FrameSaver® NP 64+

**Frame Relay
Digital Service Unit**

User's Manual - Installation Guide

PARADYNE®

TRADEMARKS

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EQUIPMENT INTERFERENCE NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

IMPORTANT SAFETY INSTRUCTIONS

When using your FrameSaver NP 64+ equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Read and understand all instructions.

2. Follow all warnings and instructions marked on the product.

3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

4. Do not use this product near water, for example, near any sink or tub, or where the floor is wet.

5. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.

6. Slots and openings in the cabinet and the back or bottom are provided for ventilation, to protect it from overheating; these openings must not be blocked or covered. The openings should never be blocked by placing the product on a carpeted or other similar soft surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7. This product should be operated only from the type of power source indicated on the marking label.

8. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.

9. Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.

10. Never push objects of any kind into this product through cabinet slots, as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

11. To reduce the risk of electric shock, do not disassemble this product, but contact Paradyne Corporation if repair or warranty work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the appliance is subsequently used.

12. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    a) When the power supply cord or plug is damaged or frayed.

    b) If liquid has been spilled into the product.

    c) If the product has been exposed to rain or water.

    d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

    e) If the product has been dropped or the cabinet has been damaged.

    f) If the product exhibits a distinct change in performance.

SAVE THESE INSTRUCTIONS

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1 Preface

About This Manual

This manual provides basic installation, operation and troubleshooting information for the FrameSaver NP 64+ Frame Relay Digital Service Unit (FSU). The information is directed to the installer who has a working knowledge of telecommunication systems and networks. The Network Service Provider will furnish specific addressing and any other information required for your installation.

Page Layout

This manual is designed to conform to conventional documentation standards. The header on each page contains the major heading of the current section. The footer of each page shows the document name, number, revision date and page number.

Locating Information

The format of this manual includes several aids to help the user locate and use information quickly.

At the beginning of this manual there is a Table of Contents, which provides an outline and quick overview of the major topics covered. A List of Figures and a List of Tables are also provided for quick reference.

Special Paragraphs

There are special paragraphs throughout this manual to help identify important information. These are:

NOTE(S): or **NOTICE:**   These identify clarifying or additional information for the proper installation and operation of this equipment.

CAUTION: ***This identifies information that requires careful attention in order to prevent equipment damage.***

Warning: ***This identifies information that requires careful attention in order to prevent equipment damage and/or injury to the operator.***

 This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

Special Instructions

The following are to be performed by qualified service personnel ONLY.

When installing FrameSaver NP 64+ equipment, observe the following precautions:

1. Never install telephone wiring during a lightning storm.

2. Never install telephone jacks in wet locations unless a jack is specifically designed for wet locations.

3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

4. Use caution when installing or modifying telephone lines.

WARNING

NO OPERATOR SERVICEABLE PARTS ARE INSIDE THIS EQUIPMENT. SERVICE MUST BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

ATTENTION

CET APPAREIL NE CONTIENT AUCUN ELÉMENT QUE L'UTILISATEUR PUISSE RÉPARER. CONFEIR LA MAINTENACE À UN PERSONNEL TECHNIQUE QUALIFIÉ.

Do not expose the FrameSaver NP 64+ to moisture, excessive heat or bright sunlight, vibration, sudden impact, or voltage surges.

Avoid Moisture

Avoid Direct Sunlight/Heat

Avoid Vibration/Sudden Impact

Avoid Voltage Surges

UNPACKING AND HANDLING

When you receive the equipment, inspect the exterior of the shipping container for signs of obvious damage. If the container is damaged, inform the local carrier that they may be subject to a claim.

As you unpack the equipment, check for physical damage and conformance to the packing list. If the equipment is damaged or does not conform to the packing list, please inform Paradyne Corporation immediately.

Equipment Attachment Limitations

Certain equipment attachment limitations apply when installing and operating this equipment.

The limitations for use in Canada and the U.S. (FCC Part 68) are described below.

Canadian

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

User should ensure for their own protection that the electrical ground connection of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: User should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five (5.0).

FCC Part 68 (U.S.)

This equipment complies with Part 68 of the FCC Rules. On the underside of this equipment is a label that contains, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be provided to the telephone company.

This equipment uses the following USOC jacks: RJ11C, RJ48S and RJ49C (optional).

This equipment is designed to be connected to the telephone network using compatible modular plugs which are Part 68 compliant. See installation instructions for details.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

If the FrameSaver NP 64+ equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this FrameSaver NP 64+ equipment, for repair or warranty information, please contact Paradyne Corporation, 16-00 Pollitt Drive, Fair Lawn, New Jersey 07410, (201) 703-4800. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

There are no user replaceable parts that may be serviced inside the FrameSaver NP 64+.

This equipment cannot be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)

Table 1-1 FCC Registration Information

Port	FIC	SOC	REN	Network USOC
Modem Line (Dial Line)	02LS2	9.0Y	0.6B	RJ11C
DDS Line @ 56 KBPS	04DU5-56	6.0Y	---	RJ48S
DDS Line @ 64 KBPS	04DU5-64	6.0Y	---	RJ48S
ISDN Line	02IS5	6.0Y	---	RJ49C

Software Revision History

This manual pertains to FrameSaver NP 64+ Base Software Revision 9.04.xx.

Revision changes for this and previous versions are listed below.

Current Revision

This revision incorporates the following operational additions and/or changes:

Rev. 9.04.xx from Rev. 8.04.xx

- Added - Top Statistics (collection of Top IP Traffic.)

- Added - Monitoring of traffic by Internet and manufacturer specific protocols.

Download Notes

Revision 9.04.xx software can be downloaded to a FrameSaver NP 64+ unit running Revision 8.04.xx without affecting the unit's current configuration. Downloading to a prior revision will only affect the following configuration item.

- PVCs that were included in the delay measurement list on the PVC Configuration screen will be deleted, and have to be re-entered.

Previous Revisions

The following lists operational additions and/or changes incorporated in previous software revisions.

Rev. 8.04.xx from Rev. 7.04.xx

- Added - Selectable Dynamic IP Address Learning function: WAN Mgmt IP address can be relearned each time the PVC returns to an active condition.

- Added - Event Log, which captures and logs Trap occurrences for SNMP retrieval.

Download Notes

Revision 8.04.xx software can be downloaded to a FrameSaver NP 64+ unit running Revision 7.04.xx without affecting the unit's current configuration. Downloading to a prior revision will only affect the following configuration item.

- PVCs that were included in the delay measurement list on the PVC Configuration screen will be deleted, and have to be re-entered.

Rev. 7.04.xx from Rev. 6.02.xx

- Added - Loop to Network operator command.

- Added - Loop to User operator command.

- Added - Defaults to internal clock when none received from network.

- Added - Separate traps for PVC Availability and Unavailability.

- Added - Current CIR rate per PVC to PVC Statistics Screen display.

- Added - Data Rate selectable or Auto for DDS.

Download Notes

Revision 7.04.xx software can be downloaded to a FrameSaver NP 64+ unit running Revision 6.02.xx without affecting the unit's current configuration. Downloading to a prior revision will only affect the following configuration item.

- PVCs that were included in the delay measurement list on the PVC Configuration screen will be deleted, and have to be re-entered.

2 Description

The FrameSaver NP 64+ Frame Relay Digital Service Unit (FSU) is a special purpose Digital Data Service CSU/DSU which provides management and diagnostic functions through Simple Network Management Protocol (SNMP) and other protocols, transported over a Frame Relay network. It also includes an integral modem which supports access to the DSU as well as other co-located equipment such as routers. The FrameSaver NP 64+ can be factory optioned to include an ISDN Adapter (for Backup and/or Bandwidth On-Demand) or Second DSU (for additional network capacity or Backup). Network Service Providers (NSPs) who prefer to have independent management access from their end-user networks (customer networks), can utilize the isolated management PVC designed into the FrameSaver NP 64+ for network demarcation and diagnostics.

System Level

Figure 2-1 shows a system level view of the FrameSaver NP 64+, including management transport. As shown in the figure, the Frame Relay network provides Permanent Virtual Circuits (PVCs) for both the Customer Data and FSU management.

NOTE: FrameSaver NP 64+ is transparent to SVCs (Switched Virtual Circuits).

The FrameSaver NP 64+ can have up to two IP Addresses for management. One IP Address allows it to communicate with SNMP work stations that have access to the NSP management PVC. A second IP Address can provide management access via a customer data (payload) PVC.

FrameSaver NP 64+ can also send SNMP Traps to multiple SNMP Alarm Servers via the management PVCs. The integral modem is used to dial into the Network Control Center (NCC) Terminal Server to access the SNMP Alarm Server and report faults that are prevented from being reported over the PVC management channels. It can also accept maintenance calls from NCC Work Stations to support operator interaction, and accept inbound calls from a customer or NCC Work Station to manage co-located devices such as a routers.
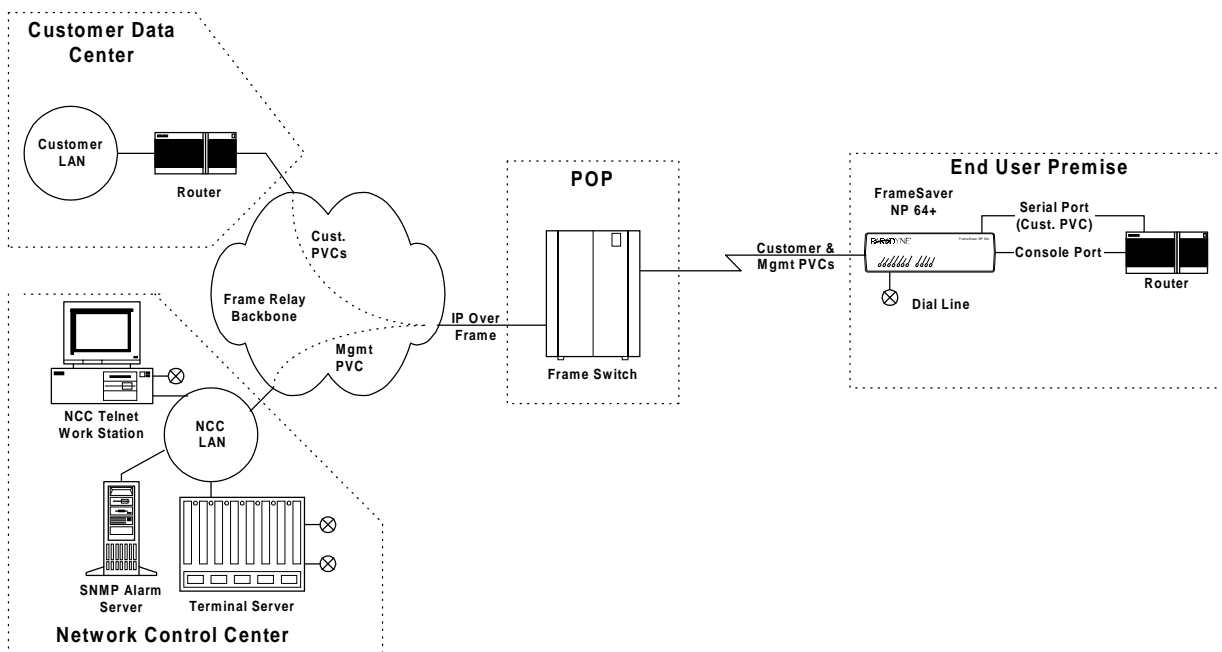
Figure 2-1 FrameSaver NP 64+ Typical Network Application

ISDN Adapter Option

The FrameSaver NP 64+ can be factory-optioned to include an integral ISDN Adapter module.

The ISDN adapter provides Backup for the DDS line and/or additional Bandwidth On-Demand. It also provides the integral Modem, B-Channel Dial-In/Dial-Out access (in addition to POTS Line access).

ISDN Backup

Backup in Frame Relay Protocol utilizing the Router's Primary Port can be via dedi-cated PVCs on an alternate port, or the frame switch manager may reroute the original PVCs to the Backup Frame Switch. It is also possible to bypass the entire Frame Relay Network and initiate backup to a pool of ports on an alternate Frame Switch connected directly to another Router.

A typical network configuration showing the backup connection to a Backup Frame Switch using rerouted PVCs is shown in Figure 2-2.
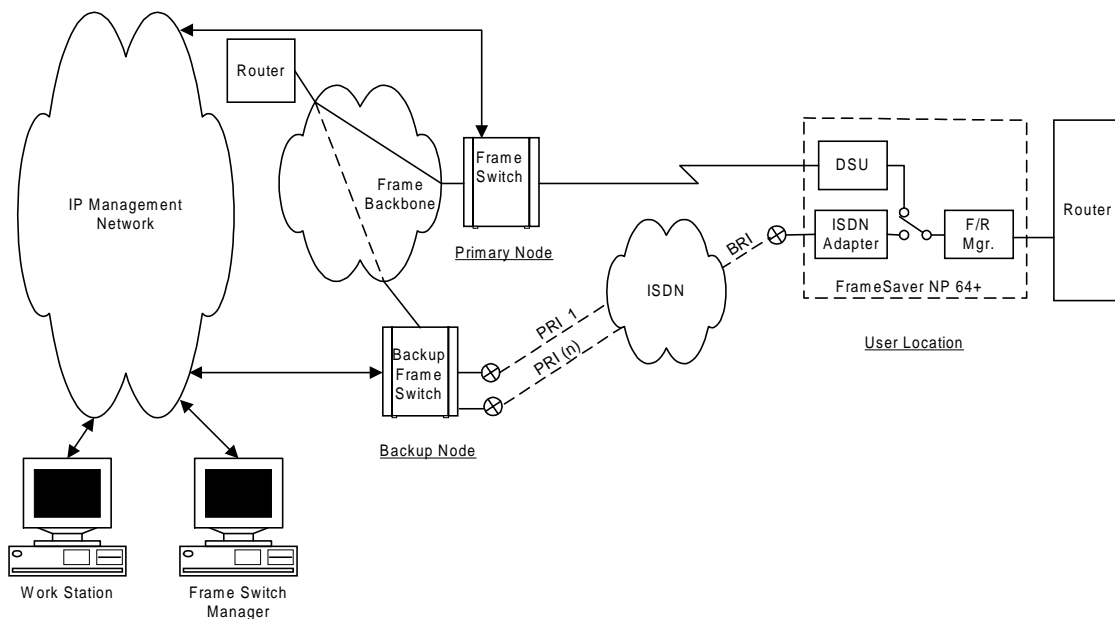
Figure 2-2 Typical Backup Configuration

The backup process is described as follows:

- FrameSaver NP 64+ detects loss of connectivity at DSU.

- ISDN Adapter card calls Backup Frame Switch and is identified by caller ID.

- Frame Switch Manager either reroutes original PVCs, or Frame Switch uses alternate PVCs for the backup connection.

- FrameSaver NP 64+ switches the data path when connected.

- Associated routers determine that PVCs have been established through LMI enquiries.

- Communication is resumed.

ISDN Bandwidth On-Demand

Bandwidth On-Demand provides an additional network connection for a second DTE (router) port based on a request from the DTE. In this configuration the FrameSaver NP 64+ ISDN Adapter is protocol-transparent. The Router determines the protocol used.

A typical network configuration showing the Bandwidth On-Demand connection is shown in Figure 2-3.
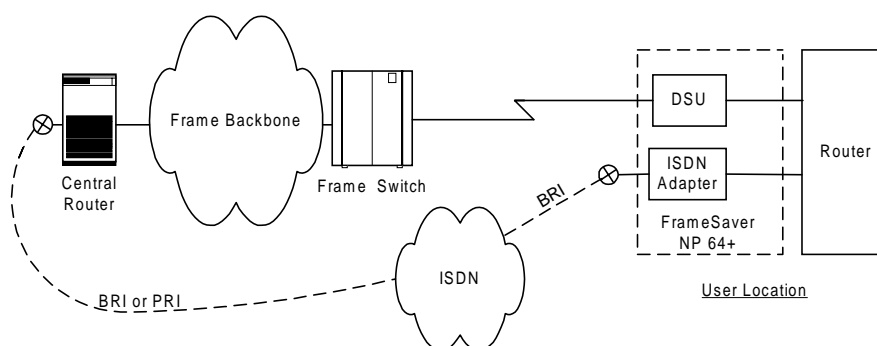
Figure 2-3 Typical Bandwidth On-Demand Configuration

The bandwidth on-demand process is described as follows:

- User's router detects need for bandwidth and raises DTR on its second port.

- FrameSaver NP 64+ ISDN Adapter calls predetermined number.

- The Central Router answers the call and establishes communications with the remote Router.

- Communication commences between Routers.

- User's Router lowers DTR to terminate the ISDN connection when the "demand" has been satisfied.

ISDN Support for Dial Modem

FrameSaver NP 64+ allows one of the ISDN B-Channels to be used in analog mode to support Dial-In or Dial-Out on the internal modem.

In this way a single 2B+D ISDN Line can provide 56/64 Kbps Backup, 56/64 Kbps Bandwidth On-Demand and Dial-In Dial-Out access to FrameSaver NP 64+ and two auxiliary devices.

A functional block diagram showing the modem line selection is shown in Figure 2-4.
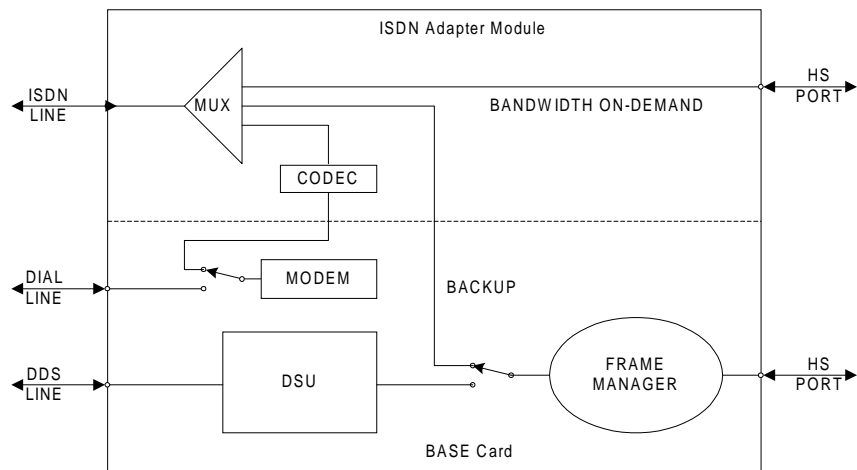
Figure 2-4 ISDN Modem Access, Block Diagram

The analog connection to the modem is made internally when the appropriate options are selected.

Second DSU Option

The Second DSU option provides a second independent DDS interface with full frame relay capability. This dual DSU configuration can be used to provide additional network capacity to a second router port, or it can provide network redundancy at locations where ISDN is not available. In both cases, PVCs are permanently provisioned to each DSU, and each maintains frame relay support and network management independently. Each module also stores its configuration in its own NVM (Non-Volatile Memory) and will independently reconfigure to its last stored state upon power up.

