a dedicated PVCR channel in slot 3, is configured as follows:

```
REMOTE>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
LOT> Slot number (1/2/3/4,def:2) ? 3
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (301-331/ALL,def:301) ? 301
PORT #301> Protocol (def:OFF) ? PVCR
PORT #301> Timeslot (1-31,def:1) ?
PORT #301> Number of consecutive timeslots (1-31,def:1) ? 31
PORT #301> DS0 speed (bps) (def:64000) ?
PORT #301> Mode (def:DEDICATED) ?
PORT #301> IP address (def:000.000.000.000) ?
PORT #301> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #301> IP RIP (def:V1) ?
PORT #301> IP RIP TX/RX (def:DUPLEX) ?
PORT #301> OSPF (def:DISABLE) ?
PORT #301> IP multicast active (def:NO) ?
PORT #301> IP multicast protocol (def:NONE) ?
PORT #301> NAT enable (def:NO) ?
PORT #301> IPX RIP (def:DISABLE) ?
```

```
PORT #301> IPX SAP (def:DISABLE) ?
PORT #301> IPX network number (def:00000000) ?
PORT #301> Compression (def:YES) ?
PORT #301> Remote unit name (def:) ? CENTRAL
PORT #301> Timeout (ms) (1000-30000,def:1000) ?
PORT #301> Number of retransmission retries (1-1000,def:100) ?
PORT #301> Maximum number of voice channels (0-10000,def:10000) ?
PORT #301> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #301> Cell Packetization (def:YES) ?
```

NOTE: For the primary link the *Remote unit name* must be defined as **CENTRAL**. This is required to allow the remote unit to call the central site unit if the primary link goes down.

The backup channel is configured as a PVCR channel set to **CALL-BKUP** mode.

- The *Port to back* parameter on this channel is set to **ANY**. It could also be set to **ALL** or **301**, the channel number of the dedicated PVCR connection.
- The *Remote unit name* is defined as **CENTRAL**. It could also be left blank, since this parameter is optional for a **CALL-BKUP** channel.

NOTE: When a *Remote unit name* is specified, only that unit is backed up. To back up all units, the *Remote unit name* must be left blank.

Here is the backup channel configuration:

```
REMOTE>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 (1/2/3/4,def:3) ? 2
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-202/ALL,def:201) ?
PORT #201> Protocol (def:OFF) ? PVCR
PORT #201> Timeslot.............................1
PORT #201> Number of consecutive timeslots......1
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Mode (def:DEDICATED) ? CALL-BKUP
PORT #201> Backup termination mode (def:AUTOMATIC) ?
PORT #201> Delay before call activation (s) (1-1000,def:10) ?
PORT #201> Delay before call deactivation (s)  (1-1000,def:120) ?
PORT #201> Call activation timer (s) (30-1000,def:30) ?
PORT #201> Port to back (def:ANY) ? ?
PORT #201> Port to back (ANY/ALL/1/2/201/301,def:ANY) ? ANY
PORT #201> IP address (def:000.000.000.000) ?
```

```
PORT #201> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #201> IP RIP (def:V1) ?
PORT #201> IP RIP TX/RX (def:DUPLEX) ?
PORT #201> OSPF (def:DISABLE) ?
PORT #201> IP multicast active (def:NO) ?
PORT #201> IP multicast protocol (def:NONE) ?
PORT #201> NAT enable (def:NO) ?
PORT #201> IPX RIP (def:DISABLE) ?
PORT #201> IPX SAP (def:DISABLE) ?
PORT #201> IPX network number (def:00000000) ?
PORT #201> Compression (def:YES) ?
PORT #201> Remote unit name (def:) ? CENTRAL
PORT #201> Timeout (ms) (1000-30000,def:1000) ?
PORT #201> Number of retransmission retries (1-1000,def:100) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Cell Packetization (def:YES) ?
```

Here is how the **PHONE** profile should be configured for calling the central site unit:

```
REMOTE>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? CENTRAL
PHONE> #1> Next hop (def:) ? REMOTE
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5551234
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ?
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

5.2 ISDN Bandwidth On Demand Application

In this application a Bandwidth On Demand connection is established using ISDN on an E1 interface. Caller ID validation is used to filter all incoming calls. Refer to "Bandwidth On Demand Using ISDN" on page 3-11 for a diagram of the application requirements for this example.

At both the central site (*Unit name:* **CENTRAL**) and the remote site (*Unit name:* **REMOTE**) the NetPerformer slots are installed with the following interface cards:

- Slot 1: E1-120 ohms interface card, connected to the PBX and used for voice traffic.
- Slot 2: E1-120 ohms interface card, connected to the ISDN network, 1 channel used for Bandwidth On Demand during peak traffic periods.
- Slot 3: E1-120 ohms interface card, providing the primary connection (a dedicated PVCR channel) to the remote unit.

In this application whenever either NetPerformer unit detects that additional bandwidth is required, it dials the other unit to establish a BOD connection over the ISDN network.

The configuration steps are as follows:

- Configure the ISDN link parameters at the central site.
- Configure the ISDN BOD channel at the central site to **CALL-BOD** mode.
- Configure the **PHONE** profile at the central site for call setup to the remote site.

  The ISDN channel at the **REMOTE** site is reached at **555-9876**.
- Configure the **CALLER ID** at the central site for call setup validation.
- Configure the ISDN link parameters at the remote site.
- Configure the ISDN BOD channel at the remote site to **CALL-BOD** mode.
- Configure the **PHONE** profile at the remote site for call setup to the central site.

  The ISDN channel at the **CENTRAL** site is reached at **555-1234**.
- Configure the **CALLER ID** at the remote site for call setup validation.

NOTE: The voice parameters and primary link must also be defined. These are not shown in the following screen captures.

5.2.1 Central Site Configuration

Here is how the ISDN link should be configured at the central site:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:ENABLE) ?
PORT #200> Signaling mode (def:EURO-ISDN) ? EURO-ISDN
PORT #200> CCS side (def:NETWORK) ? USER
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Idle code (def:7E) ?
PORT #200> Zero suppression mode (def:HDB3) ?
PORT #200> Gain limit (def:-12DB) ?
PORT #200> CRC4 mode (def:ENABLE) ?
PORT #100> International bit (def:ENABLE) ?
PORT #100> Loopback (def:DISABLE) ?
```

NOTE: Since this is not a bus configuration, the *Local number* and *Local subaddress* parameters do not need to be defined.

The BOD channel at the central site is configured as a PVCR channel set to **CALL-BOD** mode.

- The *Port to back* parameter on this channel can be left at its default value. If the channel may be used for backup as well as BOD, set it to **ANY**, **ALL** or the channel number of the dedicated PVCR connection.
- The *Remote unit name* must be defined as **REMOTE** for this application to work.

Here is the backup channel configuration:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-230/ALL,def:201) ? 201
PORT #201> Protocol (def:OFF) ? PVCR
PORT #201> Timeslot (1-31, def:1) ? 1
PORT #201> Number of consecutive timeslots (1-31, def:1) ? 1
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Mode (def:DEDICATED) ? CALL-BOD
PORT #201> Delay before BOD call activation (s) (1-1000,def:120) ?
PORT #201> Delay before BOD call deactivation (s) (1-1000,def:120) ?
PORT #201> BOD level (%) (5-95,def:80) ?
PORT #201> Delay before call activation (s) (1-1000,def:10) ?
PORT #103> Delay before call deactivation (s) (1-1000,def:120) ?
PORT #201> Call activation timer (s) (30-1000,def:30) ?
PORT #201> Port to back (ANY/ALL/1/2/3/201/301,def:ANY) ?
```

```
PORT #201> IP address (def:000.000.000.000) ?
PORT #201> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #201> IP RIP (def:V1) ?
PORT #201> IP RIP TX/RX (def:DUPLEX) ?
PORT #201> OSPF (def:DISABLE) ?
PORT #201> IP multicast active (def:NO) ?
PORT #201> IP multicast protocol (def:NONE) ?
PORT #201> NAT enable (def:NO) ?
PORT #201> IPX RIP (def:DISABLE) ?
PORT #201> IPX SAP (def:DISABLE) ?
PORT #201> IPX network number (def:00000000) ?
PORT #201> Compression (def:YES) ?
PORT #201> Remote unit name (def:) ? REMOTE
PORT #201> Timeout (ms) (1000-30000,def:1000) ?
PORT #201> Number of retransmission retries (1-1000,def:100) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Cell Packetization (def:YES) ?
```

Here is how the **PHONE** profile should be configured for calling the remote site unit.

```
CENTRAL>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? REMOTE
PHONE> #1> Next hop (def:) ? CENTRAL
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5559876
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ? 5551234
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

NOTE: Define the *Local number* if you would like it to be included with the call setup message to the remote site, for call validation purposes. The *Local number* is optional, since in most cases the network will add this information automatically as the call is forwarded to the destination unit.