Dual Network Capacity

Figure 2-5 shows a configuration which supports two router ports. The two ports can be homed to the same or diverse frame switches, as the application requires.
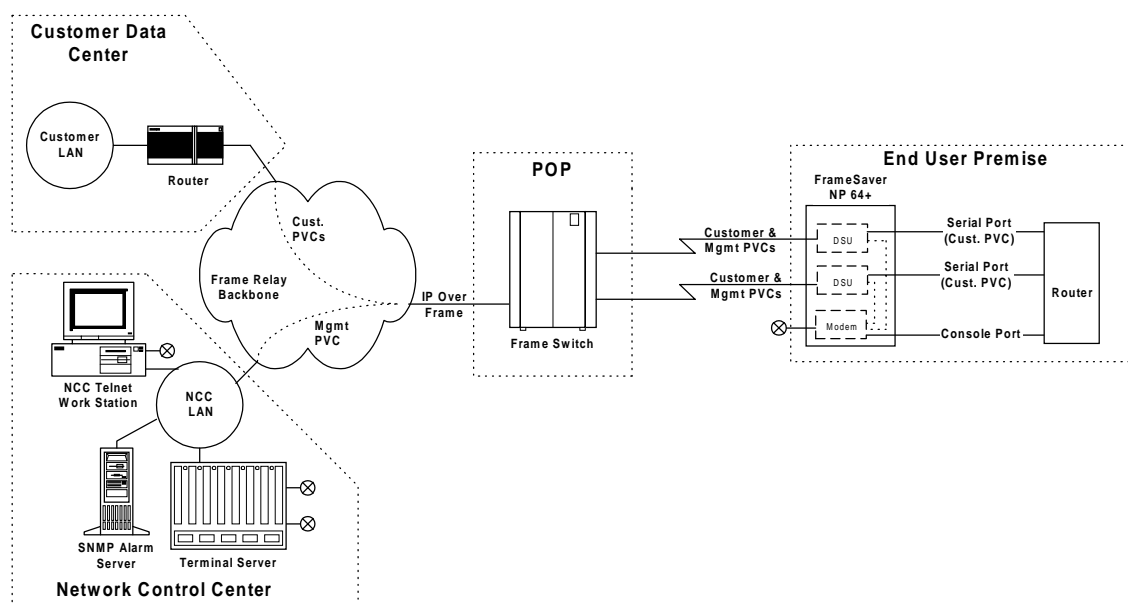
Figure 2-5 Dual DSUs with Separate CPE Ports

**Automatic
Switched Backup**

Figure 2-6 shows a configuration which can be used to back up the network frame switch, DDS line, or even the internal DSU. In this case, the CPE (router) is switched to the DSU which detects proper connectivity with its frame switch. The base DSU will be connected to the CPE unless it senses a communications failure, in which case the Second DSU Adapter module will be connected to the DTE port. Once switched to the Second DSU Adapter, and absent failures, switching back to the base DSU is accomplished through operator command.
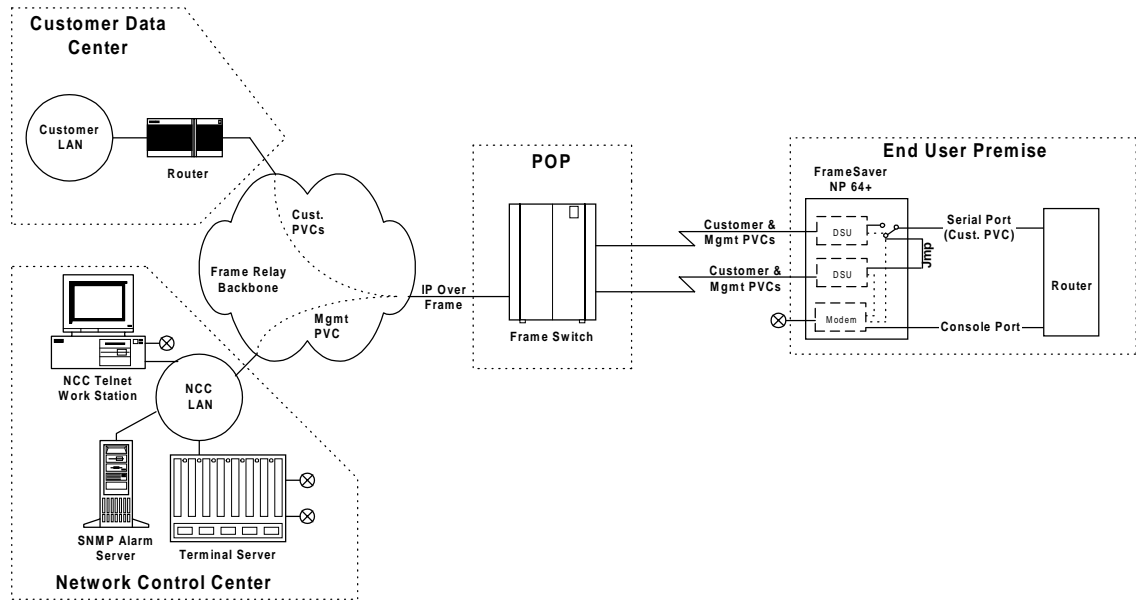
Figure 2-6 Dual DSUs with Backup Switching

FrameSaver NP 64+

The basic FrameSaver NP 64+ includes a network compliant 56/64 Kbps CSU/DSU, a Frame Relay switch function, a Frame Relay management module, and an SNMP Agent.

The unit includes two Auxiliary ports and may be factory-optioned to include an internal V.34 or V.90-compliant modem. An integral call director connects the modem to the DSU, AUX 1 port, AUX 2 port, or Option module (ISDN or Second DSU) port based on a DTMF code sent by the caller. All of the devices can access the modem for call-out purposes on a first-come, first-served basis.

System software can be downloaded to the FrameSaver NP 64+ for upgrades.

The front and rear panels of basic FrameSaver NP 64+ are shown in Figure 2-7 and Figure 2-8.

Detailed descriptions of the FrameSaver NP 64+ indicators and controls are provided in section 5 Diagnostics of this manual. Connector and pinout details are provided in section 3 Installation of this manual.
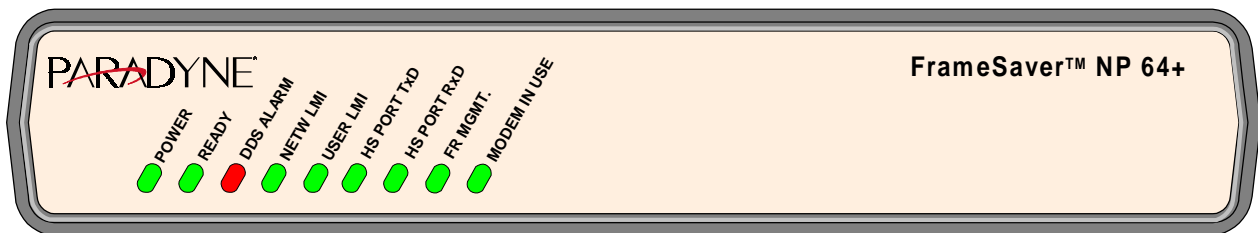
Figure 2-7 FrameSaver NP 64+ Front Panel
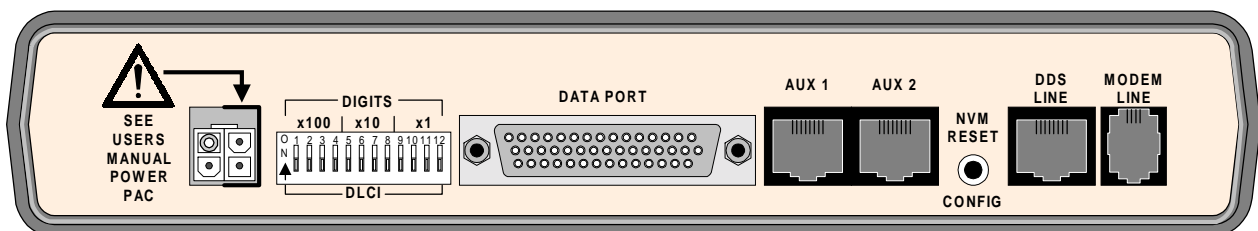
Figure 2-8 FrameSaver NP 64+ Rear Panel

Power Control Unit Option

The optional external FrameSaver Model 467 Power Control Unit (PCU) provides a mechanism for rebooting an external device by momentarily disrupting its AC power source.

The unit is a stand-alone enclosure which consists of an AC power relay, relay control circuit, power transformer, AC IN power plug/cord, AC OUT power socket/cord, and FrameSaver power/control cable.

The PCU responds to an operator command to disrupt power to the connected device for a duration of one (1) to 30 seconds. When commanded, the PCU disrupts both the Hot and Neutral power leads.

The Power Control Unit also supplies the 22 VAC power for the FrameSaver NP 64+, thereby replacing the normally supplied wall-mount power pack unit.

The PCU can be wall-mounted using the four mounting holes shown in Figure 2-9.
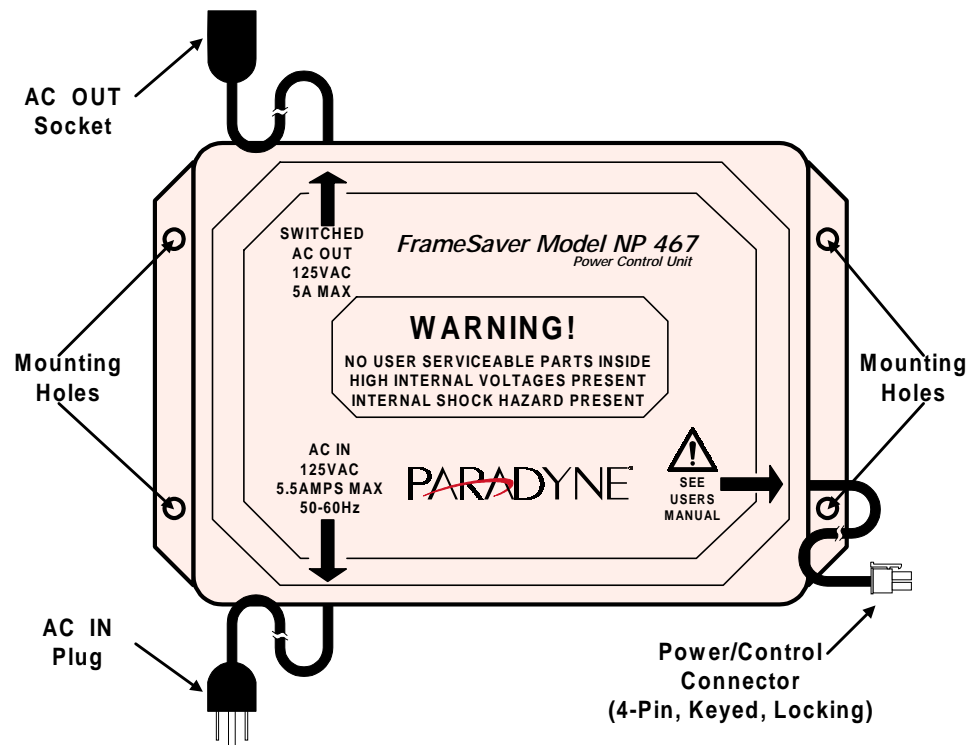
Figure 2-9 Model 467 Power Control Unit

Operating Features

This section contains operation information about the following:

- Management Access

- Software Download

- Trap Reporting

- Modem & Call Director

Management Access

Management access for control sessions or to retrieve alarm status is provided to the FrameSaver NP 64+ via in-band Telnet, dial-in VT-100 console connection or direct-connected VT-100 terminal. FrameSaver NP 64+ also supports SNMP "Get" and "Get Next" for retrieval of configurations and statistics information.

Password Security

Security is provided through five levels of password-protected access.

Level 1, System Access Password:
   Allows access to system login via User Access Passwords.

Levels 2 - 5, User Access Passwords:

   View - Allows user to display all screens.

   Test - Allows user to perform diagnostic tests from Status / Test screens and allows View password access.

   Configuration - Allows user to change operating parameters and allows Test password access.

   Supervisor - Grants unlimited access including the viewing and changing of passwords.

System Screen Displays

Once successfully logged in, the system provides screen displays for configuration, testing, and performance statistics. Help text describing each screen's display fields and commands is also provided.

WAN DLCI

The in-band Frame Relay Management Channel WAN address is defined by the DLCI (Data Link Connection Identifier). The WAN DLCI can be configured for a Dedicated PVC, or as a Tunneled channel within a Payload PVC. During initial installation the unit can be configured to automatically learn the WAN DLCI, or it can be set via the unit's rear panel DLCI DIP Switch, Local Console Port or Dial-In Console Port. Thereafter the DLCI can also be changed via in-band management access.

**Management
IP Addressing**

FrameSaver NP 64+ has special features for Network Service Providers (NSPs) who require management access to the FSU be isolated from the payload data. This isolated access is provided either by FrameSaver NP 64+'s dedicated network-facing management PVC as shown in Figure 2-1, or by the Tunneled management channel on a network-facing Payload PVC as shown in Figure 2-10.
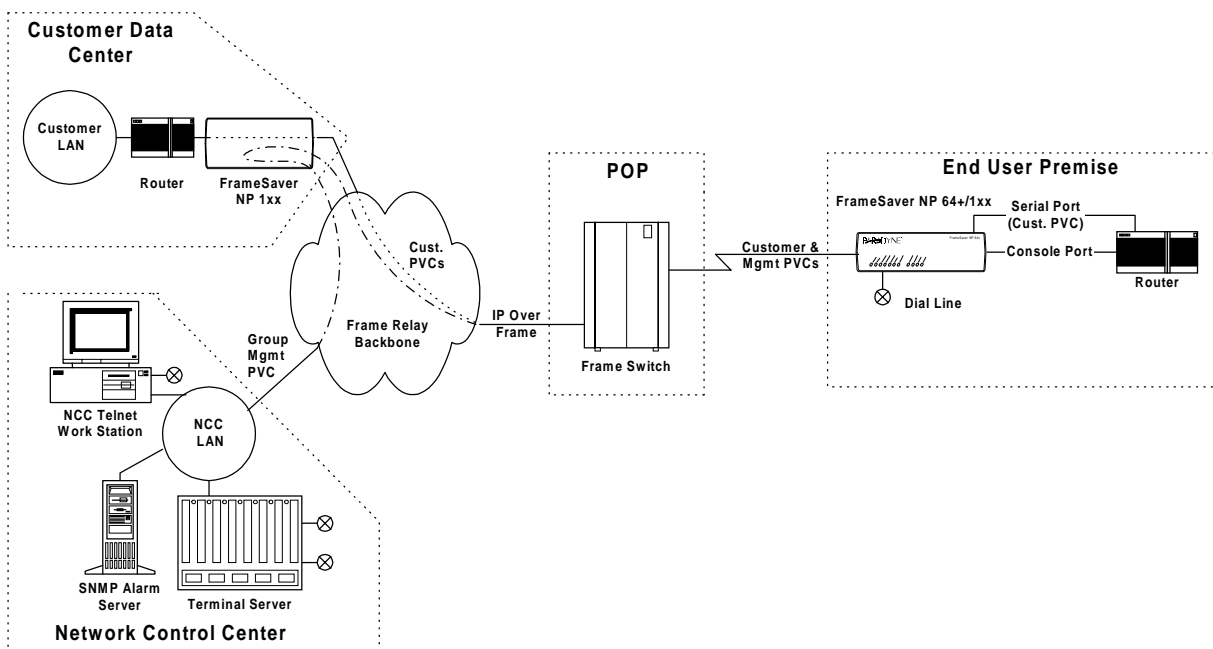
Figure 2-10 Tunneled Management

Tunnel management is accomplished by a FrameSaver NP HUB (FrameSaver NP 1xx class unit) located at a site which supports up to 48 PVCs connected to FrameSaver NP units located at remote (spoke) sites. The HUB unit performs the routing and encapsulation function for management channel messages going to and from the remote units. The HUB is connected to the network management systems by a separate dedicated group management PVC.

FrameSaver NP 64+ also provides expanded management access to the FSU through the following features:

- Support for two IP Addresses.

- An optional network-facing management channel via a specified IP Address on a specified payload PVC.

- An optional CPE-facing dedicated PVC management channel.

These optional management paths are shown in Figure 2-11.
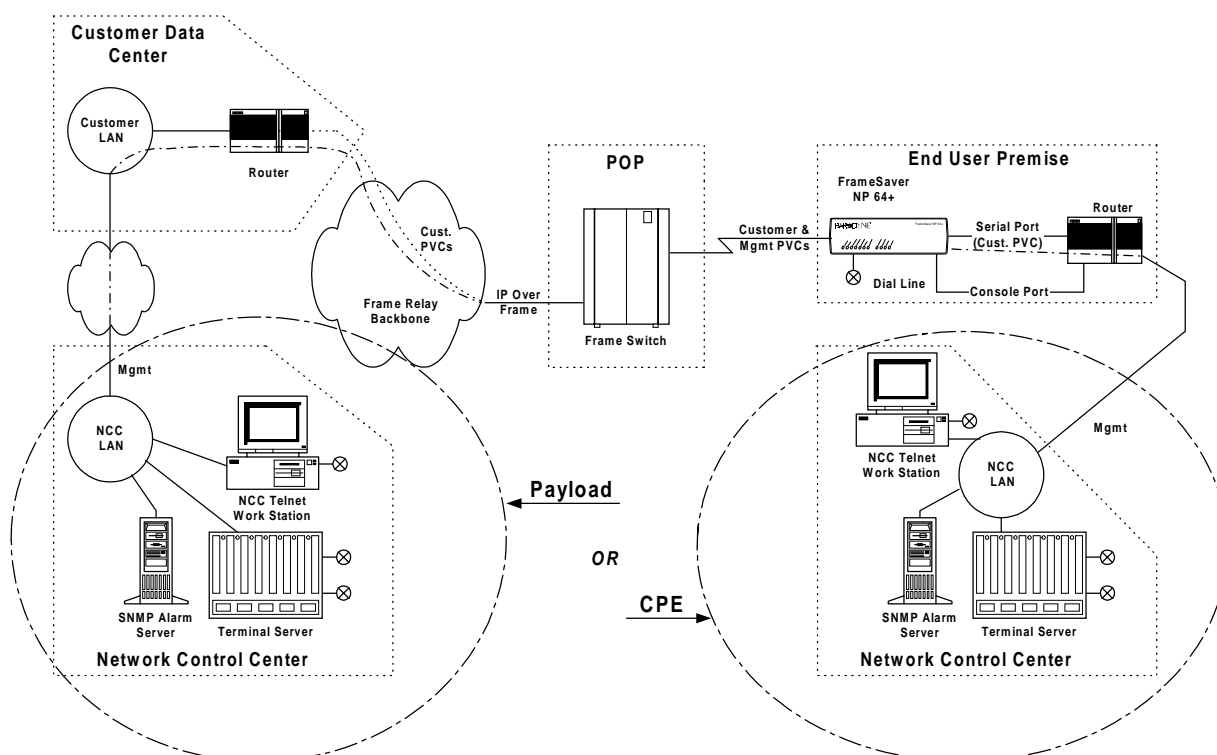
Figure 2-11 Payload / CPE Management

With these features, NSP and/or customer management of the FSU can be accomplished through three basic management modes:

- The primary IP Address is associated with the network-facing dedicated PVC or Tunneled payload PVC. In this mode, there may be a secondary IP Address. The secondary IP Address can be associated with a specified payload PVC or a dedicated CPE-facing PVC.

- The primary IP Address is associated with a specified payload PVC. There is no secondary IP Address.

- The Primary IP Address is associated with a dedicated CPE-facing PVC. There is no secondary IP Address.