For this application caller ID validation is used for authorization of all incoming calls. Here is how the **CALLER ID** is set up so that only calls from the unit **REMOTE** will be accepted:

```
CENTRAL>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) ? CALLER ID
Define authorized ISDN callers
CALLER ID> Profile number (1-64,def:1) ? 1
CALLER ID> #1> ISDN Number (def:) ? 5559876
CALLER ID> #1> Subaddress (def:) ?
```

5.2.2 Remote Site Configuration

Here is how the ISDN link should be configured at the remote site:

```
REMOTE>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:ENABLE) ?
PORT #200> Signaling mode (def:EURO-ISDN) ? EURO-ISDN
PORT #200> CCS side (def:NETWORK) ? USER
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Idle code (def:7E) ?
PORT #200> Zero suppression mode (def:HDB3) ?
PORT #200> Gain limit (def:-12DB) ?
PORT #200> CRC4 mode (def:ENABLE) ?
PORT #100> International bit (def:ENABLE) ?
PORT #100> Loopback (def:DISABLE) ?
```

The primary link, a dedicated PVCR channel in slot 3, is configured as follows:

```
REMOTE>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 (1/2/3/4,def:2) ? 3
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (301-330,def:301) ? 301
PORT #301> Protocol (def:OFF) ? PVCR
PORT #201> Timeslot (1-31, def:1) ? 1
PORT #201> Number of consecutive timeslots (1-31, def:1) ? 31
PORT #301> DS0 speed (bps) (def:64000) ?
PORT #301> Mode (def:DEDICATED) ? DEDICATED
PORT #301> Delay before call activation (s) (1-1000,def:10) ?
PORT #301> Call activation timer (s) (30-1000,def:30) ?
PORT #301> IP address (def:000.000.000.000) ?
```

```
PORT #301> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #301> IP RIP (def:V1) ?
PORT #301> IP RIP TX/RX (def:DUPLEX) ?
PORT #301> OSPF (def:DISABLE) ?
PORT #301> IP multicast active (def:NO) ?
PORT #301> IP multicast protocol (def:NONE) ?
PORT #301> NAT enable (def:NO) ?
PORT #301> IPX RIP (def:DISABLE) ?
PORT #301> IPX SAP (def:DISABLE) ?
PORT #301> IPX network number (def:00000000) ?
PORT #301> Compression (def:YES) ?
PORT #301> Remote unit name (def:) ? CENTRAL
PORT #301> Timeout (ms) (1000-30000,def:1000) ?
PORT #301> Number of retransmission retries (1-1000,def:100) ?
PORT #301> Maximum number of voice channels (0-10000,def:10000) ?
PORT #301> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #301> Cell Packetization (def:YES) ?
```

NOTE: For the primary link the *Remote unit name* must be defined as **CENTRAL**. This is required to allow the remote unit to call the central site unit when another channel is needed.

The BOD channel at the remote site is configured as a PVCR channel set to **CALL-BOD** mode:

```
REMOTE>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-230/ALL,def:201) ? 201
PORT #201> Protocol (def:OFF) ? PVCR
PORT #201> Timeslot (1-31, def:1) ? 1
PORT #201> Number of consecutive timeslots (1-31, def:1) ? 1
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Mode (def:DEDICATED) ? CALL-BOD
PORT #201> Delay before BOD call activation (s) (1-1000,def:120) ?
PORT #201> Delay before BOD call deactivation (s) (1-1000,def:120) ?
PORT #201> BOD level (%) (5-95,def:80) ?
PORT #201> Delay before call activation (s) (1-1000,def:10) ?
PORT #201> Delay before call deactivation (s) (1-1000,def:120) ?
PORT #201> Call activation timer (s) (30-1000,def:30) ?
PORT #201> Port to back (ANY/ALL/1/2/3/201/301,def:ANY) ?
PORT #201> IP address (def:000.000.000.000) ?
PORT #201> Subnet mask (number of bits) (0-24,def:0) ?
{000.000.000.000}
PORT #201> IP RIP (def:V1) ?
PORT #201> IP RIP TX/RX (def:DUPLEX) ?
```

```
PORT #201> OSPF (def:DISABLE) ?
PORT #201> IP multicast active (def:NO) ?
PORT #201> IP multicast protocol (def:NONE) ?
PORT #201> NAT enable (def:NO) ?
PORT #201> IPX RIP (def:DISABLE) ?
PORT #201> IPX SAP (def:DISABLE) ?
PORT #201> IPX network number (def:00000000) ?
PORT #201> Compression (def:YES) ?
PORT #201> Remote unit name (def:) ? CENTRAL
PORT #201> Timeout (ms) (1000-30000,def:1000) ?
PORT #201> Number of retransmission retries (1-1000,def:100) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Cell Packetization (def:YES) ?
```

Here is how the **PHONE** profile should be configured for calling the central site unit:

```
REMOTE>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? CENTRAL
PHONE> #1> Next hop (def:) ? REMOTE
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5551234
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ? 5559876
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

NOTE: Define the *Local number* if you would like it to be included with the call setup message to the remote site, for call validation purposes. The *Local number* is optional, since in most cases the network will add this information automatically as the call is forwarded to the destination unit.

Here is how the **CALLER ID** is set up on the remote unit so that only calls received from the unit **CENTRAL** will be accepted:

```
REMOTE>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) ? CALLER ID
Define authorized ISDN callers
CALLER ID> Profile number (1-64,def:1) ? 1
```

```
CALLER ID> #1> ISDN Number (def:) ? 5551234
CALLER ID> #1> Subaddress (def:) ?
```

5.3 Leased ISDN-BRI Application

In this application a WAN connection is established using a permanent ISDN link to a Frame Relay network. Refer to Figure 3-7 for a diagram of the application requirements for this example.

At both the central site (*Unit name:* **CENTRAL**) and the remote site (*Unit name:* **REMOTE**) the NetPerformer slots are installed with the following interface cards:

- Slot 1: E1-120 ohms interface card, connected to the PBX and used for voice traffic.
- Slot 2: ISDN-BRI interface card, 2 ports connected to the ISDN network, both channels of one port used for the permanent WAN connection.

In this application the main link goes through Frame Relay, which is accessed through a 128 Kbps leased ISDN-BRI connection.

The configuration steps are as follows:

- Configure the ISDN-BRI link parameters at the central site.
- Configure the 128 Kbps ISDN-BRI channel at the central site for Frame Relay operation.
- Configure a PVC at the central site for connection to the remote site.
- Configure the ISDN-BRI link parameters at the remote site.
- Configure the 128 Kbps ISDN-BRI channel at the remote site for Frame Relay operation.
- Configure a PVC at the remote site for connection to the central site.

NOTE: For the remote site the last three steps require the same commands, parameters and parameter values as the first three steps at the central site, and will not be repeated in the screen dumps below.

5.3.1 Central Site Configuration

Here is how the ISDN-BRI link should be configured at the central site. Note that there is no signaling on the link:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Signaling mode (def:NONE) ? NONE
```

```
PORT #200> Termination method (def:TE) ? TE
```

Both channels of one ISDN-BRI port at the central site are configured for Frame Relay operation, providing a total bandwidth of 128 Kbps. When the signaling is set to **NONE**, the 128 Kbps connection is established when the *Number of consecutive timeslots* is set to 2:

```
CENTRAL>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 (1/2/3/4,def:3) ? 2
Port number (1/2,def:1) ?
Item (LINK/CHANNEL,def:CHANNEL) ? CHANNEL
SLOT> Channel Number (201-202/ALL,def:201) ?
PORT #201> Protocol (def:OFF) ? FR-USER
PORT #201> Timeslot (1-2,def:1) ? 1
PORT #201> Number of consecutive timeslots (1-2,def:1) ? 2
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Management interface (def:LMI) ?
PORT #201> Congestion flow control (def:ON) ?
PORT #201> Enquiry timer (s) (1-30,def:10) ?
PORT #201> Report cycle (1-256,def:6) ?
PORT #201> CLLM function (def:OFF) ?
PORT #201> Cell Packetization (def:YES) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Drop signals on LMI down (def:NO) ?
```

Configure the PVC to the remote site in PVCR mode:

```
CENTRAL>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) ? PVC
PVC number (1-300,def:1) ? 1
PVC #1> Mode (def:OFF) ? PVCR
PVC #1> Port (def:2) ? 201
PVC #1> DLCI address (0-1022,def:0) ? 16
PVC #1> Committed Information rate (4000-2048000,def:56000) ? 56000
PVC #1> Burst Information rate (4000-2048000,def:64000) ? 128000
PVC #1> Remote unit name (def:) ?
PVC #1> Type (def:DEDICATED) ? DEDICATED
PVC #1> Timeout (ms) (1000-30000,def:1000) ?
PVC #1> Number of retransmission retries (1-1000,def:100) ?
PVC #1> Compression (def:YES) ?
PVC #1> IP address (def:000.000.000.000) ?
PVC #1> Subnet mask (number of bits) (0-24,def:0) ?    {000.000.000.000}
PVC #1> IP RIP (def:V1) ?
PVC #1> IP RIP TX/RX (def:DUPLEX) ?
PVC #1> OSPF (def:DISABLE) ?
```

```
PVC #1> IP multicast active (def:NO) ?
PVC #1> IP multicast protocol (def:NONE) ?
PVC #1> IPX RIP (def:DISABLE) ?
PVC #1> IPX SAP (def:DISABLE) ?
PVC #1> IPX NETWORK NUMBER (def:00000000) ?
PVC #1> Broadcast group (def:NO) ?
PVC #1> Maximum number of voice channels (0-10000,def:10000) ?
PVC #1> Maximum Voice Channels If High Priority Data  (0-10000,
def:10000) ?
```

As mentioned earlier, configuration of the NetPerformer at the remote site is exactly the same as that for the central site.