WAN Management IP Address

FrameSaver NP 64+ utilizes one IP Address on the network-facing Wide Area Network (WAN) management channel. This address is imbedded within the various communications protocol stacks used for SNMP, Telnet and PPP. The Unit's WAN Management IP Address may be automatically learned from the first message received on the management PVC, or it can be set via the local or remote Console Port.

When optioned with ISDN or Second DSU, FrameSaver NP 64+ can have several communications paths that allow the management channel to connect to the frame relay network in different places. Each of these connection points could result in the management PVC routing through different IP sub-nets to reach the Network Control Center, or it may be desirable to have the FrameSaver NP 64+ appear as a logically different object in the SNMP manager, especially if static routing and dedicated back-up ports are utilized. The setting/learning of these additional IP Addresses is described in detail in the Configuration section of this manual.

FrameSaver NP 64+ will retain in Non-Volatile Memory (NVM), a separate WAN IP Address for each connection point. All communications via OOB PPP (Out-Of-Band Point-to-Point Protocol) will utilize whatever IP Address is in effect depending on how the unit is currently connected to the network. There are several options for establishing the WAN IP Address within the FrameSaver NP 64+.

When the unit is shipped from the factory or when NVM is cleared on initial installation, the WAN IP Address for each connection point is set to 000.000.000.000, which indicates no address is known.

The WAN IP Address to be used on the DDS link is automatically "learned" from the first valid IP message received over the unit's management PVC. Learning will take place as long as the value of the WAN IP Address in NVM is 000.000.000.000. Once the IP Address is set or learned it is retained and used until the NVM is cleared or another address is manually set.

There is also an additional configuration option which allows the unit to relearn the WAN Mgmt IP address each time the PVC returns to an active condition.

Software Download

The FrameSaver NP 64+ system software is stored in flash memory. A new version of the software can be downloaded to the unit for software upgrade, or for restoration in the event an error is detected in the flash storage.

A description of the download process is provided in section 5 Diagnostics of this manual.

Trap Reporting

The FrameSaver NP 64+ provides an MIB which includes standard MIB-II groups and also contains a Private MIB Extension which supports the issuance of unique Traps. Traps are issued either in-band or dial-out (out-of-band) via the on-board modem, depending on the specific fault detected.

Section 5 Diagnostics of this manual lists the MIB objects and the Trap reporting path for each.

Event Log

FrameSaver NP 64+ includes an Event Log which captures Trap occurrences and logs them into a table for SNMP retrieval. The table stores up to 255 of the latest occurred events.

The log table includes the following:

- A unique event number for each event. Maximum number is 65,536 after which the count restarts. The count is also restarted by a unit reset or power up.

- A relative time-stamp which counts from when the unit last started operation.

- A description of the event, including any data included in the Trap regarding that event.

Modem & Call Director

The integral on-board modem can be switched to any one of the interfaces of the FrameSaver NP 64+ by the call director. The call director connects the modem to the Base Card, Option Module (ISDN or Second DSU), AUX 1 Port, or AUX 2 Port.

In this way, the modem is used for out-of-band trap reporting (FrameSaver NP 64+ Base Card, Option Module or DTE device connected to an AUX Port) and accepts incoming calls for management access of the FrameSaver NP 64+, DTE device or any other device connected to an AUX Port.

Figure 2-12 shows a block diagram of the Modem and Call Director.
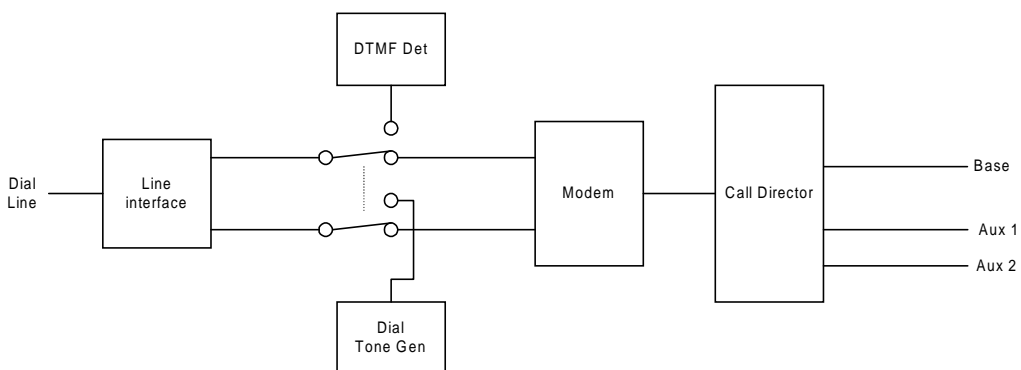
Figure 2-12 Modem & Call Director Block Diagram

On incoming calls, the modem-to-interface assignment is made based on the DTMF code detected after the FrameSaver NP 64+ line interface goes off-hook and returns a second Dial Tone.

DTMF code selections are shown in Table 2-1.

Table 2-1 Call Director DTMF Codes

Interface	DTMF Code
Base Card (DSU)	1
Aux 1 Port	2
Aux 2 Port	3
Option Adapter Module	4
Defaults to Base Card after timeout.	All Others

Modem parameters may be modified in the database as part of the configuration.

The configuration also includes a periodic self-test option for the modem and a dial tone test for the dial line (performed every four hours), with results indicated on the status screen, and failures reported as a Trap on the dedicated facility.

3 Installation

This section contains information to complete the physical installation of a FrameSaver NP 64+ which includes: mounting the unit, power connection and input/output connections.

Mounting

FrameSaver NP 64+ comes equipped with rubber feet for table or shelf-top placement, and has keyholes molded into its base for wall mounting. Optional adapter brackets are available for standard 19" or 24" rack mounting. Sufficient space for cooling and access to the front panel indicators for troubleshooting are required in all installations.

CAUTION

Failure to provide adequate cooling space may overheat the unit and void the warranty.

1. Before unpacking, ensure that the factory carton does not show any signs of damage. If it does, contact the freight carrier immediately.

2. Unpack the FrameSaver NP 64+ and Power Pack with cord or optional Power Control Unit from the factory carton(s). Check all the components for signs of damage. If they appear damaged, contact your equipment provider before proceeding.

3. Mount the FrameSaver NP 64+ in its operating location. No instructions are required for table or shelf-top placement. Wall Mounting instructions are provided below. To Rack-Mount the FrameSaver NP 64+, follow the instructions supplied with the Rack mount adapter.

CAUTION

Select a location where the unit will not be disturbed once it is operational. Do not place the FrameSaver NP 64+ on top of any heat-producing equipment. Do not place any other equipment on top of the FrameSaver NP 64+.

Wall Mounting

The FrameSaver NP 64+ mounts sideways onto a wall to provide easy access to cable connections and for front-panel visibility.

Proceed as follows to wall-mount the FrameSaver NP unit.

A. Select an appropriate location on the wall to mount the unit.

B. Mark the location for two wall-mount fasteners (not included) spaced horizontally 9.7 inches apart as shown in Figure 3-1.

NOTE: Use wall fasteners appropriate for the wall's surface material, i.e. wood screws for wooden surface, expansion fasteners for gypsum wall board, etc. The head of the fasteners should be Pan Head style and no larger than #6 screw size to ensure they will fit through the large end of the keyholes in the base of the unit.

C. Attach the fasteners to the wall leaving sufficient space (0.3 inches) between the bottom of the fastener head and the wall to allow the fastener head to pass into the keyhole opening in the base of the unit.
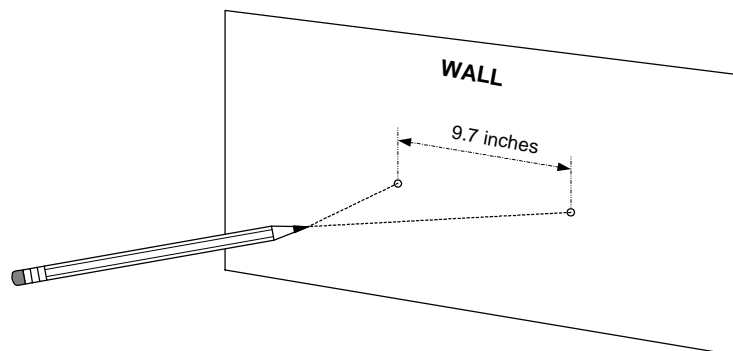
Figure 3-1 Mark Wall Location

D. With the fasteners in place, the FrameSaver NP 64+ can now be hung on the wall. Slip the larger round portion of the keyhole openings on the bottom of the unit over the fasteners attached to the wall, and then let the unit slide down so that the fasteners are snug against the upper slots of the keyholes, as shown in Figure 3-2.

NOTE: The unit may be mounted with front panel toward either the right or left.
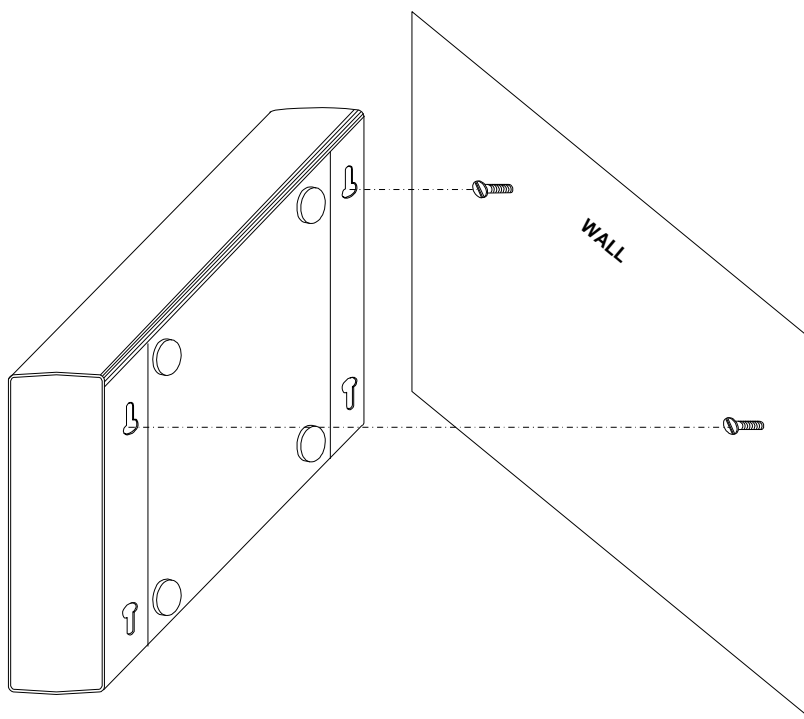
Figure 3-2 Wall Mount Installation

Wall mounting has now been completed.

Mounting Optional Model 467 Power Control Unit

The external Power Control Unit may be wall-mounted using the four mounting holes provided on its base (refer to Figure 2-9).

NOTE: Use wall fasteners appropriate for the wall's surface material, i.e. wood screws for wooden surfaces, expansion fasteners for gypsum wall board, etc.

The Power Control Unit may also be placed or mounted on a table-top, shelf, or floor near the FrameSaver NP 64+.

CAUTION

The Power Control Unit must not be placed where the unit or its cables may be bumped, kicked or walked on.

Connections

FrameSaver NP 64+ has connectors on the rear panel for power and input/output connections. Rear panel connectors and controls are shown and described in Figure 3-3 and Table 3-1.
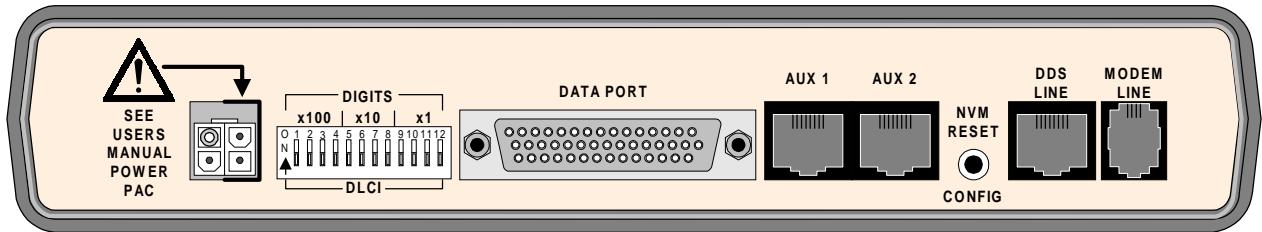
Figure 3-3 FrameSaver NP 64+ Rear Panel (Basic)

Table 3-1 FrameSaver NP 64+ Input/Output Connectors & Control Specifications

Connectors	Description
Power Connector	External Power Pack (transformer/plug combination module) or Model 467 Power Control Unit connects to 4-pin keyed connector on rear panel.
Data Port	DB-44, high-density connector provides the following interfaces, selected by the interface cable used: EIA-232 EIA-530 EIA-530-A ITU-V.35 ITU-X.21-NS (Non-Switched)
AUX 1	8-pin modular connector, EIA-232
AUX 2	8-pin modular connector, EIA-232
DDS Line	RJ48S, 8-pin keyed modular connector
Modem Line (Analog)	RJ11C, 6-pin modular connector
NVM Reset / Config	Recessed push button that causes the unit's NVM to be cleared if pressed and held (approximately 10 seconds) during the unit's power-up self-test. Also used together with the DIP Switches to configure the unit's WAN DLCI.
DIP Switches	12-position DIP switch for the initial setting of the DLCI address.

Power Connections

Power is supplied to a FrameSaver NP 64+ by the AC Power Pack shipped with each unit, or by an optional Model 467 Power Control Unit.

AC Power Pack Connection

FrameSaver NP 64+ is shipped with an AC Power Pack (transformer/plug module) with power cord. Plug the 2-pin keyed and locking connector at the end of the cord into the right-most pins of the 4-pin Power Connector located on the rear of the FrameSaver NP 64+, just to the right of the alert marking as shown in Figure 3-4.

CAUTION

The power connectors are keyed and fit easily together when oriented correctly with the locking clip toward the top of the unit. Do not force the connectors together.
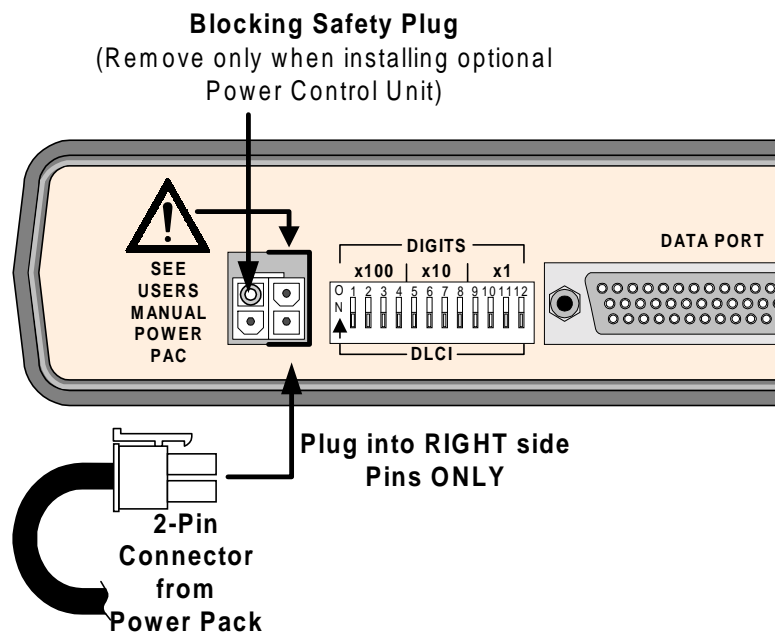
Figure 3-4 Power Connection

CAUTION

The 2-pin keyed plug fits easily into the two RIGHT side pins of the 4-pin FrameSaver NP 64+ Power Connector as shown, and must only be inserted there. The FrameSaver NP unit will be damaged if the plug is forced into the other side.

Optional Power Control Unit Connection

If the FrameSaver NP 64+ installation includes an optional Power Control Unit, the Power Pack unit described above will <u>NOT</u> be used. Power for the FrameSaver NP 64+ will be supplied by the Power Control Unit.

Connections to the optional Model 467 Power Control Unit are made as follows:

A. Remove the Blocking Safety Plug from the upper left pin of the Power Connector on the rear panel of the FrameSaver NP 64+, shown in Figure 3-4. To remove, grip the end of the Plug with a small pair of pliers and pull straight out. If tools are not available, wrap a piece of tape around the plug end to provide a better grip, and pull the plug out.

B. Connect the Power/Control cable connector from the Power Control Unit shown in Figure 3-5 to the FrameSaver NP 64+ Power Connector.

CAUTION

The power connectors are keyed and fit easily together when oriented correctly, with the locking clip toward the top of the unit. Do not force the connectors together.

C. Connect the device to be controlled (usually the DTE connected to the FrameSaver NP 64+) to the Switched AC OUT Socket of the Power Control Unit shown in Figure 3-5.
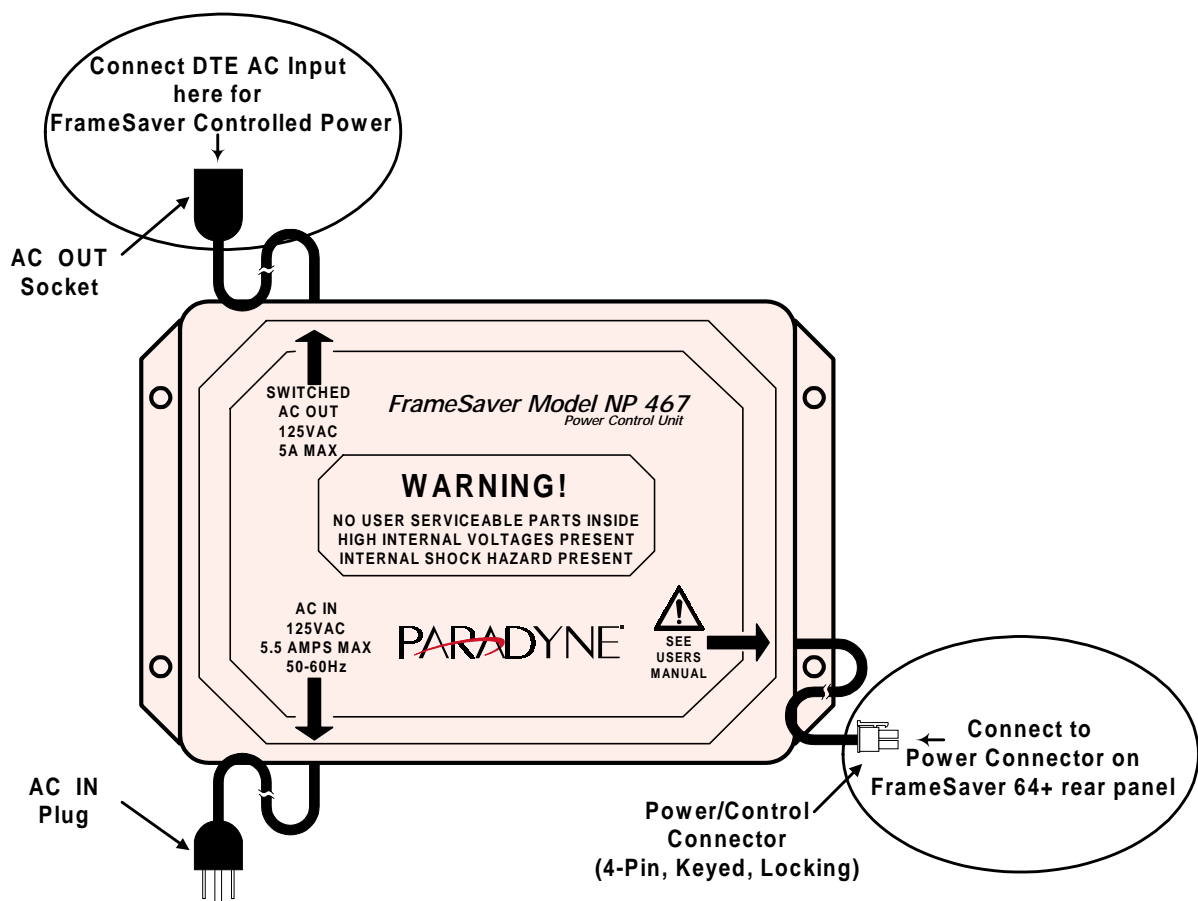
Figure 3-5 Power Control Unit Connections

**Power On,
Self-Test**

1. Verify that the proper voltage is present at the outlet to be used (refer to Table 3-12 or Table 3-13 in General Specifications at the end of this section of this manual). If the outlet voltage is correct, plug the Power Pack or Power Control Unit AC IN plug into the AC outlet. The power output to the FrameSaver NP 64+ is 22VAC, 20VA.

2. Once connected, the FrameSaver NP 64+ will go through the following normal power-up sequence:

    Basic FrameSaver NP 64+

        a. The POWER LED will light immediately and stay on.

        b. The READY LED may flash several times and then remain OFF while the unit performs its self-test (test duration - approx. 45 secs.)

        c. The READY LED will be ON steady after successful completion of the self-test.

        d. The DDS ALARM and FR MGMT. LEDs should *not* be flashing together.

        e. All other LED indications should be ignored at this time.

    FrameSaver NP 64+ with ISDN

        a. The POWER LED will light immediately and stay on.

        b. The READY and ISDN READY LEDs may flash several times and then remain OFF while the unit performs its self-test (test duration - approx. 45 secs.)

        c. The READY LED will be ON steady after successful completion of the self-test.

        d. The DDS ALARM and FR MGMT. LEDs should *not* be flashing together.

        e. All other LED indications should be ignored at this time.

If the LED indications are not as described above, refer to section 5 Diagnostics of this manual. If operation looks normal, unplug the FrameSaver NP 64+ and make the required data input/output connections.

NOTE: The FrameSaver NP 64+ does *not* have a Power ON/OFF switch.

<u>***CAUTION***</u>

It is recommended that you remove AC power from the FrameSaver NP 64+ before attaching input and output cables during the installation process.

NOTE: To remove power from the FrameSaver NP 64+, press down on the locking latch at the top of the power connector and pull the connector straight out. Do *not* pull on the cord.

3. Continue the installation by making Input/Output connections and Configuring the FrameSaver NP 64+ as described in the following sections of this manual.

Input/Output Connections

Basic FrameSaver NP 64+ has input/output connectors for the DDS facility, Data Port (DTE), two AUX ports, and Modem Line. Pinouts for each of these ports are provided in the tables that follow.

NOTE: Refer to Section 6, "Options" of this manual for a description of additional connectors with options such as the ISDN Adapter or Second DSU.

CAUTION

The installer must ensure that the plugs used to connect the DDS Line to the FrameSaver NP 64+ are "keyed" modular plugs that match the connectors. This will prevent the accidental connection of the DDS Line to either of the FrameSaver NP 64+ AUX connectors.

DDS Connection

Use cable assembly # 135-982-0006, or per pinout shown in Table 3-2.
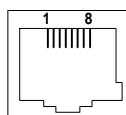
DDS Line

Table 3-2 DDS Line Pinout, RJ48S (Keyed) Connector

Pin	Description	Direction
1	R (Ring)	Transmit
2	T (Tip)	Transmit
3,4,5,6	No Connection	N/A
7	T1 (Tip 1)	Receive
8	R1 (Ring 1)	Receive
NOTE: Use Twisted Pair Cable conductors for pins: 1 & 2 and 7 & 8.		

Data Port Interface & Cable Code

The Data Port (DTE) supports five electrical interface types; ITU-V.35, EIA-530, EIA-530-A, ITU-X.21-NS, and EIA-232. The Data Port connector on the back of the FrameSaver NP 64+ is a DB-44 high density female. A short (approx. 2.5 ft.) adapter cable is used to convert from the DB-44 to the appropriate connector type for the interface selected. The adapter cable also includes a unique Cable Code (CBC), a special wiring pattern at the DB-44 connector, which automatically sets the port to the desired interface type.

NOTE: Some manufacturer specific cable pinouts are provided at the end of this manual section, under General Specifications.

Data Port Pinout   Table 3-3 shows the pinout for the Data Port connector.

Table 3-4 through Table 3-8 show the pin connections for the adapter cables for each of the interface types.

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Table 3-3 Data Port Pinout
DB-44F Connector

Pin	Signal	Direction		Pin	Signal	Direction
1	Shield	N/A		23	DCD-A	Output
2	TD(s)	Input		24	DTR-A	Input
3	RD(s)	Output		25	TC-A	Output
4	RTS(s)	Input		26	CBC-A*	N/A
5	CTS(s)	Output		27	RC-A	Output
6	DSR(s)	Output		28	CBC-B*	N/A
7	Sig. Gnd.	N/A		29	NC	
8	DCD(s)	Output		30	CBC-C*	N/A
9	DTR(s)	Input		31	Shield	N/A
10	TC(s)	Output		32	TD-B	Input
11	LL(s)	Input		33	RD-B	Output
12	RC(s)	Output		34	RTS-B	Input
13	RL(s)	Input		35	CTS-B	Output
14	TCE(s)	Input		36	DSR-B	Output
15	TM(s)	Output		37	Sig. Gnd.	N/A
16	Shield	N/A		38	DCD-B	Output
17	TD-A	Input		39	DTR-B	Input
18	RD-A	Output		40	TC-B	Output
19	RTS-A	Input		41	NC	
20	CTS-A	Output		42	RC-B	Output
21	DSR-A	Output		43	NC	
22	Sig. Gnd.	N/A		44	NC	

NOTES: *CBC = Cable Code pin.
         (s) = single ended.

ITU-V.35 Adapter Cable

Use cable assembly # 135-001-0400, or per pinout shown in Table 3-4.

Table 3-4 ITU-V.35 Interface Adapter Cable (CBC=1)

M-34F Pin	DB-44M Pin	Signal	Direction		M-34F Pin	DB-44M Pin	Signal	Direction
A	1	Shield	N/A		U			
B	7	Sig. Gnd.	N/A		V	27	RC-A	Output
C	4	RTS(s)	Input		W			
D	5	CTS(s)	Output		X	42	RC-B	Output
E	6	DSR(s)	Output		Y	25	TC-A	Output
F	8	DCD(s)	Output		Z			
G					AA	40	TC-B	Output
H	9	DTR(s)	Input		BB			
I					CC			
J					DD			
K					EE			
L					FF			
M					GG			
N					HH			
O					II			
P	17	TD-A	Input		JJ			
Q					KK			
R	18	RD-A	Output		LL			
S	32	TD-B	Input		MM			
T	33	RD-B	Output		NN			
					NC	26	CBC-A*	N/A
					NC	28 to 22	CBC-B*	N/A
					NC	30 to 22	CBC-C*	N/A

NOTES: *CBC = Cable Code pin.
(s) = single ended.
Twisted Pair cable conductors for: TD-A & B, RD-A & B, TC-A & B, and RC-A & B.
Install 300 Ohm resistors at DB-44 end across pins: 17 to 37, and 32 to 37.
Shielded cable is recommended.

EIA-530 Adapter Cable

Use cable assembly # 135-002-0400, or per pinout shown in Table 3-5.

Table 3-5 EIA-530 Interface Adapter Cable (CBC=2)

DB-25F Pin	DB-44M Pin	Signal	Direction		DB-25F Pin	DB-44M Pin	Signal	Direction
1	16	Shield	N/A		14	32	TD-B	Input
2	17	TD-A	Input		15	25	TC-A	Output
3	18	RD-A	Output		16	33	RD-B	Output
4	19	RTS-A	Input		17	27	RC-A	Output
5	20	CTS-A	Output		18			
6	21	DSR-A	Output		19	34	RTS-B	Input
7	22	Sig. Gnd.	N/A		20	24	DTR-A	Input
8	23	DCD-A	Output		21			
9	42	RC-B	Output		22	36	DSR-B	Output
10	38	DCD-B	Output		23	39	DTR-B	Input
11					24			
12	40	TC-B	Output		25			
13	35	CTS-B	Output					
					NC	26 to 22	CBC-A*	Cable Code - A
					NC	28	CBC-B*	Cable Code - B
					NC	30 to 22	CBC-C*	Cable Code - C

NOTES: *CBC = Cable Code pin.
(s) = single ended.
Twisted Pair cable for: TD-A & B, RD-A & B, RTS-A & B, CTS-A & B, DSR-A & B,
DCD-A & B, DTR-A & B, TC-A & B, and RC-A & B.
Shielded cable is recommended.

EIA-530-A Adapter Cable   Use cable assembly # 135-003-0400, or per pinout shown in Table 3-6.

Table 3-6 EIA-530-A Interface Adapter Cable (CBC=3)

DB-25F Pin	DB-44M Pin	Signal	Direction		DB-25F Pin	DB-44M Pin	Signal	Direction
1	16	Shield	N/A		14	32	TD-B	Input
2	17	TD-A	Input		15	25	TC-A	Output
3	18	RD-A	Output		16	33	RD-B	Output
4	19	RTS-A	Input		17	27	RC-A	Output
5	20	CTS-A	Output		18			
6	6	DSR(s)	Output		19	34	RTS-B	Input
7	22	Sig. Gnd.	N/A		20	9	DTR(s)	Input
8	23	DCD-A	Output		21			
9	42	RC-B	Output		22			
10	38	DCD-B	Output		23			
11					24			
12	40	TC-B	Output		25			
13	35	CTS-B	Output					
					NC	26	CBC-A*	N/A
					NC	28	CBC-B*	N/A
					NC	30 to 22	CBC-C*	N/A

NOTES: *CBC = Cable Code pin.
(s) = single ended.
Twisted Pair cable for: TD-A & B, RD-A & B, RTS-A & B, CTS-A & B,
DCD-A & B, TC-A & B, and RC-A & B.
Install 470 Ohm resistor at DB-44 end across pins: 9 to 37.
Shielded cable is recommended.

ITU-X.21-NS Adapter Cable

Use cable assembly # 135-005-0400, or per pinout shown in Table 3-7.

ITU-X.21-NS (NS indicates Non-Switched)

Table 3-7 ITU-X.21-NS Interface Adapter Cable (CBC=4)

DB-15F Pin	DB-44M Pin	Signal	Direction		DB-15F Pin	DB-44M Pin	Signal	Direction
1	16	Shield	N/A		9	32	TD-B	Input
2	17	TD-A	Input		10	34	Control-B	Input
3	19	Control-A	Input		11	33	RD-B	Output
4	18	RD-A	Output		12	38	Indication-B	Output
5	23	Indication-A	Output		13	40	TC-B	Output
6	25	TC-A	Output		14			
7					15			
8	22	Sig. Gnd.	N/A					
					NC	26 to 22	CBC-A*	N/A
					NC	28 to 22	CBC-B*	N/A
					NC	30	CBC-C*	N/A

NOTES: *CBC = Cable Code pin.
(s) = single ended.
Twisted Pair cable for: TD-A & B, RD-A & B, Control-A & B, Indication-A & B, and RC-A & B.
DTR signal and DTE timing are not supported in ITU-X.21-NS mode.
Shielded cable is recommended.

EIA-232 Adapter Cable

Use cable assembly # 135-000-0400, or per pinouts shown in Table 3-8.

Table 3-8 EIA-232 Interface Adapter Cable (CBC=0)

DB-25F Pin	DB-44M Pin	Signal	Direction		DB-25F Pin	DB-44M Pin	Signal	Direction
1	1	Shield	N/A		14			
2	2	TD(s)	Input		15	10	TC(s)	Output
3	3	RD(s)	Output		16			
4	4	RTS(s)	Input		17	12	RC(s)	Output
5	5	CTS(s)	Output		18			
6	6	DSR(s)	Output		19			
7	7	Sig. Gnd.	N/A		20	9	DTR(s)	Input
8	8	DCD(s)	Output		21			
9					22			
10					23			
11					24	14	TCE(s)	Input
12					25			
13								
					NC	26 to 22	CBC-A*	Cable Code - A
					NC	28 to 22	CBC-B*	Cable Code - B
					NC	30 to 22	CBC-C*	Cable Code - C

NOTES: *CBC = Cable Code pin.
(s) = single ended.
Shielded cable is recommended.

AUX 1 & AUX 2 Connections

For AUX Port to Console connections, use cable assembly # 135-008-0400 for modular to DB25, or # 135-990-0006 for modular to Cisco* router console, or per AUX 1 and AUX 2 Port pinouts are shown in Table 3-9 and Table 3-10.
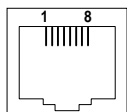
Table 3-9 AUX 1 Pinout, 8 Pin Modular Connector

AUX
Conn.

Pin	Signal	Direction
1	CTS	Output
2	DSR*	Output
3	RxD	Output
4	SG	Sig. Gnd
5	No Connection	N/A
6	TxD	Input
7	DTR	Input
8	RTS	Input

NOTES: Electrical Interface = EIA-232
         *DSR is used to drive both RLSD and DSR leads within the adapter.

.
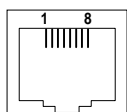
Table 3-10 AUX 2 Pinout, 8 Pin Modular Connector

AUX
Conn.

Pin	Signal	Direction
1	CTS	Output
2	DSR*	Output
3	RxD	Output
4	SG	Sig. Gnd
5	Console	Input
6	TxD	Input
7	DTR	Input
8	RTS or Contact Sense	Input

NOTES: Electrical Interface = EIA-232
         Contact Sense Input = ± 12 VDC
         *DSR is used to drive both RLSD and DSR leads within the adapter,
            and is held high when AUX 2 is in the Contact Sense mode.

In addition to providing an EIA-232 Auxiliary Port, AUX 2 also provides a local console connection to the Base Card or Option card, and can be used to monitor a local (on-site) alarm contact.

* Cisco is a registered trademark of Cisco Systems, Inc.

Console & Alarm Contact Cabling

In Console Mode, the AUX 2 port is configured as a VT-100 interface, 9.6Kbps, asynchronous, 8 data bits, one start bit, one stop bit, and no parity.

The Console Mode is enabled on the AUX 2 port when the "Console" Pin (#5) on the AUX 2 connector is asserted (connect the Console pin to the terminal's DTR). Use cable assembly # 135-007-0400 for DB-25 connector, cable assembly # 135-000-0464 for DB-9 connector, or per pinout shown in Figure 3-6.

NOTE: When AUX 2 Console Mode is enabled, the internal Modem is disabled.
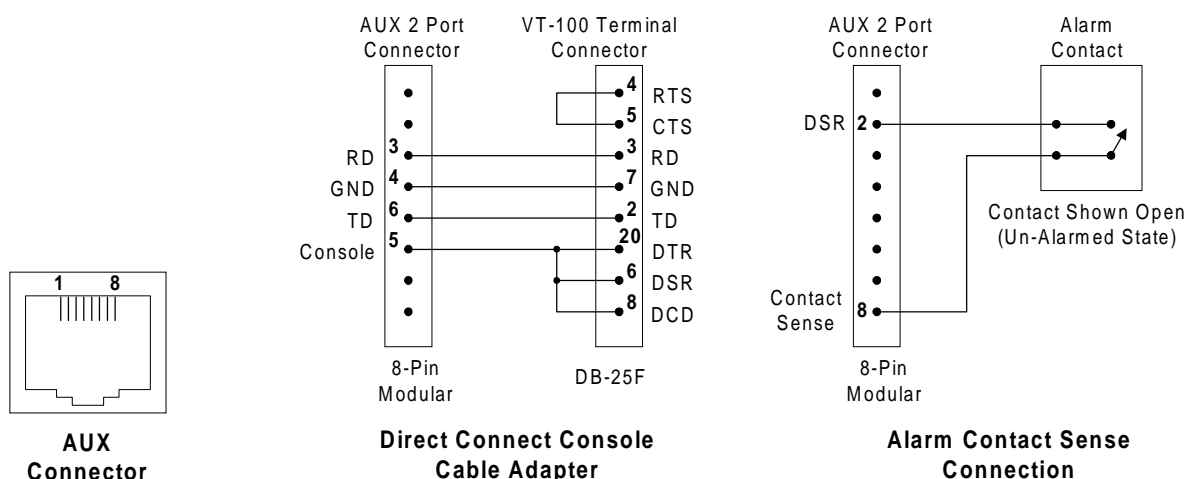
Figure 3-6 AUX 2 Port, Console or Alarm Contact Cabling

In Alarm Contact Sense Mode, DSR is held asserted to supply the signal for sensing an Alarm Contact closure, as shown in the example connection in Figure 3-6. The "Contact Sense" Pin (#8) is considered in Active Alarm State when "high" (asserted).

Modem Line Connection

Use cable assembly # 135-007-7200, or per pinout shown in Table 3-11.

Table 3-11 Modem Line Pinout, RJ11C Connector

Dial Line
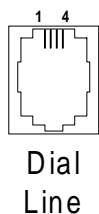
Pin	Description
1,2	No Connection
3	R (Ring)
4	T (Tip)
5,6	No Connection

Connections Completed

All connections to basic FrameSaver NP 64+ are now completed.

Proceed to Configuration in section 4 Operations of this manual.

General Specifications

FrameSaver NP 64+ Specifications

Table 3-12 FrameSaver NP 64+ General Specifications

Item	Description
Dimensions	FrameSaver NP 64+, basic unit: Table Top (with rubber feet): 1.7" H x 9.0" W x 11.5" D. Wall Mount: 9.0" H x 11.5" W x 1.7" D. Rack Mount (with removable rack mounting adapter): 1.75" H x 19.0" W (or 24.0" W) x 11.5" D.
Weight	As normally packaged including carton and accessories: 5 lbs. Unit alone (without packaging and accessories): 2.5 lbs.
Operating Range	Temperature: 0 to 50 degrees C. operating. Relative Humidity: 5 to 95% non-condensing. Altitude: 10,000 ft. max. operating, 50,000 ft. max. non-operating. Shock and Vibration: As normally encountered during shipping and handling.
Power	AC Power Pack (transformer/plug module). Input = 90 - 130 VAC, 0.2 A max., 60 Hz. Output = 22 VAC, 30 VA. Cable: 2-conductor, with 2-pin keyed locking connector, 7 ft. length.
Regulatory Compliance	UL - 1459, Third Edition and CAN/CSA C22.2 No. 225-M90 FCC Part 15, Class A Digital Device Canada's ICES003, Class A Digital Device FCC Part 68

Power Control Unit Specifications

Table 3-13 Model 467 Power Control Unit General Specifications

Item	Description
Dimensions	2.5" H x 7.25" W x 4.6"D
Weight	As packaged including carton: 4.5 lbs. Unit alone: 3.5 lbs.
Operating Range	Temperature: 0 to 50 degrees C. operating. Relative Humidity: 5 to 95% non-condensing. Altitude: 10,000 ft. max. operating, 50,000 ft. max. non-operating. Shock and Vibration: As normally encountered during shipping and handling.
Power Requirements	AC Input: 125 VAC, 50 - 60 Hz, 0.22A for the internal power transformer in addition to the connected device. 7-foot cord with 3-prong plug. Switched AC Output: 125 VAC, 5 AMPS max. 1-foot cord with 3-prong receptacle. Power Output: 22 VAC, 30 VA (FrameSaver NP 64+ Only). Power/Control Cable: 4-conductor, with 4-pin keyed locking connector, 7 ft. length.
Regulatory Compliance	UL - 1950

Cisco* HD-60 Adapter Cable Specifications

To connect a Cisco router to a FrameSaver NP 64+ Data Port configured for ITU-V.35, use cable assembly # 135-006-0400, or per pinout shown in Table 3-14.