5.4 Frame Relay over ISDN

In this application a Frame Relay network is accessed through an ISDN switched connection, as shown in Figure 5-1. Since the switched link is always connected, a low-cost ISDN line should be used in order to reduce costs. Generally, a Frame Relay over ISDN solution is used in an application having a semi-permanent ISDN connection with a leased line between two points (and associated costs) that requires signaling over the D-channel.

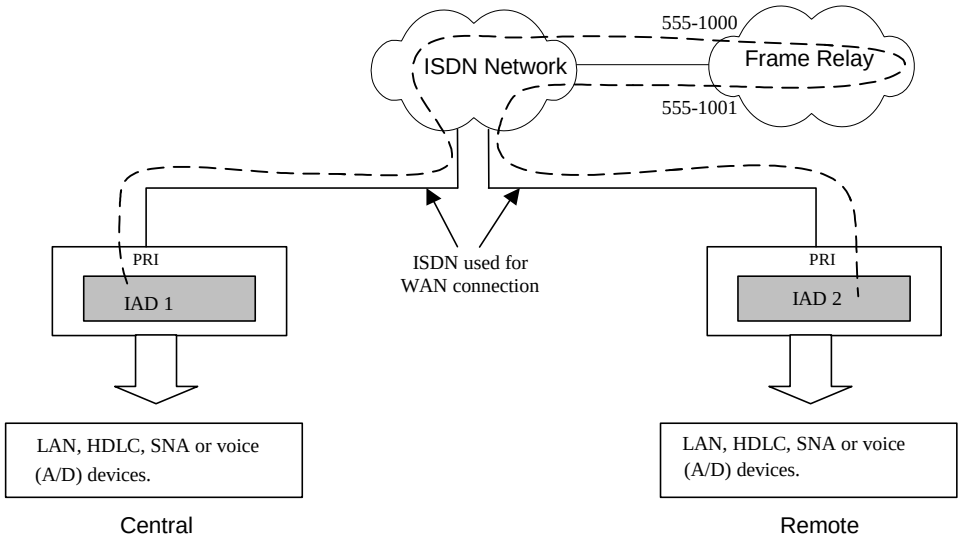

Figure 5-1: Frame Relay Over ISDN Application

At both the central site (*Unit name:* **CENTRAL**) and the remote site (*Unit name:* **REMOTE**) the NetPerformer slots are installed with the following interface card:

- Slot 2: E1-120 ohms interface card, connected to the ISDN network, 1 channel used for the Frame Relay WAN connection.

The configuration steps are as follows:

- Configure the ISDN link parameters at the central site.
- Configure the ISDN Frame Relay connection at the central site using the **FR-USER** protocol.
- Configure a PVC at the central site for connection to the remote site.
- Configure the **PHONE** profile at the central site for call setup to the Frame Relay Network.

  The ISDN channel for the Frame Relay Network is reached at **555-1000**.
- Configure the ISDN link parameters at the remote site.
- Configure the ISDN Frame Relay connection at the remote site using the **FR-USER** protocol.
- Configure a PVC at the remote site for connection to the central site.

- Configure the **PHONE** profile at the remote site for call setup to the Frame Relay Network.

The ISDN channel for the Frame Relay Network is reached at **555-1001**.

Here is how the ISDN link should be configured at the central site. Note that signaling is enabled on the link:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:ENABLE) ?
PORT #200> Signaling mode (def:EURO-ISDN) ? EURO-ISDN
PORT #200> CCS side (def:NETWORK) ? USER
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Idle code (def:7E) ?
PORT #200> Zero suppression mode (def:HDB3) ?
PORT #200> Gain limit (def:-12DB) ?
PORT #200> CRC4 mode (def:ENABLE) ?
PORT #100> International bit (def:ENABLE) ?
PORT #100> Loopback (def:DISABLE) ?
```

NOTE: Since this is not a bus configuration, the *Local number* and *Local subaddress* parameters do not need to be defined.

The ISDN channel is configured for Frame Relay operation. Note that a *Phone entry index* is defined to select the correct **PHONE** profile for call setup:

```
CENTRAL>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-230/ALL,def:201) ? 201
PORT #201> Protocol (def:OFF) ? FR-USER
PORT #201> Timeslot (1-31, def:1) ? 1
PORT #201> Number of consecutive timeslots (1-31, def:1) ? 2
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Management interface (def:LMI) ?
PORT #201> Congestion flow control (def:ON) ?
PORT #201> Enquiry timer (s) (1-30,def:15) ?
```

```
PORT #201> Report cycle (1-256,def:6) ?
PORT #201> CLLM function (def:OFF) ?
PORT #201> Cell Packetization (def:YES) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Drop signals on LMI down (def:NO) ?
PORT #201> SVC address type (def:NONE) ?
PORT #201> Delay before call activation (s) (1-1000,def:10) ?
PORT #201> Call activation timer (s) (30-1000,def:30) ?
PORT #201> Phone entry index (def:1) ? 1
```

Configure the PVC to the remote site in **PVCR** mode:

```
CENTRAL>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) ? PVC
PVC number (1-300,def:1) ? 1
PVC #1> Mode (def:OFF) ? PVCR
PVC #1> Port (def:2) ? 201
PVC #1> DLCI address (0-1022,def:0) ? 16
PVC #1> Committed Information rate (4000-2048000,def:56000) ? 56000
PVC #1> Burst Information rate (4000-2048000,def:64000) ? 64000
PVC #1> Remote unit name (def:) ?
PVC #1> Type (def:DEDICATED) ? DEDICATED
PVC #1> Timeout (ms) (1000-30000,def:1000) ?
PVC #1> Number of retransmission retries (1-1000,def:100) ?
PVC #1> Compression (def:YES) ?
PVC #1> IP address (def:000.000.000.000) ?
PVC #1> Subnet mask (number of bits) (0-24,def:0) ?    {000.000.000.000}
PVC #1> IP RIP (def:V1) ?
PVC #1> IP RIP TX/RX (def:DUPLEX) ?
PVC #1> OSPF (def:DISABLE) ?
PVC #1> IP multicast active (def:NO) ?
PVC #1> IP multicast protocol (def:NONE) ?
PVC #1> IPX RIP (def:DISABLE) ?
PVC #1> IPX SAP (def:DISABLE) ?
PVC #1> IPX NETWORK NUMBER (def:00000000) ?
PVC #1> Broadcast group (def:NO) ?
PVC #1> Maximum number of voice channels (0-10000,def:10000) ?
PVC #1> Maximum Voice Channels If High Priority Data  (0-10000,
def:10000) ?
```

Here is how the **PHONE** profile should be configured for calling the remote site unit:

```
CENTRAL>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? REMOTE
PHONE> #1> Next hop (def:) ? CENTRAL
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5551000
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ?
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

5.4.1 Remote Site Configuration

Here is how the ISDN link should be configured at the remote site:

```
REMOTE>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:CHANNEL) ? LINK
PORT #200> Status (def:DISABLE) ? ENABLE
PORT #200> Clock recovery (def:ENABLE) ?
PORT #200> Signaling mode (def:EURO-ISDN) ? EURO-ISDN
PORT #200> CCS side (def:NETWORK) ? USER
PORT #200> Channel selection mode (def:PREFERRED) ?
PORT #200> Local number (def:) ?
PORT #200> Local subaddress (def:) ?
PORT #200> Pcm encoding law (def:A-LAW) ?
PORT #200> Idle code (def:7E) ?
PORT #200> Zero suppression mode (def:HDB3) ?
PORT #200> Gain limit (def:-12DB) ?
PORT #200> CRC4 mode (def:ENABLE) ?
PORT #100> International bit (def:ENABLE) ?
PORT #100> Loopback (def:DISABLE) ?
```

The ISDN channel is configured for Frame Relay operation. Note that a *Phone entry index* is defined to select the **PHONE** profile for call setup to the central site:

```
REMOTE>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 (1/2/3/4,def:1) ? 2
Item (LINK/CHANNEL,def:LINK) ? CHANNEL
SLOT> Channel Number (201-230/ALL,def:201) ? 201
PORT #201> Protocol (def:OFF) ? FR-USER
PORT #201> Timeslot (1-31, def:1) ? 1
PORT #201> Number of consecutive timeslots (1-31, def:1) ? 2
```

```
PORT #201> DS0 speed (bps) (def:64000) ?
PORT #201> Management interface (def:LMI) ?
PORT #201> Congestion flow control (def:ON) ?
PORT #201> Enquiry timer (s) (1-30,def:15) ?
PORT #201> Report cycle (1-256,def:6) ?
PORT #201> CLLM function (def:OFF) ?
PORT #201> Cell Packetization (def:YES) ?
PORT #201> Maximum number of voice channels (0-10000,def:10000) ?
PORT #201> Maximum Voice Channels If High Priority Data  (0-
10000,def:10000) ?
PORT #201> Drop signals on LMI down (def:NO) ?
PORT #201> SVC address type (def:NONE) ?
PORT #201> Delay before call activation (s) (1-1000,def:10) ?
PORT #201> Call activation timer (s) (30-1000,def:30) ?
PORT #201> Phone entry index (def:1) ? 1
```