Table 3-14 Cisco HD-60M to FrameSaver NP 64+ HD-44M

Cisco HD-60M Pin	DB-44M Pin	Signal		Cisco HD-60M Pin	DB-44M Pin	Signal
Shield	Shield	Shield		27	33	RD-B
17	32	TD-B		28	18	RD-A
18	17	TD-A		33	8	DCD(s)
19	44	TCE-B		34	6	DSR(s)
20	29	TCE-A		35	5	CTS(s)
23	40	TC-B		42	4	RTS(s)
24	25	TC-A		43	9	DTR(s)
25	42	RC-B		45	7	Sig. Gnd.
26	27	RC-A		46	1	Shield

NOTES:

Shielded cable is required.

Twisted Pair cable conductors for HD-60 pins: 17 & 18, 19 & 20, 21 & 22, 23 & 24, 25 & 26, 27 & 28, 33 & 34, 35 & 42, 43, & 44, 45 & 46.

HD-60 pins tied: 48 to 49, 50 to 51 to 52, 53 to 54 to 55 to 56.

HD-44 pins tied: 17 to 37 via resistor, 32 to 37 via resistor,
    22 to 28 to 30, then all to 29 via resistor,
    22 to 28 to 30, then all to 44 via resistor
    (Resistor = 300 Ohm, 1/4 W, 5%).

(s) = single ended.

* Cisco is a registered trademark of Cisco Systems, Inc.

4 Operation

This section contains configuration and operation information for basic FrameSaver NP 64+. Refer to Section 6, "Options" of this manual for configuration and operation information for FrameSaver NP 64+ options such as ISDN Adapter.

Configuration

FrameSaver NP 64+ configuration consists of initially setting the WAN Management Channel's DLCI address via the rear panel DIP Switches, dial-in VT-100 console connection or direct connected VT-100 terminal. This parameter can also be reconfigured via in-band Telnet Management session after the initial installation.

Additional parameters are configured via in-band Telnet, dial-in VT-100 console connection or direct connected VT-100 terminal.

The configuration procedures to complete the installation are presented in and should be performed in the following order:

1. Set WAN Management DLCI DIP Switches.

2. Power unit on while clearing NVM.

3. Connect Console Terminal, establish a management session and set the operating parameters.

   OR

   Contact the Network Control Center to establish a management session and have the operating parameters set remotely.

WAN DLCI DIP Switch Settings

To use the in-band WAN Frame Relay Management Channel, the WAN Management DLCI (Frame Relay Management Channel's PVC Address) must be set. A 12-position DIP switch on the rear panel of the FrameSaver NP 64+ may be used to set the WAN DLCI.

The DLCI is a three-digit decimal number, with each digit represented in binary format (BCD - Binary Coded Decimal) by four DIP switch positions as shown in Figure 4-1. The DLCI DIP Switches are set for the desired value using the BCD switch settings representing the decimal numbers for each digit position as shown in Table 4-1.
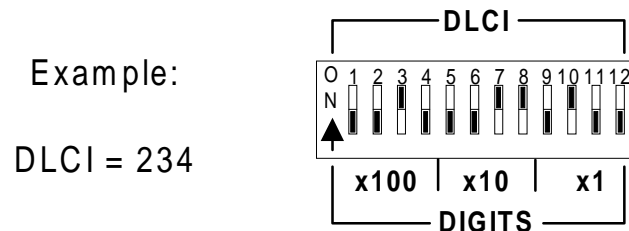
Figure 4-1 DLCI DIP Switch

Table 4-1 BCD DIP Switch Settings

Decimal Digit	Switch Positions		Decimal Digit	Switch Positions
0	DDDD		5	DUDU
1	DDDU		6	DUUD
2	DDUD		7	DUUU
3	DDUU		8	UDDD
4	DUDD		9	UDDU
NOTE: U (Up) = ON, D (Down) = OFF				

The WAN DLCI can be set for Dedicated or Tunneled mode using the DIP Switches.

To enter a dedicated WAN DLCI, set the DIP Switches for the desired DLCI value as described above and proceed to the Power On section on page 4-3 to clear the unit's NVM. A dedicated DLCI is automatically stored in NVM from the DIP Switch settings whenever the unit's NVM is cleared.

NOTE: An invalid DLCI value will be ignored (valid values are: 16-991).

To change the DLCI for tunneled operation or the DLCI value (via the DIP Switches), use the following procedure once the unit is powered up and operational.

1. Set DIP Switches to either:

   a) All switches OFF to select Dedicated WAN management PVC.
   b) All switches ON to select Tunneled WAN management PVC.

2. Press NVM RESET / CONFIG push button, and hold for at least one second.

3. Set DIP Switches to desired DLCI value (see example in Figure 4-1.)

4. Press NVM RESET / CONFIG push button, and hold for at least one second.

CAUTION

If the WAN DLCI value is changed while the FrameSaver NP 64+ is operating, the unit will perform a system reset after the new value is entered. The system reset will terminate any console session in progress and interrupt data traffic.

CAUTION

An unintentional parameter change and unit reset could occur if the "NVM RESET / CONFIG" push button is pressed while the unit is operating. To prevent this, set all the DIP Switches to "OFF" after the WAN DLCI parameters have been entered.

Power On

With all the connections completed and the WAN DLCI DIP Switches set, the Frame-Saver NP 64+ is ready to be powered on.

Proceed by holding in the recessed push button switch labeled "NVM RESET / CON-FIG" on the unit's rear panel while plugging in the power connector and continue to hold the button for approximately 10 seconds. This will "clear" the unit's NVM of any previous configuration. After the NVM RESET / CONFIG button is released, the FrameSaver NP 64+ will complete its power-on self-test sequence with front panel LED indications as follows:

a. The POWER LED will light immediately and stay on.

b. The READY LED may flash several times and then remain OFF while the unit performs its self-test (test duration - approx. 45 secs.)

c. The READY LED will be ON steady after successful completion of the self-test.

d. The DDS FAULT and FR MGMT. LEDs should ***not*** be flashing together.

e. All other LED indications should be ignored until configuration has been completed.

If the LED indications are not as described above, refer to Section 5, "Diagnostics" of this manual.

If operation looks normal, proceed by connecting a Console Terminal and entering the operating parameters or contact the Network Control Center to have the parameters set remotely.

NOTE: If the Dial Line has not been connected to the FrameSaver NP 64+ prior to powering the unit on, the unit will issue a Dial Line Failure In-Band Trap to the Trap Manager after it completes its Modem and Dial Line self test. This is normal.

Establish Management Session

The FrameSaver NP 64+ sends a Startup/Login Prompt when a management connection has been established (in-band Telnet, dial-in VT-100 console connection or direct connected VT-100 terminal), provided that another management session is not currently in use.

Login

The startup display and prompt are.:

```
FrameSaver NP 64 - Frame Relay Service Unit
(C) Paradyne Corporation 1996-2000.
All Rights Reserved
Base:00.64/09.04.15.03

Please enter your SYSTEM access password:
Please enter your USER access password:
```

Only the User access password prompt will be displayed if the System-level password feature is disabled. If enabled, the System access password prompt will be displayed, and the User access password prompt will be displayed only after entering a valid System Password.

At the User access prompt, enter the Configuration or Supervisor Password followed by ENTER (factory default Configuration Password is "33333333").

NOTE: Only Configuration or Supervisor-level USER Password will allow configuration changes. View level displays all screens but allows no configuration changes or testing; and Test level displays all screens, allows performance of tests, but no configuration changes.

The next prompt asks for your name and phone number:

```
Please enter your USER access password:
Please enter your name and phone #:
```

Enter name and phone number followed by ENTER. If this information is provided, it will be displayed to any other operator attempting to Login (via other access port) while in use, so they may contact you in case they have to gain immediate access.

NOTES:

1. Console session will be terminated and must be reinitiated if there are three invalid password attempts, or a timeout resulting from no attempt for one minute.

2. If the unit's NVM has been cleared since the last successful login, this will be indicated on the Startup screen display as shown below:

```
FrameSaver NP 64 - Frame Relay Service Unit
(C) Paradyne Corporation 1996-2000.
All Rights Reserved
Base:00.64/09.04.15.03

System Database Reset to Factory Defaults.

Please enter your USER access password:
```

Block Mode

FrameSaver NP 64+ supports Block as well as Character mode management access.

To enable Block mode, set the VT-100 terminal (or emulator) to "LOCAL ECHO." When logging in, along with entering the password, type "\VT100" (include a space between the last character of the password and the "\" character) followed by ENTER.

In this mode, the VT-100 terminal will echo characters to the screen locally and store them, sending the entire string to the FrameSaver NP 64+ when ENTER is pressed. The FrameSaver NP 64+ will not echo received characters in this mode. It will process all received characters at once.

Logout

Logout is automatic on disconnecting the local terminal, terminating a dial-in call, or after a timeout period (approx. 10 mins.) if a Telnet session is broken.

Logout can be done manually by selecting Logout (LO) from the System View Screen.

Screen Format

The general format for FrameSaver NP 64+ screen displays is 80 x 24 characters. The lines (rows) are divided as follows:

Line 1	Screen title.
Line 2-3	Unit ID and applicable hardware and/or software version numbers.
Line 3 - 21	Screen specific parameters/statistics.
Line 20 - 22	Command list for that screen.
Line 23	Command line (command entered here).
Line 24	Command error and warning messages.

Examples of each of the screen displays are shown in the appropriate sections of this manual.

Help Text

Help text is provided for each of the FrameSaver NP 64+ screen displays to assist the user. Help text for a screen is accessed from that screen by entering "?" followed by ENTER. The HELP command is shown on the command line of each applicable screen.

Edits - Selections

Edits to parameters fields, such as on the configuration screens, are made one field at a time. Each field is edited by entering the character used to designate the field (shown in brackets) on the screen, followed by the equal sign "=" and a selection from a pick-list (a number, an ID, or a string of characters), all followed by ENTER.

Current selections are highlighted on the screens by being bracketed by ">>"....."<<" characters.

NOTE: Multiple fields may be edited using a single command (except when indicated otherwise) by separating the entries by commas, all followed by ENTER.

This page intentionally left blank.

Management Command Flow

Figure 4-2 shows the general flow for management access for the basic FrameSaver NP 64+. It shows each of the screen displays and the general function for that screen.

- DSU CONFIGURATION -
Set Parameters
Help / Save

- FRAME MANAGER
CONFIGURATION -
Set Parameters
Help / Save

- SNMP COMMUNITY
CONFIGURATION -
Set Parameters
Help / Save

- LOGOUT -
Login Prompt or
In Use
Login w/Mode:

- SYSTEM VIEW -
Logout / AutoUpdate
Help / Select Screen:

- SNMP TRAP MANAGER
CONFIGURATION -
Set Parameters
Help / Save

- PVC PERFORMANCE
CONFIGURATION -
Set Parameters
Help / Save

- PROTOCOL MONITOR
CONFIGURATION -
Set Parameters
Help / Save

- DSU STATISTICS SUMMARY -
Help / AutoUpdate
Reset Stats
View History:

- DSU STATISTICS
HISTORY -
Help / Select Page

- PVC STATISTICS SUMMARY -
Help / AutoUpdate
Reset Stats
View History:

- PVC STATISTICS
HISTORY -
Help / Select Page

- PROTOCOL STATISTICS
SUMMARY -
Help / AutoUpdate
Reset Stats / View History:

- PROTOCOL
STATISTICS
HISTORY -
Help / Select Page

- TOP TALKER STATISTICS
SUMMARY -
Help / AutoUpdate
Reset Stats / View History:

- TOP TALKER
STATISTICS
HISTORY -
Help / Select Page

- DSU TEST -
Test Operations
Help / AutoUpdate

Figure 4-2 Management Control Flow for Basic FrameSaver NP 64+

Parameter Setting

Upon successful login, the System View screen is displayed.

The System View screen presents an overview of the system status and provides the path to configuration, test, and other status screens.

```
*********************** FrameSaver NP 64 - System View ************************
     Name: F@43802                                      Base S/W: 09.04.15
 Location: Fair Lawn, N.J.                                   S/N: 001812
  Contact: J. Jones


                    System Test/Fault:
    DSU Status                              High Speed Interface Status
      Rx Level: -10dB                                     DTR: On
     Data Rate: 56k                                       RTS: On
                                                        Power: On

    Modem Status                            Interface: ITU-V35
          Fault:
    Connection:


    Aux Port Status
    Aux1 DTR: Off
    Aux2 DTR: Off
    Aux2 Alm:
 DsuConfig[DC]   FrameConfig[FC]    PvcConfig[PC]    MonConfig[MC]
   DsuTest[DT]      DsuStats[DS]     PvcStats[PS]    MonStats[MS]     TopStats[TS]
SnmpConfig[SC]    TrapConfig[TC]
 Help[?]    Logout[LO]    AutoUpdate[AU]
>
```

Figure 4-3 System View Screen

The System View screen fields are as follows:

Name - Device ID defined in the Unit Configuration.

Location - Physical location (city and state) of unit.

Contact - Contact person and phone number contained in the Unit Configuration.

Base S/W - Software revision number currently operating the unit.
> The first two-digit number indicates the unit's feature set, the second indicates the base software revision, and the last indicates minor revision level. An Alpha character at the end of this field indicates the option type installed, if any.

S/N - Serial Number of Unit.

System Test / Fault -

> All Test and/or Fault fields display: Blank or the highest priority Test or Fault causing a disruption of the data path or other operational disruption of the unit.

> Refer to the Appendix of this manual for a list and description of tests and faults.

DSU Status -
 Rx Level: Value in dB of the signal level as measured on the DDS Loop.
  Valid values are: -0 to -50dB or (blank) if in RLOS state.
 Data Rate: DDS Loop data rate as detected by the unit.
  Valid values are: 56k, 64k or (blank) if in RLOS state.

Modem Status -
 Fault: Highest priority fault that disrupts modem operation.
 Refer to the Appendix of this manual for a list and description of faults.
 Connection: Currently active modem assignment.
  Valid items are: Base Card, AUX 1 Port, AUX 2 Port,
   Option Card or (blank) if none active.

Aux Port Status -
 Aux1 DTR: State of DTR Lead for the interface, ON or OFF.
 Aux2 DTR: State of DTR Lead for the interface, ON or OFF.
 Aux2 Alm: State of contact sense, (blank) or Contact Sense Alarm.
  This field is only displayed when Aux2 is configured for
  Contact Sense Mode.

High Speed Interface Status -
 DTR: State of DTR lead, when Power is being detected from the DTE.
  States are: ON, OFF or (blank) if Power OFF.
 RTS: State of RTS lead, when Power is being detected from the DTE.
  States are: ON, OFF or (blank) if Power OFF.
 Power: ON or OFF based on sensing voltage on Tx data lead(s) from the DTE.
 Interface: Interface adapter cable currently installed.
  Types are: ITU-V35, EIA-530, EIA-530-A, ITU-X21-NS, EIA-232 or
  (blank) if none.

Commands:

DsuConfig [DC] - Advances to DSU Configuration Screen.
FrameConfig [FC] - Advances to Frame Manager Configuration Screen.
PvcConfig [PC] - Advances to PVC Performance Configuration Screen.
MonConfig[MC] - Advances to Protocol Monitor Configuration Screen.
DsuTest [DT] - Advances to DSU Test Screen.
DsuStats [DS] - Advances to DSU Statistics Summary Screen.
PvcStats [PS] - Advances to PVC Statistics Summary Screen.
MonStats[MS] - Advances to Protocol Monitor Statistics Summary Screen.
TopStats[TS] - Advances to Top Talker / Conversation Statistics Summary Screen.
SnmpConfig [SC] - Advances to SNMP Community Access Configuration Screen.
TrapConfig [TC] - Advances to SNMP Trap Manager Configuration Screen.

Help [?] - Advances to "Help" for System View screen.

Logout [LO] - Logs out from system.

AutoUpdate [AU] - Causes the status fields on the current screen displayed to refresh
 automatically (approximately every five seconds).

To proceed setting operating parameters, select DSU Configuration screen [DC] by
typing "DC" followed by ENTER.

DSU Configuration   The DSU Configuration screen allows you to view and alter parameters for the DSU and Modem.

The DSU Configuration screen is shown in Figure 4-4.

```
***************************** DSU Configuration *****************************
                    WAN DLCI Switch: 017         TelcoLpCtl [K=]   Frm Mgr [Z=]
    Name [N=]: F@43802                            >>1) Enable<<    >>1) FrRelay<<
Location [L=]: Fair Lawn, N.J.                      2) Disable        2) ClrChan
 Contact [C=]: J. Jones                           DataRate [Q=56,64,Auto]: Auto
 WAN IP Add [I=]: 0.0.0.0          Payload/CPE IP Add [J=]: 0.0.0.0
        ------ Modem Setup / Model: RC288DPi Rev 05BA V1.400-V34_DS ------
  Dial String [D=]:
  Answer DSU [AD=]:
  Aux1 Setup [A1=]: A96N8AT&K0Q1^MATA
  Aux2 Setup [A2=]: A96N8AT&K0Q1^MATA
 (NOTE: Text & IP entries may not be made in combination with other parameters!)

 ModemLine [M=]  RtryCount[R=#]:2  RtryHoldoff[H=#]:30  InactivityLogout[O=#]:15
  1) Test          1 thru 4         1 thru 60 seconds     1 thru 30 minutes
>>2) No Test<<
                   WAN Encap [T=]   MTUSize[W=#]:1492     View Pswrd [P=]:11111111
 P/C Encap [U=]  >>1) Learning<<    88 thru 4000 Octs    Test Pswrd [E=]:22222222
>>2) Raw<<          2) Raw                               Config Pswrd [F=]:33333333
  2) IETF           3) IETF    ---- CHAP Name/Key ---    Super Pswrd [S=]:********
                    4) SNAP    [CN=]:CHAPNAME********    Super Verify [V=]:********
Help[?]  Save[SA]  Cancel[X]  [CK=]:****************    System Pswrd [Y=]:DISABLED
>
```

Figure 4-4 DSU Configuration Screen

All FrameSaver NP 64+ screen entries and selections are made by entering the two or three characters shown in brackets next to the field titles, equals "=", then entering the value or string followed by ENTER.

Example: Set Name to ABC

Type: N=ABC and press ENTER

Current selections are highlighted by bracketing with, ">>"....."<<" characters.

Configure DSU

WAN DLCI Switch: Displays the current settings of the DLCI DIP S*witches* on the back of the FrameSaver NP 64+. This may or may not be the current DLCI address being used by the unit. The current address being used is displayed on the Frame Manager Configuration Screen.