Configure the PVC to the central site in **PVCR** mode:

```
REMOTE>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) ? PVC
PVC number (1-300,def:1) ? 1
PVC #1> Mode (def:OFF) ? PVCR
PVC #1> Port (def:2) ? 201
PVC #1> DLCI address (0-1022,def:0) ? 16
PVC #1> Committed Information rate (4000-2048000,def:56000) ? 56000
PVC #1> Burst Information rate (4000-2048000,def:64000) ? 64000
PVC #1> Remote unit name (def:) ?
PVC #1> Type (def:DEDICATED) ? DEDICATED
PVC #1> Timeout (ms) (1000-30000,def:1000) ?
PVC #1> Number of retransmission retries (1-1000,def:100) ?
PVC #1> Compression (def:YES) ?
PVC #1> IP address (def:000.000.000.000) ?
PVC #1> Subnet mask (number of bits) (0-24,def:0) ?    {000.000.000.000}
PVC #1> IP RIP (def:V1) ?
PVC #1> IP RIP TX/RX (def:DUPLEX) ?
PVC #1> OSPF (def:DISABLE) ?
PVC #1> IP multicast active (def:NO) ?
PVC #1> IP multicast protocol (def:NONE) ?
PVC #1> IPX RIP (def:DISABLE) ?
PVC #1> IPX SAP (def:DISABLE) ?
PVC #1> IPX NETWORK NUMBER (def:00000000) ?
PVC #1> Broadcast group (def:NO) ?
PVC #1> Maximum number of voice channels (0-10000,def:10000) ?
PVC #1> Maximum Voice Channels If High Priority Data  (0-10000,
def:10000) ?
```

Here is how the **PHONE** profile should be configured for calling the remote site unit:

```
REMOTE>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 (1-16,def:1) ? 1
PHONE> #1> Remote unit (def:) ? CENTRAL
PHONE> #1> Next hop (def:) ? REMOTE
PHONE> #1> Cost (0-65534,def:1) ?
PHONE> #1> Dialer type (def:MODEM) ? ISDN
PHONE> #1> Remote number (def:) ? 5551001
PHONE> #1> Remote subaddress (def:) ?
PHONE> #1> Local number (def:) ?
PHONE> #1> Local subaddress (def:) ?
PHONE> #1> Number of links (1-64,def:1) ?
```

6

SE/SLOT/#/LINK Configuration Parameters

6.1 T1 Port

6.1.1 Common Parameters

These parameters are common to all T1 channels, regardless of the *Signaling mode* defined. Some of the parameters detailed in this section also apply to configuration of an E1 or ISDN-BRI S/T port.

Framer Type

Console	SNMP	Text-based Config
Framer Type	ifwanE1T1Type	[ifwan#] E1T1Type

For an E1/T1 interface only (Dual Framer)
Sets the type of framer used on this physical port.

- **E1:** The physical link uses E1 framing (32 channels)
- **T1:** The physical link uses T1 framing (24 channels).

Values: *E1, T1*

Default: *E1*

Status

Console	SNMP	Text-based Config
Status	ifwanT1E1Status	[ifwan#] T1E1Status

Sets the activation status of this physical port.

- **ENABLE:** Activates the physical link
- **DISABLE:** The physical link is not activated.

NOTE: This means that all data/voice channels associated with this port are disabled, but the channel configuration is not lost.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

Clock recovery

Console	SNMP	Text-based Config
Clock recovery	ifwanClockRecovery	[ifwan#] ClockRecovery

Specifies whether the clock received on this digital port can be used as the master clock for all digital ports or as one of the backup clocks.

- **ENABLE:** The clock received on this port provides the clock for other digital ports
- **DISABLE:** The clock received on this port is not used elsewhere.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

Digital port clock source

Console	SNMP	Text-based Config
Digital port clock source	ifwanDigitalPortClkSrc	[ifwan#] DigitalPort-ClkSrc

Specifies the source of the master clock for digital ports. This parameter indicates whether the clock should be generated internally, or taken from one of the interface cards installed in the NetPerformer unit. *Digital port clock source* can be used in conjunction with *Clock recovery* to optimize the clock distribution. Set *Digital port clock source* to:

- **Numeric value:** The slot containing the digital interface card that is connected to the network (**1**, **2**, …)

  Select a numeric value if you want all transmit clocks to be driven by the receive clock of the digital interface card that is installed in that slot number.
- **INTERNAL:** To allow the NetPerformer to use its internal reference clock.

  Select **INTERNAL** (the default value) if you want all transmit clocks to be driven by the internal reference clock (up to 1.544 Mbps for T1, up to 2.048 Mbps for E1, or up to 128 Kbps for ISDN-BRI S/T).

NOTE: The value you select for this parameter will be applied globally to all digital ports on the same NetPerformer unit.

Values: *INTERNAL, 1, 2, 3, 4* (numeric values are product-dependent)

Default: *INTERNAL*

Signaling mode

Console	SNMP	Text-based Config
Signaling mode	ifwanSignaling	[ifwan#] Signaling

Specifies the type of signaling that is in effect on this digital port. The setting you select determines what other parameters must be defined, as detailed in following sections.

For data transport on a T1 interface card the *Signaling mode* can be set to:

- **NONE:** data-only connection
- **ROB BIT:** T1 Robbed-bit signaling
- **TRSP-ORIG** (originate) or **TRSP-ANSW** (answer): Transparent HDLC-based or PCM64K-based transport

NOTE: **TRSP-ORIG** and **TRSP-ANSW** signaling modes are not available when the NetPerformer SIP VoIP licensed software option has been installed. They are used to establish a permanent point-to-point transparent signaling connection between digital interfaces (T1 or E1).

- **NTT** or **KDD:** ISDN access in Japan
- **4ESS**, **5ESS**, **DMS100** or **NI2:** ISDN access in other countries (mainly North America)
- **QSIG:** Standard PBX access with supplementary services support.

Values: *NONE, ROB BIT, TRSP-ORIG, TRSP-ANSW, NTT, KDD, 4ESS, 5ESS, DMS100, NI2, QSIG*

Default: *NONE*

Interface Mode

Console	SNMP	Text-based Config
Interface Mode	ifwanInterfaceMode	[ifwan#] InterfaceMode

For an E1/T1 interface only (Dual Framer)
Sets the type of interface mode used on this physical port. **The two ends of the digital connection must have opposite NT/TE values.**

- **TE:** The interface uses the receive clock from the connected device to transmit data
- **NT:** The interface provides the clock signal to the connected device.

NOTE: On the T1, legacy E1-120 and ISDN-BRI S/T interface cards, the interface mode is set through hardware strapping . For strapping instructions, refer to the *Hardware Installation Guide* for your NetPerformer product.

Values: *TE, NT*

Default: *TE*

6.1.2 NONE Signaling Mode (on T1)

NOTE: Some of the parameters detailed in this section also apply to other signaling modes on the T1 LINK.

Pcm encoding law

Console	SNMP	Text-based Config
Pcm encoding law	ifwanEncodingLaw	[ifwan#] EncodingLaw

Specifies the PCM coding law in effect on this interface.

Values: *A-LAW, MU-LAW*

Default: *MU-LAW*

Hunt Group Sorting

Console	SNMP	Text-based Config
Hunt Group Sorting	ifwanHuntRules	[ifwan#] HuntRules

Specifies the Hunt Group sorting rules in effect on this interface when it is used for placing a voice call:

- **LSA:** Linear Selection Ascending. When the NetPerformer tries to place a call, **timeslot selection always starts with the lowest numbered timeslot**, and cycles upward to higher numbered timeslots until a free timeslot is found.
- **LSD:** Linear Selection Descending. When the NetPerformer tries to place a call, **timeslot selection always starts with the highest numbered timeslot**, and cycles downward to lower numbered timeslots until a free timeslot is found.
- **RRA:** Round Robin Ascending. When the NetPerformer tries to place a call, **timeslot selection starts with the timeslot that is one number higher than the last used timeslot on that interface**, and cycles upward to higher numbered timeslots until a free timeslot is found. If the highest numbered timeslot is reached, the cycle continues with timeslot 1.
- **RRD:** Round Robin Descending. When the NetPerformer tries to place a call, **timeslot selection starts with the timeslot that is one number lower than the last used timeslot on that interface**, and cycles downward to lower numbered timeslots until a free timeslot is found. If timeslot 1 is reached, the cycle continues with the highest numbered timeslot on the interface.

For further details on Hunt Group sorting rules, refer to the *Advanced Voice Features* module of this document series.