1. Enter **Name** and **Location** of this FrameSaver NP 64+ installation (optional but recommended).

2. Enter **Contact** Name and Phone Number of local service personnel (optional).

3. Select "Enable" or "Disable" for **Telco Lp Ctl**, to allow or prevent the DSU from responding to Telco-Initiated latching loopback commands.

4. Select "56," "64," or "Auto" for the DSU **DataRate**. Auto lets the unit search for and "learn" the DDS line rate (Frame Relay mode only). Once found, the DataRate is fixed at that value. Entering 56 or 64 (Kbps) sets that rate. Default = Auto.

CAUTION
DataRate must be set to the actual rate (56 or 64 Kbps) when FRM MGR is set for "ClrChan" and/or LMI Protocol is set for "None". Auto should NOT be used for these configurations.

5. Enter **WAN IP Address** for SNMP management of the FrameSaver NP 64+. If set to the default value as shown in Figure 4-4, the IP Address will be learned automatically. The first valid IP Address will be "learned." Once a value is entered or learned automatically, it will replace the "0.0.0.0" value and auto learning will be discontinued unless configured for "relearn" mode (see "WAN Mgmt DLCI" on page 4-14 of this section.

6. Enter **Payload** or **CPE** (private user) **IP Address** for PVC management of the FrameSaver NP 64+.

CAUTION
If either WAN or Payload/CPE Mgmt "IP Address" or "Encap" (see next page) settings are altered, any in-band management session (Telnet) will be terminated upon issuance of the Save [SA] command and will have to be reestablished.

7. **Frame Mgr** - Select "FrRelay" to configure for normal Frame Manager function. Setting the Frame Manager to "ClrChan" causes the unit to operate in the "Transparent" mode. Transparent mode will also disable Frame Relay related monitoring and statistics gathering, and block access to Frame Relay related configuration screens.

CAUTION
If the Frame Manager setting is changed, the FrameSaver NP 64+ will perform a system reset after the Save [SA] command is issued. The system reset will terminate any console session in progress and interrupt data traffic.

Modem Setup

1. **Model:** Displays the model and firmware version of the installed modem.

2. **Dial String** - Enter modem "AT" string with phone number to dial Trap Manager and any other AT codes (if required) for modem initialization. String is sent to modem followed by <CR>. If blank (default), no action is taken.

   NOTE: Each character sequence "^M" within the AT string causes <CR> to be sent followed by a one to 2-second delay, making it possible to define multiple command lines.

3. **Answer DSU** - Enter modem "AT" string (if required) for modem initialization when answering a call for the DSU. Default is blank.

4. **AUX 1 Setup** - Enter modem "header" and "AT" string for modem initialization when answering a call for AUX 1 port. The header consists of the first one to six characters of the string, which specify the operating mode, data rate, parity, and number of data bits for the device connected to the AUX port.
   Choices are:

   Operating Mode - "A" (Answer), "D" (Dial Out), "B" (Bi-Directional)
   Data Rate - "12" (1200), "24" (2400), "48" (4800), "96" (9600), "192" (19200), "288" (28800), "384" (38400), and "576" (57600 bps)
   ("Data Rate" is the asynchronous interface rate. Actual modem rate is negotiated upon connection.)

Parity - "N" (None), "E" (Even), or "O" (Odd)

Data Bits - "8" (8 data bits), or "7" (7 data bits)

Default is shown in Figure 4-4:   9600bps, 8 data bits, no parity, no flow control.

NOTES:

Operating Mode A or B - On incoming call, modem must establish connection within 60 seconds.

Operating Mode D or B - Raising DTR will assign modem to AUX Port (if not already in-use) within five seconds.

Each character sequence "^M" within the AT string causes <CR> to be sent followed by a one (1) second delay, making it possible to define multiple command lines.

5. **AUX 2 Setup** - Functions the same as for AUX 1 above, with the additional Operating Mode of "CS" (first two characters). In this mode AUX 2 monitors the RTS lead as an Alarm Contact Sense. RTS "ON" (high) is considered the Alarm Active State. An Alarm will be issued after a state change of 3 seconds or more.

6. **Retry Count** - Enter number of times the FrameSaver NP 64+ will reattempt a connection when dialing out via modem, after the initial attempt has failed.

7. **Retry Holdoff** - Enter the delay time before a dial-out attempt will be retried.

8. **Modem Line** - Select "Test" or "No Test" to enable or disable the automatic dial-tone testing of the dial line (during power-up/reset as well as the four-hour routine test). Default = No Test.

Inactivity Logout

Set the console session inactivity (idle) time, which when reached will force a logout.

Encapsulation

Protocols are encapsulated and carried within each Frame Relay "Frame" and are identified by the NLPID (Network Level Protocol ID). The NLPID may identify a specific protocol such as defined by IETF, or indicate a set of lower level protocols such as SNAP (SubNetwork Access Protocol).

WAN Encap - Select the type of IP encapsulation to be used for private network PVC management access. Selections are:

Learning - The unit will attempt to learn automatically. Once a value is entered or auto-learned, auto-learning will be discontinued.

Raw - No encapsulation or NLPID.

IETF - Protocol will be specified by its own NLPID.

SNAP - Protocol will be under the SNAP NLPID.

P/C Encap - Select the type of IP encapsulation to be used for management access via the Payload PVC or CPE (private user) PVC. Selections are:

Raw - No encapsulation or NLPID.

IETF - Protocol will be specified by its own NLPID.

MTU Size - Sets the maximum size (Maximum Transmit Unit) for any IP packet sent by the unit via any management route (dedicated, backup, or PPP dial session.)

> **NOTE:** Setting the MTU Size to less than 120 could prohibit the generation of the "Power Loss" trap.

CHAP

Challenge Handshake Authentication Protocol used for access verification when the unit attempts to establish a PPP session to report Out-of-Band Traps.

NOTE: For enhanced network security, it is highly recommended that the terminal server designated to receive these calls be configured such that access to the network is limited to Trap Reporting only.

CHAP Name - Name identifier for the response returned by the unit.
Factory Default = "CHAPNAME."

CHAP Key - Key identifier used as the common secret for any CHAP challenge.
When Key is (blank), the CHAP feature is disabled (default).

NOTE: Password and CHAP fields will only be displayed if logged in as Supervisor.

Passwords

1. **View Pswrd** - "View Only" access password. Factory Default = "11111111."

2. **Test Pswrd** - "Test" and "View" access password. Factory Default = "22222222."

3. **Config Pswrd** - "Configuration," "Test" and "View" access password.
   Factory Default = "33333333."

4. **Super Pswrd** - "Supervisory" access password (unlimited access, including ability to change all passwords).

5. **Super Verify** - Supervisor password must be re-entered here if the Supervisor Password is changed.

6. **System Pswrd** - Provides an additional "system level" password prior to the Login Prompt.

Commands available on this screen are:

Help [?] - Advances to "Help" for System Configuration screen.

Save [SA] - Saves parameters and display returns to System View screen.

Cancel [X] - Changes made (if any) are not saved and display returns to System View screen.

Save the System Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Proceed to Frame Manager Configuration, selecting [FC] by typing "FC" followed by ENTER.

Frame Manager Configuration

The Frame Manager Configuration screen allows you to view and alter parameters for Frame Manager operations.

The Frame Manager Configuration screen is shown in Figure 4-5.

```
*********************** Frame Manager Configuration ***********************
     Name: F@43802
                                      LMI Protocol [P=]
  WAN Mgmt DLCI [D=#,T#orD#]: Disabled     1) None       3) "LMI"
  P/C Mgmt DLCI [E=P#orC#]: Disabled     >>2) ANSI"D" <<  4) ITU"A"
   X to Disable or 16 thru 991
  ------------ Network -----------      ------------- User -------------
  T391/Status Enq Rate [S1=#]: 10       T392/Status Enq Timeout [S2=#]: 15
   5 thru 30 seconds                     5 thru 30 seconds
  N392/Event Err Thres [T1=#]: 3        N392/Event Error Thres [T2=#]: 3
      N393/Event Count [C1=#]: 4            N393/Event Count [C2=#]: 4
       1 thru 10                             1 thru 10
  N391/Full Status Freq [F1=#]: 6       Force Full Status Response [F2=]
   1 thru 255                           >>1) Disable<<
                                          2) Enable
  PVC BECN/FECN Thres [B=#]: Disabled
   X to Disable or 1 thru 895 seconds

  Link Err Thres [L1=#]: Disabled       Link Err Thres [L2=#]: Disabled
   X to Disable or 1 thru 895 seconds    X to Disable or 1 thru 895 seconds

Help[?]    Save[SA]    Cancel[X]
>
```

Figure 4-5 Frame Manager Configuration Screen

Configure Frame Manager

1. **WAN Mgmt DLCI** - Displays current DLCI value of the private network PVC or Tunneled PVC for WAN management of the FrameSaver NP 64+, as stored in the unit's non-volatile memory (NVM). This value may be entered using the unit's rear panel DLCI DIP Switches (except for "relearn" mode), or entered from this screen. Enter only DLCI number for private network PVC, preface the DLCI number with "T" for tunneled PVC, or preface the DLCI number with "D" for relearn mode. In relearn mode, the WAN management DLCI will be automatically relearned each time the PVC returns to an "active" condition.

2. **P/C Mgmt DLCI** - Sets or disables the direction and PVC for Payload/CPE management access to the FrameSaver NP 64+. The first letter (P or C) determines which direction, and the remainder indicates the DLCI value.

NOTE: The P/C Mgmt DLCI value must NOT be the same as WAN Mgmt DLCI.

CAUTION

If either WAN or P/C Mgmt DLCI value is changed, the FrameSaver NP 64+ will perform a system reset after the Save [SA] command is issued. The system reset will terminate any console session in progress and interrupt data traffic.

3. **LMI Protocol** - Displays and allows the selection of the LMI protocol used. If set to "None," LMI traffic (if any) to or from the Network will be passed through the FrameSaver NP 64+ unaffected, and the unit's LMI alarms and status will be cleared.

4. **Network** (DTE) - Consists of the settings required for "ANSI D" protocol. These include T391, N392, N393 and N391.

   T391/Status Enquiry Rate - Interval in seconds between the LMI Status Enquiries issued by the FrameSaver NP 64+ to the Network (Frame Switch).

   The ratio of N392 to N393 defines the rate of Bad/No LMI responses to Count of events, beyond which the Network link is declared Out-of-Service. This ratio is set by selecting the values (1 to 10) for each of these parameters, defined as follows:
   N392/Event Error Threshold - Number of Bad/No responses to LMI Status Enquiries issued by FrameSaver NP 64+.
   N393/Event Count - Count of all monitored requests (to be used for the ratio).

   N391/Full Status Frequency - The Frequency Number "*n*," will cause every "*n^{th}*" LMI Status Enquiry issued to be a Full LMI Status Enquiry.

   PVC BECN/FECN Threshold - FrameSaver NP 64+ maintains a count of seconds during which a receive frame contained a BECN or FECN bit set. When the number of seconds containing BECN or FECN bits (flags) for any PVC in the most-recent interval equals or exceeds this Threshold Setting, an alarm is declared.

5. **User** (DCE) - Consists of the settings required for "ANSI D" protocol. These include T392, N392 and N393.

   T392/Status Enquiry Timeout - Timeout interval in seconds while waiting for an LMI Status Enquiry from the User equipment.

   The ratio of N392 to N393 defines the rate of Bad/No LMI inquiries to Count of events, beyond which the User link is declared Out-of-Service. This ratio is set by selecting the values (1 to 10) for each of these parameters, defined as follows:

   N392/Event Error Threshold - Number of Bad/No inquiries for LMI Status Enquiries issued by the User equipment.
   N393/Event Count - Count of all monitored inquiries (to be used for the ratio).

   Force Full Status Response - Enable causes the FrameSaver NP 64+ to send four consecutive Full LMI Enquiry Messages toward the Network upon detecting a recovery of its DDS link (or ISDN link if so optioned and active). Upon receiving a Full Response it forwards that to the DTE, regardless of that enquiry type. In some cases this will speed recovery from a link outage. Disable causes the FrameSaver NP 64+ to follow normal conventions per the N391 parameter.

6. **Link Err Threshold** - Disables or sets the threshold of Data Frame Error Seconds which when reached or exceeded will cause an alarm to be declared. Set independently for Network and User sides.

Commands

Help [?] - Advances to "Help" for Frame Manager Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

Save the Frame Manager Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Proceed to SNMP Community Access Configuration, selecting [SC] by typing "SC" followed by ENTER.

SNMP Community Access Configuration

The SNMP Community Access Configuration screen allows you to view and alter parameters for SNMP Community operations.

The SNMP Community Access Configuration screen is shown in Figure 4-6.

```
********************* SNMP Community Access Configuration *********************
     Name: F@43802

          Community #1 Name [C1=]: public
          Community #2 Name [C2=]:
          Community #3 Name [C3=]:
          Community #4 Name [C4=]:
          Community #5 Name [C5=]:
          Community #6 Name [C6=]:

  Comm #1 Access [A1=]       Comm #2 Access [A2=]       Comm #3 Access [A3=]
    1) Read Only               1) Read Only               1) Read Only
 >>2) Read/Write<<          >>2) Read/Write<<          >>2) Read/Write<<
    3) None                    3) None                    3) None


  Comm #4 Access [A4=]       Comm #5 Access [A5=]       Comm #6 Access [A6=]
    1) Read Only               1) Read Only               1) Read Only
 >>2) Read/Write<<          >>2) Read/Write<<          >>2) Read/Write<<
    3) None                    3) None                    3) None

NOTE: Each Name entry must be made individually.
Help[?]    Save[SA]    Cancel[X]
>
```

Figure 4-6 SNMP Community Access Configuration Screen

1. **Community # *n* (1-6) Name** - Community names to which the unit belongs. These commands [C*n*] must be entered individually, not with other fields.

2. **Comm # *n* (1-6) Access** - Setting for Read/Write access in each of the communities.

NOTE: Settings may only be changed after login with Supervisor password.

Default values for these settings are as shown in Figure 4-6.

Commands

Help [?] - Advances to "Help" for SNMP Community Access Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

Save the SNMP Community Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Proceed to Trap Configuration, selecting [TC] by typing "TC" followed by ENTER.

SNMP Trap Manager Configuration

The SNMP Trap Manager Configuration screen allows you to view and alter parameters for SNMP Trap Manager related operations.

The SNMP Trap Manager Configuration screen is shown in Figure 4-7.

```
*********************** SNMP Trap Manager Configuration ***********************
     Name: F@43802
Mgr ------ IP Address ----- --------------- Name --------------- ---- Path ---
 #1 [T1=]:0.0.0.0        [N1=]:                           [P1=WorP]:WAN
 #2 [T2=]:0.0.0.0        [N2=]:                           [P2=WorP]:WAN
 #3 [T3=]:0.0.0.0        [N3=]:                           [P3=WorP]:WAN
 #4 [T4=]:0.0.0.0        [N4=]:                           [P4=WorP]:P/C
 #5 [T5=]:0.0.0.0        [N5=]:                           [P5=WorP]:P/C
 #6 [T6=]:0.0.0.0        [N6=]:                           [P6=WorP]:P/C
    NOTE: Each Name & IP entry must be made individually.


 Disable Traps [B=] ([B=m,n,...r] and/or [B=m-n] for multiple disables)
>> 1)Authen Fail<<      7)Netw Thresh      13)ContactSense    19)ISDN Backup
   2)Carrier Loss       8)User Thresh      14)BECN/FECN       20)ISDN Demand
   3)Out of Serv        9)DTR Loss         15)IsdnAdptFail    21)PVCDrpdThres
   4)DSU Failure       10)DtePowerLoss     16)IsdnLineFail    22)PVCDlvdThres
   5)LMI NetwFail      11)Modem Fail       17)PVCDly Thresh   23)PVCAvailable
   6)LMI UserFail      12)DialLineFail     18)Login Fail      24)PVCUnavail


        Clear Holdoff [H=#]: 5          Terminate Delay [D=#]: 45
         1 thru 15 minutes              1 thru 120 seconds
Help[?]    Save[SA]    Cancel[X]
>
```

Figure 4-7 SNMP Trap Manager Configuration Screen

Occurrences of any Traps (unless disabled), will be sent to all Trap Managers defined, including Traps sent Out-of-Band (dial-out) using the FrameSaver NP 64+ internal modem.
Out-of-Band Traps, however, will only be sent provided the modem is not already in use when the trap occurs.

1. **Mgr # *n* (1-6)** - Parameters to be selected for each Trap Manager are as follows:
   Each Trap Manager defined will be sent a copy of each Trap (alarm) that occurs.

CAUTION

The Loss-of-Power (cry-for-help) Trap will only be sent to the <u>First</u> Trap Manager defined. This Trap Manager should be defined with a WAN or Payload IP Address to ensure receipt of this trap. A CPE IP Address defined Trap Manager will probably not receive this Trap, due to this message not passing through other CPE equipment affected by the loss of power.

IP Add - Sets the IP Address for each Trap Manager designated to receive Traps.
Name - 32-character string that identifies the Trap Manager.

Path - Selects WAN (W) or Payload/CPE (P) as the management path for sending traps to the corresponding Trap Manager.

CAUTION

Trap Manager addresses must be unique across both WAN and P/C Networks. Out-of-band traps are sent to all trap managers assigned to one of the two paths. The AC power loss trap is sent to the first trap manager in the list with a valid IP address.

2. **Disable Traps** - Selects Traps to be disabled. Can be selected individually, in a range, or group. Selected (disabled) items are bracketed by ">>".....".<<" characters as shown in Figure 4-7, item #1.

NOTE: Trap descriptions are provided in the Diagnostics sections of this manual.

3. **Clear Holdoff** - Sets the number of minutes that a trap condition must remain clear, before it is declared clear.

4. **Terminate Delay** - Sets the time a Dial-Out connection will remain in place after the last out-of-band trap was sent, to permit exchange of additional PDUs (Protocol Data Units).

Commands:

Help [?] - Advances to "Help" for SNMP Community Access Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

Save the SNMP Trap Manager Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Proceed to PVC Configuration, selecting [PC] by typing "PC" followed by ENTER.

PVC Performance Configuration

The PVC Performance Configuration screen allows you to view and alter parameters for Network Delay, Bandwidth utilization, and congestion measurement operations.

The PVC Performance Configuration screen is shown in Figure 4-8.

```
*********************** PVC Performance Configuration ***********************
     Name: F@43802

Desired Delay Mon Rate [R=#]: 10          Drpd Mon Pkt Thres [L=#]: Disabled
 X to Disable or 1 thru 240 Seconds        X to Disable or 1 thru 895 pkts
Min Pkts for Delay Alarm [C=#]: 10        PVC Delay Thres [T=#]: Disabled
 3 thru 895 pkts                           X to Disable or 10 thru 9000 mSecs
Desired Loss Mon Rate [S=#]: 60           PVC Dlvd Pkt Thres [G=#]: Disabled
 X to Disable or 60 thru 240 Seconds       X to Disable or 10 thru 99 %
"LMI" CIR Values [V=]                      Interval Period [I=#]: 15
>>1) Use<<                                 1 thru 15 minutes
  2) Ignore
        CIR Bins [B=#,#,#,#,#,#]: 25,35,50,71,100,141    (1 thru 200 %)

 Auto: TxCIR[A1=#]:0    RxCIR[A2=#]:0     Mon [AM=None,Dlay,Loss,orBoth]: None
Manual: TxCIR[M1=#]:0   RxCIR[M2=#]:0     Mon [MM=None,Dlay,Loss,orBoth]: Dlay
        0 thru 64 Kbs
AddPVC [A=#]  DeletePVC [D=#] ([A=m,n,...r) and/or [A=m-n] for multiple entries)
 PVC,TxCR,RxCR,Mon    PVC,TxCR,RxCR,Mon    PVC,TxCR,RxCR,Mon    PVC,TxCR,RxCR,Mon


Help[?]    Save[SA]    Cancel[X]
>
```

Figure 4-8 PVC Performance Configuration Screen

1. **Desired Delay Mon Rate** - Setting for the rate at which a Delay measurement packet is injected on each PVC in the list specified at the bottom of this screen. Default value (10) dictates that within each 10-second period, every PVC on the list is measured once. A PVC's measurement packet is considered lost if it does not return before a subsequent packet is injected on that PVC. The packet send rate cannot exceed 10 per second.