Values: *LSA, LSD, RRA, RRD*

Default: *RRA*

Idle code

Console	SNMP	Text-based Config
Idle code	ifwanIdleCode	[ifwan#] IdleCode

Specifies the byte that will be transmitted when there is no real data to transmit over this port.

Values: *OO - FF*

Default: *7F*

Zero suppression mode

Console	SNMP	Text-based Config
Zero suppression mode	ifwanLineCoding	[ifwan#] LineCoding

Specifies the type of 1’s density control or zero suppression on this link.

Values: *B8ZS, AMI, B7ZS*

Default: *B8ZS*

Long Haul

Console	SNMP	Text-based Config
Long Haul	ifwanLongHaul	[ifwan#] LongHaul

For an E1/T1 interface only (Dual Framer)
Specifies whether the connection is made over a long haul (**YES**) or short haul (**NO**). This determines the gain to be applied on the received DS1 signal.

Values: *NO, YES*

Default: *NO*

Gain limit

Console	SNMP	Text-based Config
Gain limit	ifwanGainLimit	[ifwan#] GainLimit

For a T1 or E1 interface only.

Specifies the gain to be applied on the received DS1 signal.

Values: *-30DB, -36DB*

Default: *-30DB*

Framing mode

Console	SNMP	Text-based Config
Framing mode	ifwanFraming	[ifwan#] Framing

Determines the framing format (**ESF** or **D4**).

Values: *ESF, D4*

Default: *ESF*

Line Build Out

Console	SNMP	Text-based Config
Line Build Out	ifwanLineBuild	[ifwan#] LineBuild

Specifies the build-out to be applied on the transmitted DS1 signal. The *Line Build Out* adjusts waveshaping on the T1 driver to match lines of different lengths.

Values: *0-133FT, 133-266FT, 266-399FT, 399-533FT, 533-655FT, -7.5DB, -15DB, -22.5DB*

Default: *0-133FT*

Custom Waveform

Console	SNMP	Text-based Config
Custom Waveform	ifwanCustomWaveform	[ifwan#] CustomWaveform

For an E1/T1 interface only (Dual Framer)
Determines whether custom waveshaping will be applied to this interface. When this parameter is set to **ENABLE**, the custom waveform overrides the waveshaping determined from the *Line Build Out* parameter.

When you enable *Custom Waveform*, you can customize the waveform parameters using the **E1-T1 WAVEFORM** submenu of the **SE/CUSTOM** console command. Start by loading a standard waveform template, either **E1 75 OHMS** or **E1 120 OHMS**, and adjust the parameters that are displayed.

NOTE: Custom waveshaping is not configurable using SNMP or text-based configureation.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

Loopback

Console	SNMP	Text-based Config
Loopback	ifwanT1E1LoopBack	[ifwan#] T1E1LoopBack

Determines whether a loopback condition is activated on this physical port. Set *Loopback* to **ENABLE** for troubleshooting purposes only. For details, refer to the *Monitoring and Statistics* module of this document series.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

PVCR Link management

Console	SNMP	Text-based Config
PVCR Link management	ifwanPvcrLinkManage-ment	[ifwan#] PvcrLinkManagement

For an E1/T1 interface only (Dual Framer)
Determines whether the PVCR Link Management feature will be enabled on this interface.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

When *PVCR Link management* is set to **ENABLE**, the following three parameters are displayed at the NetPerformer console.

Link management alarm type

Console	SNMP	Text-based Config
Link management alarm type	ifwanPvcrManagement-AlarmType	[ifwan#] PvcrManagementAlarm-Type

For an E1/T1 interface only (Dual Framer) when PVCR Link Managment is enabled
Determines what type of alarm will be generated on this interface for the PVCR Link Management feature:

- **RAI/YELLOW:** For an RAI alarm on an E1 interface or a YELLOW alarm on a T1 interface.

NOTE: The **ALM** LED for the interface will turn **yellow** when this type of alarm is detected.

- **AIS:** For an AIS alarm on either an E1 or T1 interface.

NOTE: The **ALM** LED on the interface will turn **red** when this type of alarm is detected.

Values: *RAI/YELLOW, AIS*

Default: *RAI/YELLOW*

Remote unit

Console	SNMP	Text-based Config
Remote unit	ifwanLinkRemoteUnit	[ifwan#] LinkRemoteUnit

For an E1/T1 interface only (Dual Framer) when PVCR Link Managment is enabled
Determines which remote NetPerformer will be monitored for an alarm signal. Enter the *Unit name* that has been configured on the remote 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.

NOTE: The decision to send or remove an alarm on the E1/T1 interface is based on the loss or recovery of the PVCR link to the unit specified by the *Remote unit* parameter.

Values: Maximum 32-character alphanumeric string

Default: no value

Remote port number

Console	SNMP	Text-based Config
Remote port number	ifwanLinkRemotePort	[ifwan#] LinkRemotePort

For an E1/T1 interface only (Dual Framer) when PVCR Link Managment is enabled
Determines which remote digital LINK will receive the alarm indication. Enter the port number that corresponds to the LINK configuration on the remote side (**100**, **150**, **200**, **250**, **300**, **350**, **400** or **450**). By default, the same number as the local LINK number is selected.

Values: product-dependent LINK port numbers *(100, 150, 200, 250, 300, 350, 400, 450)*

Default: the local LINK port number

6.1.3 ROB BIT Signaling Mode

All parameters for **ROB BIT** signaling mode are common to a T1 port with no signaling. Refer to “NONE Signaling Mode (on T1)” on page 6-5.

6.1.4 TRSP-ORIG and TRSP-ANSW Signaling Modes (on T1)

All parameters for **TRSP-ORIG** and **TRSP-ANSW** signaling modes are common to a T1 port with no signaling. Refer to “NONE Signaling Mode (on T1)” on page 6-5.

6.1.5 CCS Signaling Modes

On a T1 card, the CCS signaling modes that can be used for digital data transport are: **NTT**, **KDD**, **4ESS**, **5ESS**, **DMS100**, **NI2** and **QSIG**.

NOTE: CCS parameters that are common to a T1 port with no signaling are listed under “NONE Signaling Mode (on T1)” on page 6-5.

CCS side

Console	SNMP	Text-based Config
CCS side	ifwanCcsSide	[ifwan#] CcsSide

Reflects which side of the CCS application the NetPerformer unit is facing via this channel:

- **USER:** Select this value when the unit is facing the network side of the application

- **NETWORK:** Select this value when the unit is facing the user side of the application.


Caution

The two sides of a CCS connection must have opposite values for this parameter.

Values: *USER, NETWORK*

Default: *USER*

QSIG master

Console	SNMP	Text-based Config
QSIG master	ifwanQsigMaster	[ifwan#] QsigMaster

For QSIG Signaling mode only:
Reflects the type of QSIG equipment the NetPerformer unit is facing via this port:

- **YES:** Select this value when the unit connects to equipment that is defined as slave
- **NO:** Select this value when the unit connects to equipment that is defined as master.


Caution

The two sides of a QSIG connection must have opposite values for this parameter.

Values: *YES, NO*

Default: *NO*

Channel selection mode

Console	SNMP	Text-based Config
Channel selection mode	ifwanChannelSelection-Mode	[ifwan#] ChannelSelectionMode

When the NetPerformer sends an ISDN Setup message to the PBX or CO, it suggests a channel number for the connection. The *Channel selection mode* parameter determines the way in which the NetPerformer selection will be interpreted during call setup.

NOTE: **This parameter is not required for a data connection, and can be left at its default value, PREFERRED.** It is applied only to outgoing ISDN/QSIG calls that are initiated by the NetPerformer unit.

Values: *PREFERRED, EXCLUSIVE*

Default: *PREFERRED*

Local number

Console	SNMP	Text-based Config
Local number	ifwanLocalNum	[ifwan#] LocalNum

Defines the local ISDN number for the digital port. This number is used when multiple ISDN devices are connected on the same bus.

The *Local number* is optional. When it is not defined, the NetPerformer will process every ISDN Setup message received on this port.

When the *Local number* is defined, the NetPerformer ignores or processes a Connection Request received on this port based on the value of this parameter. This value is validated against the Called Party Number included in the ISDN Setup message that initiates the connection.

Values: maximum 20 digits (0 to 9)

Default: no value

Local subaddress

Console	SNMP	Text-based Config
Local subaddress	ifwanLocalSubAddr	[ifwan#] LocalSubAddr

Defines the local ISDN subaddress for the digital port. This address is used when multiple ISDN devices with the same subscriber number are connected on the same bus. It uniquely identifies the NetPerformer unit in an application where more than one device can be reached using a single ISDN number.

The *Local subaddress* is optional. When it is not defined, the NetPerformer will process every ISDN Setup message received on this port (provided that the Setup message includes a Called Party Number which matches the value of the *Local number*).

When the *Local subaddress* is defined, the NetPerformer ignores or processes a Connection Request received at this port based on the value of this parameter. This value is validated against the Called Party Subaddress included in the ISDN Setup message that initiates the connection.

Values: maximum 20 digits (0 to 9)

Default: no value

For an application that uses ISDN signaling you can define the *Numbering Plan* that must be used when placing a call. Five parameters control the numbering plan definition:

- *Calling number type of network*
- *Calling number numbering plan*
- *Called number type of network*
- *Called number numbering plan*
- Override remote types and plans

The values of the first four of these parameters are based on definitions in the ISDN standard specifications. **Configure each parameter according to the current configuration of the switch/PBX.** The last parameter is used to override the numbering plan configured on the remote unit when ISDN signaling is the same on both sides of the connection.

Calling number type of network

Console	SNMP	Text-based Config
Calling number type of network	ifwanCallingTypeNumber	[ifwan#] CallingTypeNumber

Defines the network at the calling number location, using a 3-digit binary code:

- **000:** Unknown. This is the default value.
- **001:** International
- **010:** National
- **011:** Network specific
- **100:** Subscriber number
- **110:** Abbreviated number
- **111:** Reserved.

Values: *000 (*Unknown*), 001 (*International*), 010 (*National*), 011 (*Network specific*), 100 (*Subscriber number*), 110 (*Abbreviated number*), 111 (*Reserved*)*

Default: *000 (*Unknown*)*

Calling number numbering plan

Console	SNMP	Text-based Config
Calling number numbering plan	ifwanCallingNumbering-Plan	[ifwan#] CallingNumberingPlan

Defines the numbering plan used at the calling number location, using a 4-digit binary code:

- **0000:** Unknown. This is the default value.
- **0001:** Telephony numbering using E.164
- **0011:** Data-based numbering using X.121
- **0100:** Telex numbering using F.69
- **1000:** National standard
- **1001:** Private
- **1111:** Reserved.

Values: *0000* (Unknown), *0001* (Telephony numbering E.164), *0011* (Data X.121), *0100* (Telex F.69), *1000* (National standard), *1001* (Private), *1111* (Reserved)

Default: *0000* (Unknown)

Called number type of network

Console	SNMP	Text-based Config
Called number type of network	ifwanCalledTypeNumber	[ifwan#] CalledTypeNumber

Defines the network at the called number location, using a 3-digit binary code:

- **000:** Unknown. This is the default value.
- **001:** International
- **010:** National
- **011:** Network specific
- **100:** Subscriber number
- **110:** Abbreviated number
- **111:** Reserved.

Values: *000* (Unknown), *001* (International), *010* (National), *011* (Network specific), *100* (Subscriber number), *110* (Abbreviated number), *111* (Reserved)

Default: *000 (*Unknown*)*

Called number numbering plan

Console	SNMP	Text-based Config
Called number numbering plan	ifwanCalledNumbering-Plan	[ifwan#] CalledNumberingPlan

Defines the numbering plan used at the called number location, using a 4-digit binary code:

- **0000:** Unknown. This is the default value.
- **0001:** Telephony numbering using E.164
- **0011:** Data-based numbering using X.121
- **0100:** Telex numbering using F.69
- **1000:** National standard
- **1001:** Private
- **1111:** Reserved.

Values: *0000* (Unknown), *0001* (Telephony numbering E.164), *0011* (Data X.121), *0100* (Telex F.69), *1000* (National standard), *1001* (Private), *1111* (Reserved)

Default: 0000 (Unknown)

Override remote types and plans

Console	SNMP	Text-based Config
Override remote types and plans	ifwanOverrideRemote-TypesPlans	[ifwan#] OverrideRemote-TypesPlans

Determines whether the local settings for the numbering plan parameters will override the settings configured on the remote side when ISDN signaling is the same on both sides of the connection. These parameters include:

- *Calling number type of network*
- *Calling number numbering plan*
- *Called number type of network*

- *Called number numbering plan*

Set *Override remote types and plans* to **YES** to force the remote port to the local settings.

Values: *NO, YES*

Default: *NO*

Generate ring back locally

Console	SNMP	Text-based Config
Generate ring back locally	ifwanRingBackLocally	[ifwan#] RingBackLocally

The *Generate ring back locally* parameter is used in voice applications that require **Ring Back** at the local unit. For data applications, leave it at its default setting, **DISABLE**.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

6.2 E1 Port

E1 parameters that are identical to those on a T1 port are listed under "T1 Port" on page 6-2. For E1 parameters that have different values than the same parameter on a T1 port, the differences are noted in this section. E1 parameters that are unique to an E1 port are fully detailed in this section.

6.2.1 Signaling mode

NOTE: Refer to "Signaling mode" on page 6-3 for the SNMP and text-based configuration equivalents of this parameter.

For data transport on an E1 interface card the *Signaling mode* can be set to:

- **NONE:** data-only connection
- **TRSP-ORIG** (originate) or **TRSP-ANSW** (answer): Transparent HDLC-based or PCM64K-based transport

  TRSP-ORIG and **TRSP-ANSW** signaling modes are not available when the NetPerformer SIP VoIP licensed software option has been installed. They are used to establish a permanent point-to-point transparent signaling connection between digital interfaces (T1 or E1).
- **CAS:** data connection using Channel Associative Signaling (CAS)
- **EURO-ISDN:** data connection using ISDN-PRI (ETSI) in Europe
- **QSIG:** Standard PBX access with supplementary services support.

Values: *NONE, TRSP-ORIG, TRSP-ANSW, CAS, EURO-ISDN, QSIG*

Default: *NONE*

6.2.2 NONE Signaling Mode (on E1)

Pcm encoding law

NOTE: Refer to "Pcm encoding law" on page 6-5 for the SNMP and text-based configuration equivalents of this parameter.

The default value on an E1 port is **A-LAW** rather than **MU-LAW** (on T1 port).

Values: *A-LAW, MU-LAW*

Default: *A-LAW*

Idle code

NOTE: Refer to “Idle code” on page 6-6 for the SNMP and text-based configuration equivalents of this parameter.

The default value on an E1 port is **7E** rather than **7F** (on T1 port).

Values: *OO - FF*

Default: *7E*

Zero suppression mode

NOTE: Refer to “Zero suppression mode” on page 6-6 for the SNMP and text-based configuration equivalents of this parameter.

The values for *Zero suppression mode* on an E1 port are different from those for the same parameter on a T1 port.

Values: *HDB3, AMI*

Default: *HDB3*

Gain limit

NOTE: Refer to “Gain limit” on page 6-6 for the SNMP and text-based configuration equivalents of this parameter.

The values for *Gain limit* on an E1 port are different from those for the same parameter on a T1 port.

Values: *-12DB, -43DB*

Default: *-12DB*

Impedance and Line Build Out

Console	SNMP	Text-based Config
Impedance and Line Build Out	ifwanLineBuild	[ifwan#] LineBuild

For an E1/T1 interface set to E1 only.
Specifies the impedance on the interface, which determines the build-out to be applied on the transmitted DS1 signal.

Values: *120 OHMS, 75 OHMS*

Default: *120 OHMS*

CRC4 mode

Console	SNMP	Text-based Config
CRC4 mode	ifwanCrc4	[ifwan#] Crc4

Determines whether the CRC-4 procedure is enabled or disabled on the E1 port.

Values: *DISABLE, ENABLE*

Default: *ENABLE*

International bit

Console	SNMP	Text-based Config
International bit	ifwanT1E1InterBit	[ifwan#] ifwanT1E1InterBit

Determines whether the International Bit (I-bit) is set (**ENABLE**) or not set (**DISABLE**) on the E1 port.

Values: *DISABLE, ENABLE*

Default: *ENABLE*

ETS 300 011 mode

Console	SNMP	Text-based Config
ETS 300 011 mode	ifwanE1Ets300011	[ifwan#] E1Ets300011

For a legacy E1 interface only.
Determines whether *ETS 300 011 Mode* is enabled or disabled on the E1 port.

Values: *DISABLE, ENABLE*

Default: *DISABLE*

6.2.3 TRSP-ORIG and TRSP-ANSW Signaling Modes (on E1)

All parameters for **TRSP-ORIG** and **TRSP-ANSW** signaling modes are common to an E1 port with no signaling. Refer to “NONE Signaling Mode (on E1)” on page 6-17.

6.2.4 CAS Signaling Mode

All parameters for the **CAS** signaling mode are common to an E1 port with no signaling. Refer to “NONE Signaling Mode (on E1)” on page 6-17.

6.2.5 EURO-ISDN Signaling Mode

The following parameters for **EURO-ISDN** signaling mode on an E1 card are identical to the same parameters on a T1 port configured with a CCS *Signaling mode*, as detailed in "CCS Signaling Modes" on page 6-10:

- *CCS side*: see "CCS side" on page 6-10
- *Channel selection mode*: see "Channel selection mode" on page 6-11
- *Local number*: see "Local number" on page 6-12
- *Local subaddress*: see "Local subaddress" on page 6-12
- *Calling number type of network*: see "Calling number type of network" on page 6-13
- *Calling number numbering plan*: see "Calling number numbering plan" on page 6-14
- *Called number type of network*: see "Called number type of network" on page 6-14
- *Called number numbering plan*: see "Called number numbering plan" on page 6-15
- *Override remote types and plans:* see "Override remote types and plans" on page 6-15
- *Generate ring back locally*: see "Generate ring back locally" on page 6-16.