    NOTE: FrameSaver NP 64+ Delay measurement packets are 36 bytes in length, when issued. A FrameSaver NP looping (receiving and returning) a Delay measurement packet will add two additional bytes to the packet.

2. **Min Pkts for Delay Alarm** - Setting for the number of packets that must be received within the current interval on a PVC before the "PVC Delay Thres" average is considered a valid check for that PVC. If the number is not reached within the interval, that PVC cannot cause the alarm condition to be declared or maintained, based on the average of the packets received.

3. **Desired Loss Mon Rate** - Setting for the rate at which a Loss measurement packet (Packet-Counting packet) is injected on each PVC in the list specified at the bottom of this screen. Default value (60) dictates that within each 60-second period, every PVC in the list is measured once. A PVC's packet is considered lost if it does not return before a subsequent packet is injected on that PVC. On a per-PVC basis, the originating unit delays 10 seconds if the previous response was lost. The packet send rate cannot exceed 10 per second.

   NOTE: FrameSaver NP 64+ Loss packets are 42 bytes in length, when issued. A FrameSaver NP looping (receiving and returning) a Loss packet will add two additional bytes to the packet.

4. **Drpd Mon Pkt Thres** - FrameSaver NP 64+ maintains a count of monitor packets lost (both Delay and Loss packets) for the current interval for each PVC. When either of the monitor packet counts on any PVC equal or exceed this threshold setting, a "PVC Drpd Mon Alarm" alarm is declared. The alarm is cleared when all PVCs in a subsequent interval fail to equal or exceed the threshold value. Applies to auto and manually learned DLCIs.

5. **PVC Delay Thres** - FrameSaver NP 64+ maintains an average delay measurement for each PVC for the current interval. A "PVC Delay Alarm" is declared when the average on any PVC equals or exceeds this setting. The alarm is cleared when all PVCs in a subsequent interval fail to equal or exceed the threshold value. Applies to auto and manually learned DLCIs.

6. **PVC Dlvd Pkt Thres** - A "PVC Dlvd Pkt Alarm" is declared when the percentage of packets delivered on any monitored PVC falls below this threshold setting. The alarm is cleared when all PVCs in a subsequent interval fail to fall below the threshold value. Applies to auto and manually learned DLCIs.

7. **Interval Period** - Sets the time period for each interval of PVC statistics, from one (1) to 15 minutes.

   NOTE: Changing the interval period will cause all PVC monitoring statistics to be cleared.

8. **"LMI" CIR Values** - Selecting "Use," sets (automatically) the CIR value of each PVC to the value reported by the Frame Switch LMI message.

   NOTE: This feature operates only with "LMI" LMI Protocol selected.

9. **CIR Bins** - Sets the upper value (in %) for each of the six "bins" in which CIR data will be collected. All six values must be entered with each setting.

10. **Auto** & **Manual** - Specifies the Tx and Rx CIR value and Mon (monitoring packet(s)) type to be used when PVCs are added to the statistics list. Valid CIR values are 0 through 64, default value is zero.

   Auto - When a non-configured PVC is detected, the indicated settings are used until reconfigured by an operator, learned from the LMI, or the PVC is unlearned (via reset or software purge).

   Manual - For PVCs manually added (using the AddPVC command), the parameters will be as specified here.

   Mon - Selects the Monitor setting for PVCs added automatically and manually. Defaults are None for Auto, and Delay for Manual.

   Dlay = Delay packets only.

   Loss = Loss packets only.

   Both = Delay and Loss packets.

   None = Neither packet types will be sent.

11. **Add PVC** - Inserts one or more additional DLCIs (to a maximum of eight) onto the list to be monitored.

   NOTE: If a WAN DLCI (dedicated or tunneled) has been defined for FrameSaver NP management, it is automatically included as one of the eight for monitoring. The WAN DLCI however, is not displayed in the list unless manually added. If not added to the list, the 8th listed DLCI will <u>NOT</u> be monitored.

12. **Delete PVC** - Removes one or more DLCIs from the list.

   PVC,TxCR,RxCR,Mon - Heading under which the DLCIs and parameters are listed (in numerical order) for all PVCs to be included for continuous background performance measurement. A maximum of eight DLCIs may be listed.

Commands:

Help [?] - Advances to "Help" for PVC Performance Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

Save the PVC Performance Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Protocol Monitor Configuration

The Protocol Monitor Configuration Screen allows you to view and alter parameters for Protocol Monitor and Top IP Traffic collection operations.

The Protocol Monitor Configuration Screen is shown in Figure 4-9.

```
*********************** Protocol Monitor Configuration ***********************
      Name: F@43802


  Protocols [P=] ([P=m,n,...r] and/or [P=m-n] for up to 7 selections)
 >> 1) IP<<                >>11) APPLETALK(SNAP)<<     21) DECNET(Raw)
    2) IP/TCP              >>12) DECNET(SNAP)<<        22) VINES(Raw)
    3) IP/TCP/TELNET         13) VINES(SNAP)           23) XNS(Raw)
    4) IP/TCP/FTP            14) XNS(SNAP)             24) IP/TCP/HTTP
    5) IP/UDP                15) ISO CLNP(IETF)        25) IP/TCP/GOPHER
    6) IP/UDP/SNMP           16) IP/ICMP
 >> 7) IPX(SNAP)<<           17) IP/TCP/SMTP
    8) IPX/SPX(SNAP)         18) IPX(Raw)
 >> 9) NETBIOS(SNAP)<<       19) IPX/SPX/(Raw)
 >>10) SNA(SNAP)<<           20) APPLETALK(Raw)


               Top Statistics [T=]          Rank Top Stats By [R=]
             >>1) Conversation<<            >>1) Octets<<
               2) Talk/Listen                2) Packets
               3) Disable

Help[?]    Save[SA]    Cancel[X]
>
```

Figure 4-9 Protocol Monitor Configuration Screen

1. **Protocols** - Selects up to seven protocols to be monitored, from the protocol list displayed. All protocols to be monitored must be entered with a single command. Can be selected individually, in a range, or group. Selected items are bracketed by ">>".....".<<" characters as shown in item #1 on the example screen above. Enter "P=" followed by nothing or a space to deselect all (factory default). Parenthesis indicate the subset under which a protocol is grouped, such as SNAP (Refer to "Encapsulation" on page 4-12 in this manual for details).

2. **Top Statistics** - Selection determines whether the Top IP Traffic collection will be based on the top User "Talker" and "Listener," or the top "Conversation" Pair in each direction. Factory default is "Disable."

   Top Talker/Listeners are determined by separately tracking, in the send and receive direction, the IP address and the total traffic of the most prolific transmitters and receivers of IP traffic within the measurement interval.

   Top Conversation Pairs are determined by separately tracking, in send and receive direction, IP address pairs of each host/client conversation and the total traffic sent by each pair during the measurement interval.

   Both Top Conversation Pair and Talker/Listener are calculated across the aggregate link regardless of the PVC on which the traffic occurred.

3. **Rank Top Stats By** - Selection determines whether the Top IP Traffic collection will be ranked by IP traffic with the highest Packet counts or IP traffic with the highest Octet counts.

Commands:

Help [?] - Advances to "Help" for Protocol Monitor Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

Save the Protocol Monitor Configuration changes when they are all set correctly by entering "SA" followed by ENTER. Also returns the user to the System View screen.

Configuration Completed

The basic FrameSaver NP 64+ initial configuration is now completed.

If the unit is not optionally equipped, such as with an ISDN Adapter, or the option feature will not be used at this time, then proceed to the next section of this manual, Test Installation.

If the FrameSaver NP 64+ is equipped with an option module, proceed to Section 6, "Options" of this manual for installation and configuration instructions for that option.

Test Installation

The final step of the FrameSaver NP 64+ installation is to verify operations. This is done through the Network Control Center (NCC).

1. Contact the Network Control Center and inform the Operator that the physical installation and initial configuration are completed.

2. The NCC will establish a management session to the FrameSaver NP 64+ and complete any final/additional configuration, and review the system's status screens to verify operation.

NOTE: To enable NCC management access, the local console session must be logged out, and if the NCC is attempting a dial-in connection, the local terminal must also be disconnected from the AUX 2 port.

If this installation is configured for Out-Of-Band Trap Reporting, a test of this feature should also be performed. This is done by initiating a Network communications failure which causes the FrameSaver NP 64+ to issue a Trap Report to the Trap Manager. This test must be coordinated with the NCC Operator to verify that the Trap Report is received and that Network communications are restored after the test.

3. Coordinate the initiation of this test with the NCC Operator, and when told to do so, disconnect the DDS Line from the FrameSaver NP 64+. The FrameSaver NP 64+ will dial-out to issue a Trap Report after approximately five (5) seconds. This can be seen on the front panel by the "MODEM IN USE" LED going steady ON. After the "MODEM IN USE" LED goes OFF, reconnect the DDS Line and confirm with the NCC Operator that the Trap Report has been received, and that good communications have been reestablished with the FrameSaver NP 64+.

NOTE: If the NCC management session (Step # 2) was established via dial-in, this must be terminated before the FrameSaver NP 64+ can use the Modem to issue the Trap Report.

This dial-out Trap Report test is highly recommended because it adds a greater level of confidence to the completion of the installation process. This test verifies all of the following, in addition to the normal operation of the FrameSaver NP 64+:

- Dial Line is operational and a call can be made (not inadvertently blocked).

- Trap Manager phone number is correct.

- IP Address is correct.

- Trap Manager Address and Community are correct.

The installation and initial testing are now complete. If any results were other than those described, refer to section 5 Diagnostics of this manual for assistance.

5 Diagnostics

This section contains general diagnostic information for basic FrameSaver NP 64+. Refer to Section 6, "Options" of this manual for additional diagnostic information regarding optional features such as the ISDN Adapter or Second DSU.

FrameSaver NP 64+ diagnostic features include; Front Panel LED Indicators, BER Testing, Statistic gathering and reporting, and Alarm reporting.

LED Indicators

Front panel indicators are shown in Figure 5-1 and described in Table 5-1.
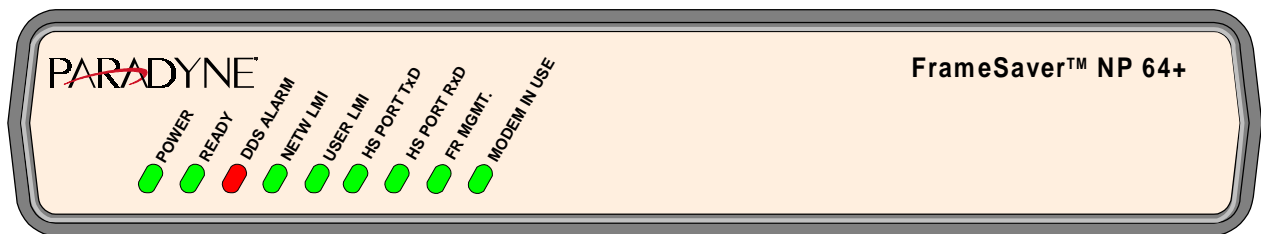
Figure 5-1 FrameSaver NP 64+ Front Panel View (Basic)

Table 5-1 FrameSaver NP 64+ Front Panel Indicators

Nomenclature	Description	Function
POWER	Green LED	ON, indicates unit is receiving proper operating voltages.
READY	Green LED	Steady ON, indicates unit has successfully passed its internal self-test. FLASHING, indicates the unit is performing its self-test (test time approx. 45 sec.). OFF after self-test, indicates a hardware failure was detected during the self-test.
DDS ALARM	Red LED	OFF, indicates the DDS Facility (WAN) is active, properly connected, and the DSU is in sync. with the DDS Network. ON, indicates RLOS or OOS condition detected. FLASHING simultaneously with FR MGMT. LED, indicates software download* in process.
NETW LMI	Green LED	ON, indicates network is responding to all LMI requests from unit. FLASHING, indicates unit is reaching timeout before some (but not all) network LMI responses are received. OFF, indicates no network response to LMI requests.
USER LMI	Green LED	ON, indicates unit is receiving all LMI requests from user (DTE). FLASHING, indicates unit is reaching timeout before some (but not all) user LMI requests are received. OFF, indicates no user LMI requests to unit.
HS PORT TxD	Green LED	ON, indicates High Speed data is being Received from the local DTE (Router).
HS PORT RxD	Green LED	ON, indicates High Speed data is being Sent to local DTE (Router).
FR MGMT.	Green LED	On momentarily whenever a message is received on the Management Channel PVC. FLASHING simultaneously with DDS ALARM LED, indicates software download* in process.
MODEM IN USE	Green LED	Steady ON, indicates the modem is connected to a port. FLASHING, indicates that ringing is incoming on the Dial Line.
*See Software Download at the end of this section for description.		

Testing

FrameSaver NP 64+ provides management access diagnostic test support.

Diagnostic Test Support

FrameSaver NP 64+ supports diagnostic loopback testing and can source a BER Test directed toward the DDS circuit or toward the DTE.

A block diagram of the test paths within the FrameSaver NP 64+ is shown in Figure 5-2.
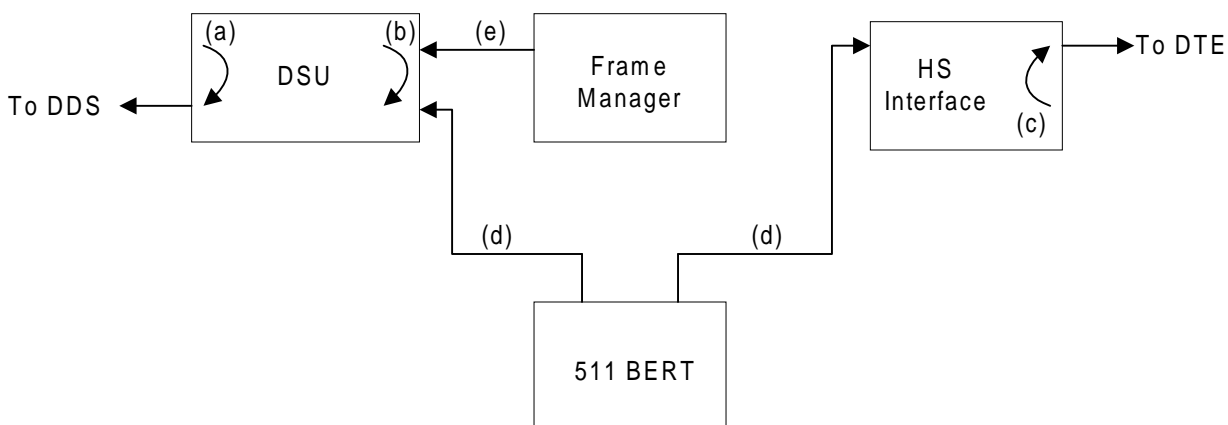
Figure 5-2 Diagnostic Test Paths

The arrows indicate the direction of the loopbacks and direction of the sourced test.

Loops and sources are as follows:

a. CSU loop in response to reversal of line polarity.

b. Latching and non-latching DSU loop in response to network control code. Also, the equivalent of a latching DSU loop by operator command.

c. DTE loop at the Data Port (high speed interface) by operator command.

d. Unframed 511 BER Test directed toward the DDS circuit or DTE by operator commands issued through management session. BER results are updated every five seconds and displayed on the DSU Test screen.

e. Framed Test Packets directed toward the DDS circuit by operator commands issued through management session. Results are updated every five seconds and displayed on the DST Test screen.

NOTE: A "hard" loopback applied at the unit's DDS connector can be used to quickly isolate a DDS Facility failure from a FrameSaver NP problem. With this loopback in place, a working unit should display a Receive Level between -10 to 0 dB on the System View and DSU Statistics Summary screens. Also a BERT to Network test will pass.

The DSU Test screen is accessed form the System View screen, selecting [DT} by typing "DT" followed by ENTER.

DSU Tests

The DSU Test screen provides base card status and access to DSU tests.

The DSU Test screen is shown in Figure 5-3.

```
******************************** DSU Test ********************************
     Name: F@43802


  DSU Fault:                         Frame Mgr Fault:
   DSU Loop:


       Test Mode [T=]                     High Speed Interface
        1) Clear                              DTR: On
     >>2) BERT to Netw<<                      RTS: On
        3) BERT to User                     Power: On
        4) Test Pkts to Netw            Interface: ITU-V35
        5) Loop to User
        6) Loop to Netw


BERT: Blocks Sent:   ,   ,     Block Errors:   ,   ,     BlkErr Rate: 0.00E+00
      Test Duration: 00:00:00

ResetTest[RT]   Clear Loop[CL]    InjectErr[IE secs]     RebootExt[RE secs]
Help[?]    Close[X]    AutoUpdate[AU]
>
```

Figure 5-3 DSU Test Screen

DSU Fault, **Frame Mgr Fault** and **DSU Loop** - Display (blank) or the highest priority Fault causing a disruption of the data path.

Refer to the Appendix in this manual for a list and description of all fault displays.

Test Mode - Allows selection of the following mutually exclusive test modes:

Clear - Terminates operator or Telco-initiated Loopbacks, BERT, and Test Packet tests.

BER Testing:
Unframed 511 BER patterns (1000 bit block size) can be directed either toward the Network or toward the User. Only one BER test may be active at a time. The results are a count of the number of Blocks Sent, Blocks Errored, Block Error Rate and the duration of the test, displayed as shown on the example screen above. When the BERT duration reaches the maximum count of 99:59:59, all counts freeze until cleared or reset by the operator (the BERT data however, continues to be sent).

Test Packets toward the Network - Sends Link Test Packets (40 -1590 octets) toward the network (DDS Facility). Displayed test results include selected DLCI, packets sent, packets dropped, percent received, octets sent, test duration and average and maximum delay (network and full delay), for each network.

Loop to User - Loops data back to High Speed Interface Port.

Loop to Netw - Loops data back to Network.

NOTES:

1. PVC tests will prompt for the input of a PVC DLCI destination.

2. "Test Pkts to Netw" delay values may not correlate to values displayed on the PVC Statistics Screens because the Link Test Packet size (40 - 1590 octets) is larger than the Delay measurement packet (36 octets).

3. Delay and Loss measurement packets (for <u>ALL</u> PVCs) are halted, while a "Test Pkts to Netw" test is performed. This will also affect the Delay and Loss packet counts and measurement fields on the PVC Statistics Screens.