The other parameters for the **EURO-ISDN** signaling mode are common to an E1 port with no signaling. Refer to "NONE Signaling Mode (on E1)" on page 6-17.

6.3 ISDN-BRI S/T Port

ISDN-BRI S/T parameters that are identical to those on an E1 port are listed under "E1 Port" on page 6-17. ISDN-BRI S/T parameters that are unique to an ISDN-BRI S/T port are fully detailed in this section.

Signaling mode

NOTE: Refer to "Signaling mode" on page 6-3 for the SNMP and text-based configuration equivalents of this parameter.

For data transport on an ISDN-BRI S/T interface card the *Signaling mode* can be set to:

- **NONE:** data-only connection
- **EURO-ISDN:** data connection using ISDN-BRI S/T in Europe
- **INS-NET** or **KDD:** ISDN-BRI S/T access in Japan
- **NI1**, **NI2**, **5ESS** or **DMS100:** ISDN-BRI S/T access in other countries
- **QSIG:** Standard PBX access with supplementary services support.

Values: *NONE, EURO-ISDN, INS-NET, KDD, NI1, NI2, 5ESS, DMS100, QSIG*

Default: *NONE*

6.3.1 NONE Signaling Mode (on ISDN-BRI S/T)

Most of the parameters for an ISDN-BRI S/T port with no signaling are identical to parameters configured on an E1 port configured with EURO-ISDN signaling (refer to "EURO-ISDN Signaling Mode" on page 6-20). The following parameters are unique to ISDN-BRI S/T ports.

Terminal Endpoint Identifier (TEI)

Console	SNMP	Text-based Config
Terminal Endpoint Identifier (TEI)	ifwanTeiModeOrValue	[ifwan#] TeiModeOrValue

Determines the mode or specific value of the Terminal Endpoint Identifier:

- **AUTOMATIC:** The TEI is automatically negotiated
- **0:** The TEI is ignored or disabled
- **1 to 63:** The TEI has a predefined value equal to the selected value.

Values: *AUTOMATIC, 0 (*disabled*), 1 - 63*

Default: *AUTOMATIC*

Power Mode

Console	SNMP	Text-based Config
Power Mode	ifwanPwrMode	[ifwan#] PwrMode

The NetPerformer can supply power through an NT port to external TE equipment. The *Power Mode* parameter determines the power feed mode that is used:

- **OFF:** No power is provided to the external TE device.
- **PHANTOM:** Fixed power is provided to the connected device using a standard I.430 Phantom supply.

NOTE: The *Power Mode* parameter is listed **only when the ISDN-BRI S/T port is set to NT termination mode**. If the ISDN-BRI S/T port is set to TE termination mode, the power source is automatically disabled by the hardware.

Values: *OFF, PHANTOM*

Default: *OFF*

6.3.2 CCS Signaling Modes

On an ISDN-BRI S/T card, the CCS signaling modes that can be used for digital data transport are: **EURO-ISDN**, **INS-NET**, **KDD**, **NI1**, **NI2**, **5ESS, DMS100** and **QSIG**.

All parameters for **EURO-ISDN** signaling are as for **EURO-ISDN** on an E1 card (see “EURO-ISDN Signaling Mode” on page 6-20) or no signaling on an ISDN-BRI S/T card (see “NONE Signaling Mode (on ISDN-BRI S/T)” on page 6-21).

Two additional parameters are required for configuration of an ISDN-BRI S/T port in **NI1**, **NI2**, **5ESS**, **DMS100** or QSIG signaling mode:

Local SPID 1

Console	SNMP	Text-based Config
Local SPID 1	ifwanLocalIsdnSpid1	[ifwan#] LocalIsdnSpid1

Defines the first Service Profile Identifier (SPID) that is included with the ISDN-BRI call setup message. It is required for a port with **NI1** signaling, and optional for a port with **NI2**, **5ESS** or **DMS100** signaling.

Values: Maximum 20 digits (0 to 9)

Default: no value

Local SPID 2

Console	SNMP	Text-based Config
Local SPID 2	ifwanLocalIsdnSpid2	[ifwan#] LocalIsdnSpid2

Defines the second SPID that is included with the ISDN-BRI call setup message. It is required for a port with **NI1** signaling, and optional for a port with **NI2**, **5ESS** or **DMS100** signaling.

Values: Maximum 20 digits (0 to 9)

Default: no value

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SE/SLOT/#/CHANNEL Configuration Parameters

NOTE: Parameters specific to a protocol available only with a licensed software option are described in the module for that option. Refer to the *SkyPerformer Option* module of this document series.

7.1 Common Parameters

The following parameters can be configured for all digital channels.

7.1.1 Channel Number

Console	SNMP	Text-based Config
Channel Number	IfwanEntry, ifwanIndex	[ifwan#]

Determines which channel on the digital interface is selected for configuration, using a 3-digit number:

- An T1 interface supports a maximum of 24 channels. The first digit of the *Channel Number* is the slot number where the interface card is installed, or the span number for built-in interfaces. The last two digits are the channel number on the port.

  For example: *Channel Number* **102** is the second channel on the interface card installed in slot 1.

  On spans or interface cards with 2 ports, the *Channel Number* is increased by **50** for any channel on the second port. For example: *Channel Number* **165** is the 15th channel on port 2 of a dual-port E1/T1 interface card installed in slot 1.
- An E1 interface supports a maximum of **32** channels. The same numbering conventions apply to this interface as for the T1 interface.

  For example: *Channel Number* **132** is the last channel on the interface card installed in slot 1 (single-port card or first port of a dual-port card).
- The ISDN-BRI S/T interface card has only 2 user channels per port, numbered **101** and **102** on port 1, and **151** and **152** on port 2.

Values: T1 port: *x01-x24, x51-x74*
E1 port: *x01-x32, x51-x82*
ISDN-BRI S/T port: *101, 102, 151, 152*

Default: The next available channel on the interface

7.1.2 Protocol

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

Defines the operating protocol for the channel. For support of data traffic, set the *Protocol* to a data protocol:

- If the *Signaling mode* is set to **NONE**, **TRSP-ORIG**, **TRSP-ANSW**, **CAS** or **ROB BIT**, the following data protocols are available:

  D&I, FR-NET, FR-USER, HDLC, PASSTHRU, PASSTHRUOFR, PPP, PVCR, SS7, TRANSPARENT

  The **TRANSPARENT** protocol is used to establish a permanent point-to-point transparent signaling connection between digital interface cards. **It is *not* available on a NetPerformer unit installed with SIP VoIP option**.

- If the *Signaling mode* is set to **EURO-ISDN**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS**, **DMS100** or **QSIG**, the following data protocols are available:

  D&I, FR-NET, FR-USER, PASSTHRU, PASSTHRUOFR, PPP, PVCR, SS7, TRANSPARENT

- Use the **OFF** value when the port is not used.

Values: *D&I, FR-NET, FR-USER, HDLC, PASSTHRU, PASSTHRUOFR, PPP, PVCR, SS7, TRANSPARENT*

Default: *OFF*

7.1.3 Timeslot

Console	SNMP	Text-based Config
Timeslot	ifwanTimeslot	[ifwan#] Timeslot

Defines the first timeslot that will be associated with this digital channel. The default value is the next available timeslot.

You must select an unused timeslot. If the timeslot you select is already used by another channel, the message **Time slot assignment conflict with channel *X*** is displayed, where ***X*** is the channel to which this timeslot has been assigned.

NOTE: Timeslot information is not requested during configuration of a user channel on an ISDN-BRI S/T port. The timeslot information that is presented is for read-only purposes.

Values: T1 port: *1 - 24*
E1 port: *1 - 32*
ISDN-BRI S/T port: not applicable

Default: The next available timeslot

7.1.4 Number of consecutive timeslots

Console	SNMP	Text-based Config
Number of consecutive timeslots	ifwanNumberOfTimeslots	[ifwan#] NumberOfTimeslots

Defines the number of consecutive timeslots used by this digital channel. **All timeslots assigned to a single data channel must be contiguous.**

- On a T1 interface card, the maximum *Number of consecutive timeslots* is 24.
- On an E1 interface card, the maximum number depends on the *Signaling mode* defined on the LINK:
  - If the *Signaling mode* is **NONE**, timeslot 16 is available for data. An E1 channel can have up to 31 timeslots when no signaling is used.

  Example: If a channel is defined to start at *Timeslot* **15** with the *Number of consecutive timeslots* set to **3**, the channel will use timeslots 15, 16 and 17.

  - If any other *Signaling mode* is configured on the E1 link, timeslot 16 is reserved. In this case, the maximum number of timeslots that can be assigned to an E1 channel is 30.

  Example: When signaling is carried on the E1 link, a channel starting at *Timeslot* **15** with the *Number of consecutive timeslots* set to **3** will use timeslots 15, 17 and 18.

The range of consecutive timeslots available is dynamically adjusted to the current

configuration. For example, if you assign timeslots 1-4 to a particular channel on a T1 interface card, the default value of the *Timeslot* parameter will be 5 for the next channel you configure, and the maximum *Number of consecutive timeslots* will be reduced to 20.

NOTE: Timeslot information is not requested during configuration of a user channel on an ISDN-BRI S/T port. The timeslot information that is presented is for read-only purposes.

Values: T1 port: *1 - 24*
E1 port: *1 - 32*
ISDN-BRI S/T port: not applicable

Default: *1*

7.1.5 DS0 speed (bps)

Console	SNMP	Text-based Config
DS0 speed (bps)	ifwanDsOSpeed-bps	[ifwan#] DsOSpeed-bps

Determines the speed of each timeslot (or DS0 channel) in the digital channel, either 64000 bps or 56000 bps. The actual speed of the data channel is the *Number of consecutive timeslots* times this speed.

NOTE: On a **D&I** channel, the *DS0 speed* parameter is used to indicate whether the channel carries signaling information. Refer to the next section for details.

Values: *64000, 56000*

Default: *64000*

7.1.6 Redundant Link

Console	SNMP	Text-based Config
Redundant link	ifwanRedundantLink	[ifwan#] RedundantLink

Determines if the link is used in a redundant way. When this parameter is set to YES, and the unit is in backup mode, the state of the link remains at standby instead of toggling between down and call.

Values: *NO, YES*

Default: *NO*

7.2 PVCR Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), most **PVCR** parameters behave as for a serial port set to the **PVCR** protocol.

One exception to this is the *Mode* parameter. On a PVCR 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 PVCR 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**

The **WAIT USER** mode is **not** available on a PVCR channel.

For further information, refer to the appendix *SE/PORT/#/PVCR Configuration Parameters* of the *WAN/Leased Lines* module of this document series.

NOTE: **PVCR** is available with all LINK signaling modes.

7.3 D&I Channel

Most of the parameters for a Drop and Insert (D&I) channel are parameters common to all digital channels, detailed in the preceding section. The following parameters are unique to D&I channels or have special meaning for this type of channel.

NOTE: **D&I** is available with all LINK signaling modes.

7.3.1 DS0 speed (bps)

On a **D&I** channel:

- A *DS0 speed* of **64000** indicates that the channel has 8 bits of data with no signaling
- A *DS0 speed* of **56000** indicates that the signaling information is carried over the channel (for handling voice traffic).

This value should not be selected for a data channel.

Partner channel

Console	SNMP	Text-based Config
Partner channel	ifwanPartnerChannel	[ifwan#] PartnerChannel

Defines the channel on the remote unit with which this channel will perform passthrough traffic exchanges.

You must select another channel that has been defined with the **D&I** protocol.

Values: *NONE, 1 - 499*

Default: *NONE*

7.4 FR-NET Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **FR-NET** parameters behave as for a serial port set to the **FR-NET** protocol. Refer to the appendix *SE/PORT Configuration Parameters* of the *WAN/Frame Relay* module of this document series.

If the *Signaling mode* on the LINK is set to a CCS mode: **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS** or **DMS100**, the *Timeslot* and *Number of consecutive timeslots* are selected automatically, and the following additional parameters are listed:

- *Delay before call activation (s)*
- *Call activation timer (s)*
- *Phone entry index*.

The first two parameters behave in the same way as those used for PVCR Link Backup. Refer to the section *CALL-BKUP Mode* of the appendix *SE/PORT/#/PVCR Configuration Parameters* in the *WAN/Leased Lines* module of this document series.

NOTE: **FR-NET** is available with all LINK signaling modes.

7.4.1 Phone entry index

Console	SNMP	Text-based Config
Phone entry index	ifwanPhoneEntryIndex	[ifwan#] PhoneEntryIndex

Specifies which phone profile will be used to establish connectivity with the Frame Relay network when setting up an ISDN connection.

The phone profiles are defined using the **SETUP/PHONE** submenu. For further information, refer to the section *ISDN Dialer* of the appendix *SE/PHONE Configuration Parameters* in the *WAN/Leased Lines* module of this document series.

Values: *1 - 64*

Default: *1*

7.5 FR-USER Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **FR-USER** parameters behave as for a serial port set to the **FR-USER** protocol. Refer to the appendix *SE/PORT Configuration Parameters* of the *WAN/Frame Relay* module of this document series.

No SVC parameters are available when the NetPerformer is installed with the SIP VoIP licensed software option.

If the *Signaling mode* on the LINK is set to a CCS mode: **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS** or **DMS100**, the *Timeslot* and *Number of consecutive timeslots* are selected automatically, and the following additional parameters are listed:

- *Delay before call activation (s)*
- *Call activation timer (s)*
- *Phone entry index*.

The first two parameters behave in the same way as those used for PVCR Link Backup. Refer to the section *CALL-BKUP Mode* of the appendix *SE/PORT/#/PVCR Configuration Parameters* in the *WAN/Leased Lines* module of this document series. The *Phone entry index* parameter is detailed in the preceding section.

NOTE: **FR-USER** is available with all LINK signaling modes.

7.6 HDLC Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **HDLC** parameters behave as for a serial port set to the **HDLC** protocol. Refer to the section *HDLC and PASSTHRU Ports* in the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module of this document series.

NOTE: **HDLC** is available only when the *Signaling mode* on the LINK is set to **NONE**, **TRSP-ORIG**, **TRSP-ANSW**, **CAS** or **ROB BIT**.

7.7 PASSTHRU Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **PASSTHRU** parameters behave as for a serial port set to the **PASSTHRU** protocol. Refer to the section *HDLC and PASSTHRU Ports* in the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module of this document series.

NOTE: **PASSTHRU on a digital T1 or E1 channel is supported on the SDM-9220 and SDM-9230 only,** and is available with all LINK signaling modes.

In earlier NetPerformer versions, **PASSTHRU** was used for Drop & Insert mode. That mode is now configured with a separate protocol, named **D&I** (see “D&I Channel” on page 7-8).

7.8 PASSTHRUOFR Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **PASSTHRUOFR** parameters behave as for a serial port set to the **PASSTHRUOFR** protocol. Refer to the section *PASSTHRUOFR Port* in the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module of this document series.

NOTE: On a digital PASSTHRUOFR channel you must set the *PVC number* to the number of a PVC in TRANSP mode.

NOTE: PASSTHRUOFR on a digital T1 or E1 channel is supported on the SDM-9220 and SDM-9230 only, and is available with all LINK signaling modes.

7.9 PPP Channel

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **PPP** parameters behave as for a serial port set to the synchronous **PPP** protocol. Refer to the appendix *SE/PORT/#/ PPP Configuration Parameters* of the *WAN/Point-to-Point Protocol (PPP)* module of this document series.

NOTE: On a digital channel, the **PPP** protocol provides a synchronous PPP connection, and is available with all LINK signaling modes. The *Timeslot* and *Number of consecutive timeslots* are selected automatically by the NetPerformer.

7.10 PVCR Channel

PVCR is available with all LINK signaling modes, with the following restrictions:

- Link backup (*Mode* parameter set to **CALL-BKUP**) and Bandwidth On Demand (*Mode* parameter set to **CALL-BOD**) are available only when the *Signaling mode* on the LINK is set to **EURO-ISDN**, **QSIG**, **INS-NET**, **NTT**, **KDD**, **NI1**, **NI2**, **4ESS**, **5ESS** or **DMS100**.
- If the *Signaling mode* on the LINK is set to **NONE**, **TRSP-ORIG**, **TRSP-ANSW**, **CAS** or **ROB BIT**, the *Mode* of the PVCR channel can be **DEDICATED** or **INACTIVE** only.

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the remaining **PVCR** parameters behave as for a serial port set to the **PVCR** protocol. Refer to the appendix *SE/PORT/#/ PVCR Configuration Parameters* of the *WAN/Leased Lines* module of this document series.

7.11 SS7 Channel

Although the **SS7** protocol is used to carry voice traffic over a digital channel, it is configured on the NetPerformer like a digital data channel with no signaling tones. Signaling is handled on dedicated channels (out-of-band) rather than with voice channels (using MF signaling tones).

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **SS7** parameters behave as for a serial port set to the **PASSTHRU** protocol. Refer to the section *HDLC and PASSTHRU Ports* in the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module of this document series.

NOTE: **SS7** is available with all LINK signaling modes.

7.12 TRANSPARENT Channel

The **TRANSPARENT** protocol is used to establish a permanent point-to-point transparent connection between digital interfaces (T1 or E1). The number of timeslots used is set to **1**, and is not configurable.

Other than the parameters common to all digital channels (*Channel Number*, *Protocol*, *Timeslot*, *Number of consecutive timeslots*, *DS0 speed*), the **TRANSPARENT** parameters behave as for a serial port set to the **PASSTHRU** protocol. Refer to the section *HDLC and PASSTHRU Ports* in the appendix *SE/PORT Configuration Parameters* of the *Legacy Data* module of this document series.

NOTE: **TRANSPARENT** is available with all LINK signaling modes on the base NetPerformer unit only (without SIP VoIP licensed software option).

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www.memotec.com

Memotec Inc.
7755 Henri-Bourassa Boulevard West
Montreal, Quebec
Canada H4S 1P7
Tel: (514) 738-4781
Fax: (514) 738-4436
www.memotec.com

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