4. Initiating certain test options when management access is via the DDS link would terminate management.These tests will be blocked and an Error Message displayed on the screen. Examples of this are "BERT to Netw" and "Test Pkts to Netw" where the DLCI selection matches the management DLCI of this unit.

High Speed Interface Status -
    DTR: State of DTR lead, when Power is being detected from the DTE.
        States are: ON, OFF or (blank) if Power OFF.
    RTS: State of RTS lead, when Power is being detected from the DTE.
        States are: ON, OFF or (blank) if Power OFF.
    Power: ON or OFF based on sensing voltage on Tx data lead(s) from the DTE.
    Interface: Interface adapter cable currently installed.
        Types are: ITU-V35, EIA-530, EIA-530-A, ITU-X21-NS, EIA-232 or (blank) if none.

Commands:

ResetTest [RT] - Resets BERT or PVC result counters without disrupting the test operation and refreshes all dynamic information contained on the screen.

ClearLoop [CL] - Resets the DSU loop hardware removing any existing latched loopbacks.

InjectErr [IE secs] - Injects a single bit error into the BERT stream. When issued without the "secs," a single bit error will be injected at execution of this command. When issued with a "secs" value between 1 - 255, a single bit error will be injected once a second for the number of "secs" entered (user can issue other commands while this takes place in "background").

ReBootExt [RE secs] - Used with Model 467 Power Control Unit to ReBoot DTE de-vice. With no secs parameter, causes Power Control Unit to remove power for five sec-onds. With secs parameter, causes power to remain off for the specified number of seconds (1 to 30).

Additional commands on this screen are:

AutoUpdate [AU] - Provides automatic screen update and refresh (every five seconds) of all status and Test (when active) results. No changes can be made while in this mode, and the bottom lines on the screen are replaced as shown in Figure 5-4. AutoUpdate is exited by pressing ENTER.

```
         --->   Screen updates every 5 seconds   <---
         --->   Press Enter for Command Prompt   <---
```

Figure 5-4 Auto Update Screen Change

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Statistics

FrameSaver NP 64+ provides current and historical performance statistics for the following:

- DSU interface

- DSU and Frame Relay Traffic (in summary and on a per-PVC basis)

- PVC, Protocol, and Top IP Traffic statistics

DSU and Frame Manager statistics are accumulated in 15-minute intervals for the last 24 hours. PVC, Protocol monitoring, and Top IP Traffic statistics are accumulated in user-defined intervals (1 - 15 minutes).

DSU Statistics Summary

The DSU Statistics Summary screen provides summary performance information and access to detailed performance history displays.

The DSU Statistics Summary screen is shown in Figure 5-5.

```
*************************** DSU Statistics Summary ***************************
     Name: F@43802

                     System Test/Fault:

   DSU Status                              High Speed Interface Status
     Rx Level: -10dB                                  DTR: On
    Data Rate: 56k                                    RTS: On
                                                    Power: On



                     Current Interval Count: 455 secs
                     24 Hour Interval Count: 96 Valid


         ---------- DSU ----------  -Bkp-  ---- Network ----   ----- User ------
          RLOS    OOS     BPV    LBK (y/n) LTO    LFE    DFES   LTO    LFE   DFES
   Curr     0      0       0      0   n     0      0      0      0      0      0
   24 Hr    0      0       0      0   y     0      0      0      0      0      0


ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]    Close[X]    AutoUpdate[AU]
>
```

Figure 5-5 DSU Statistics Summary Screen

Name - Device's ID as defined in unit's Device Configuration.

System Test / Fault - Displays (blank) or the highest priority Test or Fault causing disruption of the data path.

Refer to the Appendix in this manual for a list and description of all fault displays.

DSU Status -
    Rx Level: Value in dB of the signal level as measured on the DDS Loop.
        Valid values are: -0 to -50dB or (blank) if in RLOS state.
    Data Rate: DDS Loop data rate as detected by the unit.
        Valid values are: 56k, 64k or (blank) if in RLOS state

High Speed Interface Status -
    DTR: State of DTR lead, when Power is being detected from the DTE.
        States are: ON, OFF or (blank) if Power OFF.
    RTS: State of RTS lead, when Power is being detected from the DTE.
        States are: ON, OFF or (blank) if Power OFF.
    Power: ON or OFF based on sensing voltage on Tx data lead(s) from the DTE.

Current Interval Count - Displays the number of seconds that have elapsed in the current 15-minute interval.

24 Hour Interval Count - Displays the number of 15-minute intervals that have been accumulated since the last reset of the counters (max. 96).

DSU (heading) - The following DSU parameters are displayed:

    RLOS: Receive Loss of Signal (carrier loss) - Count of seconds during which DSU detects Loss of Signal.
    OOS: Out of Service - Count of seconds during which DSU detects Out of Service codes (ASC, MOS, TEST, TIP, or UMC).
    BPV: Bipolar Violations - Number of bipolar violations accumulated during the interval.
    LBK: Loopback - Count of seconds during which DSU is in telco-initiated CSU or DSU loopback.

Bkp - Displays "y" for yes, or "n" for no, to indicate whether the traffic had been rerouted by a dial backup connection anytime during the interval.

Network and **User** (headings):

Network - Statistics representing traffic received from the frame switch.

User - Statistics representing traffic received from the DTE (router).

The Frame Relay traffic parameters displayed for Network and User are:

    LTO: LMI Timeouts - Count of LMI timeouts detected for the interval.

    LFE: LMI Frame Errors - Count of LMI Frame Errors detected for the interval.

    DFES: Data Frame Errored Seconds - Count of seconds during which the unit's Frame Manager detects an Errored data frame.

    NOTE: When the "LMI Protocol" is set to "None," the values for LTO and LFE will be blank.

Curr - Displays the total count for each of the performance parameters within the current 15-minute interval.

24 Hr - Displays the total counts for each of the performance parameters over all valid intervals.

Additional commands on this screen are:

ResetStats [RS] - Clears all counters (including 24-hour history).

ViewHistory [VH current_time (optional)**]** - Advances to Page 1 of the DSU Statistics History screen.

The "current_time" optional parameter causes the history interval count to reflect the actual time-of-day rather than a simple count of intervals. The entry is in 24-hour format, using three or four digits. Example: 1445 = 2:45 PM.

DSU Statistics History

The DSU Statistics History screen displays all performance parameters for the DSU and Frame Relay Traffic for each of the 96 possible, 15-minute intervals.

The first history screen (1 of up to 6) is accessed by selecting ViewHistory [VH] from the DSU Statistics Summary screen.

The first page of the DSU History screen is shown in Figure 5-6.

```
*************************** DSU Statistics History ***************************
     Name: F@43802
                             Page [P=#]: 1 of 6
   Past   ---------- DSU ---------- -Bkp-  ---- Network ----    ----- User ------
   Int. RLOS      OOS      BPV     LBK (y/n) LTO     LFE    DFES   LTO    LFE    DFES
      1     0       0       0       0    n    0       0       0     0      0       0
      2     0       0       0       0    n    0       0       0     0      0       0
      3     0       0       0       0    n    0       0       0     0      0       0
      4     0       0       0       0    y    0       0       0     0      0       0
      5     0       0       0       0    y    0       0       0     0      0       0
      6     0       0       0       0    y    0       0       0     0      0       0
      7     0       0       0       0    n    0       0       0     0      0       0
      8     0       0       0       0    n    0       0       0     0      0       0
      9     0       0       0       0    n    0       0       0     0      0       0
     10     0       0       0       0    n    0       0       0     0      0       0
     11     0       0       0       0    n    0       0       0     0      0       0
     12     0       0       0       0    n    0       0       0     0      0       0
     13     0       0       0       0    n    0       0       0     0      0       0
     14     0       0       0       0    n    0       0       0     0      0       0
     15     0       0       0       0    n    0       0       0     0      0       0
     16     0       0       0       0    n    0       0       0     0      0       0
Help[?]    Close[X]
>
```

Figure 5-6 DSU Statistics History Screen

Page [P=] - Selects the desired History page.

DSU, **Network** and **User** statistics are as described for the previous screen (DSU Statistics Summary).

Bkp - Indicates whether the interval traffic had been rerouted by a dial backup connection during the interval.

Interval "1" shows the statistics for the most recently *completed* interval of the previous 24 hours.

The interval can be displayed as time-of-day rather than a simple count of intervals by including the "current_time" parameter with the command to enter this screen, as described on the previous page of this manual.

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PVC Statistics Summary

The PVC Statistics Summary screen provides summary performance information and access to detailed performance history displays for the Frame Relay traffic on a per-PVC basis.

The PVC Statistics Summary screen is shown in Figure 5-7.

```
*************************** PVC Statistics Summary ***************************
Name: F@43802                       Mode[M=P,TC,RC,TL,RL,FD,orND]:Pkt&Oct
  (P=Pkt&Oct,TC=TxCir,RC=RxCir,TL=TxLoss,RL=RxLoss,FD=FullDlay,orND=NetwDlay)
FirstDLCI[P=#]: 16    Current Interval Count: 455 of 900 secs     Delay(mS)
  DLCI RxOcts/Kbs TxOcts/Kbs RxPkts TxPkts BECN FECN   RxDE   TxDE  Avg  Max
    25       0/ 0       0/ 0      0      0    0    0      0      0   55   70
    33       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   234       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   341       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   464       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   531       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   793       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   795       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   942       0/ 0       0/ 0      0      0    0    0      0      0   55   70
   Etc       0/ 0       0/ 0      0      0    0    0      0      0
   Sum       0/ 0       0/ 0      0      0    0    0      0      0
-- 15 Min Interval History: 96 Valid -- Past Summary for DLCI [D=#orSum]: Sum --
          RxOcts/Kbs     TxOcts/Kbs    RxPkts    TxPkts BECN FECN    RxDE      TxDE
10 Secs:       0/ 0          0/ 0         0         0    0    0        0         0
History:       0/ 0          0/ 0         0         0    0    0        0         0
ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]    Close[X]    AutoUpdate[AU]
>
```

Figure 5-7 PVC Statistics Summary Screen (Packet & Octet Mode)

Mode [M=] - Selects one of the displayed modes.

First DLCI - Selects first DLCI number to be displayed (or first higher number.)

Current Interval Count - Displays "n" of "m" seconds, where "n" indicates the number of elapsed seconds in the current interval, and "m" indicates the total number of seconds per interval (set on the PVC Performance Configuration Screen). Current interval statistics are total counts for each parameter within the current interval.

NOTE: **Rx** - Indicates traffic received from the Frame Relay Network.
            Tx - Indicates traffic sent toward the Frame Relay Network.

Packet & Octet Mode

The Frame Relay traffic parameters displayed for each DLCI are:

DLCI - The DLCI to which this line of statistics applies. "Etc" is the summation of all unlisted DLCIs and "Sum" is the summation of all DLCIs.

RxOcts/Kbs - Count of bytes Received within packets/Data rate in kilobits per second, calculated from the total Octets counted for the protocol category.

TxOcts/Kbs - Count of bytes Sent within packets/Data rate in kilobits per second, calculated from the total Octets counted for the protocol category.

RxPkts & **TxPkts** - Count of packets received (Rx) and count of packets sent (Tx).

> **NOTE:** Measurement Packets (Delay, Loss, & Link Test) are included in the RxPkts and TxPkts counts of the FrameSaver NP originating the packets. Measurement packets are included *only* in the RxPkts count of a FrameSaver NP looping (receiving and returning) Measurement Packets.

BECN & **FECN** - Count of packets with the BECN or FECN bit set. If the count exceeds 9999, the displayed value will be 9999.

RxDE & **TxDE** - Count of packets received (Rx) with the DE bit set and count of packets sent (Tx) with the DE bit set (*does not* include Measurement Packets).

Delay (mS) Avg & **Max** - Average and Maximum round trip delay of Delay measurement Packets echoed by a distant FrameSaver NP unit. These values are overwritten with 9999 during an interval where PVC "Drpd Mon Pkt Alarm" has been detected for that specific PVC. These values are set to "0" (zero) for PVCs not designated for the sending of Delay Packets.

> **NOTE:** Sending of Delay and Loss measurement packets is suspended for <u>ALL</u> PVCs while a "Test Pkts to Netw" (operator initiated) test is performed on any PVC.

As PVCs are passed, new DLCIs are added to the list which are displayed in numerical DLCI order. If the total number of DLCIs with traffic exceeds nine, within the interval, the tenth line labeled "Etc" appears containing the count of all packets not counted in the previous nine.

***n* Minute Interval History** - Displays the number of valid intervals that have been accumulated since the last reset of the counters. ("n" value is Interval Period set on the PVC Performance Configuration screen.) History statistics are total counts for each performance parameter over all valid intervals up to 96 intervals.

Past Summary for DLCI [D=#orSum] - Determines what part of statistics history will be used to produce the 10-second and History statistics displays. Choices are:

Specific PVC - Enter DLCI number (#) or "Etc," for that PVC.

Sum of all PVCs - Enter Sum (or only "S").

Frame Relay traffic parameters displayed are the same as for Current Interval above.

10 Secs: - Counts for each of the performance parameters for the selected PVC(s) accumulated during the first 10-second period after entering this screen.

NOTE: This count will update every 10 seconds only if AutoUpdate [AU] is activated.

History: - Total counts for each of the performance parameters for the selected PVC(s) over all valid intervals up to a maximum of 96 intervals. Does not include current interval.

TxCir & RxCir Modes

The TxCir Mode screen display is shown in Figure 5-8.

```
*************************** PVC Statistics Summary ***************************
Name: F243802                          Mode[M=P,TC,RC,TL,RL,FD,orND]:TxCir
  (P=Pkt&Oct,TC=TxCir,RC=RxCir,TL=TxLoss,RL=RxLoss,FD=FullDlay,orND=NetwDlay)
FirstDLCI[P=#]: 16    Current Interval Count: 455 of 900 secs          CIR
  DLCI  |  0  |1-25 | -35 | -50 | -71 | -100| -141| >141%(ofCIR)  UAS   Kbps
    25   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
    33   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   234   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   341   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   464   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   531   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   793   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   795   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   942   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
   Etc
   Sum   100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)
-- 15 Min Interval History: 96 Valid -- Past Summary for DLCI [D=#orSum]:  25 --
          |  0  |1-25 | -35 | -50 | -71 | -100| -141| >141%(ofCIR)  UAS   Kbps
10 Secs: 100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
History: 100.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0%(ofTime)   0      0
ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]   Close[X]    NextPage[+]    AutoUpdate[AU]
>
```

Figure 5-8 PVC Statistics Summary Screen (TxCIR Mode)

TxCIR and **RxCIR** Modes - Display the Tx or Rx traffic level for each PVC based on the time spent at each range of CIR.

   xxx% (of CIR), column headings - Indicate the range of values assigned on the PVC Performance Configuration Screen to each of the "Bins" (columns). In the example shown in Figure 5-8 above, the CIR ranges for the eight Bins are:

   | 0 | 1 - 25 | 26 - 35 | 36 - 50 | 51 - 71 | 72 - 100 | 101 - 141 | > 141 |

   xxx% (of Time) - Indicates the percentage of available seconds during which the traffic level for this PVC was within this Bin's CIR range.

   UAS - UnAvailable Seconds determined by LMI reporting that the PVC is not listed active in LMI Full Status Messages or while Netw LMI Failure exists. (UAS counts are not maintained for the FrameSaver NP's WAN Management PVC.)

   CIR Kbps - Current CIR value being used for percent of usage calculations (binning), for each PVC listed.

TxLoss & RxLoss Modes

TxLoss Mode screen display is shown in Figure 5-9.

```
*************************** PVC Statistics Summary ***************************
Name: F243802                         Mode[M=P,TC,RC,TL,RL,FD,orND]:TxLoss
   (P=Pkt&Oct,TC=TxCir,RC=RxCir,TL=TxLoss,RL=RxLoss,FD=FullDlay,orND=NetwDlay)
FirstDLCI[P=#]: 16    Current Interval Count: 455 of 900 secs
   DLCI      NonDEPkts/-DEPkts-/Sta         NonDEPkts/-DEPkts-/Sta    %Dlvd
    25 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
       NNI-1:        0/       0/      NNI-2:        0/       0/
    33 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   234 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   341 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   464 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   531 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   793 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   795 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   942 Origin:       0/       0/Rst  Destin:       0/       0/      100.000
   Sum
-- 15 Min Interval History: 96 Valid -- Past Summary for DLCI [D=#orSum]:  25 --
    NonDEPkts/--DEPkts--      NNI-1      NNI-2  NonDEPkts/--DEPkts--/Sta   %Dlvd
LstP:      0/       0          0          0         0/       0/      100.000
H:         0/       0          0          0         0/       0/      100.000
ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]   Close[X]    NextPage[+]    AutoUpdate[AU]
>
```

Figure 5-9 PVC Statistics Summary Screen (TxLoss Mode)

TxLoss Mode - Displays Loss measurement packet data for each PVC based on Loss packets originating from this FrameSaver NP.

RxLoss Mode - Displays Loss measurement packet data for each PVC based on Loss packets originating from a distant FrameSaver NP.

NonDEPkts/DEPkts - Counts of packets (with and without DE flags) which have passed through the indicated segment.

Sta - Status for the indicated device. One of the following will appear:
(blank) - Indicates normal status.
Drpd - The number of Dropped Loss measurement Packets has exceeded the threshold for this PVC. (TxLoss mode only.)
Rst - Resync was executed at some time during the interval.

Origin & Destin - The Origin counts and status from the device where the traffic is entering the network. Destination values are derived from where the traffic leaves the network.

NNI-1 - Values are from the first NNI encountered after the Origin.

NNI-2 - Values are from the second NNI encountered after the Origin.

% Dlvd - Percentage of sent packets delivered to the far end (NonDEPkts plus DEPkts).

LstP - Counts (as above) for the Last Loss measurement packet received.

H - Counts (as above) for the accumulated history.

NOTE: Sending of Delay and Loss measurement packets is suspended for <u>ALL</u> PVCs while a "Test Pkts to Netw" (operator initiated) test is performed on any PVC.

**FullDlay &
NetwDlay Modes**

Full Delay screen display is shown in Figure 5-10.

```
************************** PVC Statistics Summary **************************
Name: F@243802                        Mode[M=P,TC,RC,TL,RL,FD,orND]:FullDlay
   (P=Pkt&Oct,TC=TxCir,RC=RxCir,TL=TxLoss,RL=RxLoss,FD=FullDlay,orND=NetwDlay)
FirstDLCI[P=#]: 16    Current Interval Count: 455 of 900 secs
  DLCI           1stN:Avg  Max  MidN:Avg  Max  LstN:Avg  Max  Total:Avg  Max
    25  Delay(mS):      15   20        20   25        20   25         55   70
    33  Delay(mS):      15   20        20   25        20   25         55   70
   234  Delay(mS):      15   20        20   25        20   25         55   70
   341  Delay(mS):      15   20        20   25        20   25         55   70
   464  Delay(mS):      15   20        20   25        20   25         55   70
   531  Delay(mS):      15   20        20   25        20   25         55   70
   793  Delay(mS):      15   20        20   25        20   25         55   70
   795  Delay(mS):      15   20        20   25        20   25         55   70
   942  Delay(mS):      15   20        20   25        20   25         55   70
   Etc
   Sum
-- 15 Min Interval History: 96 Valid -- Past Summary for DLCI [D=#orSum]:  25 --
                1stN:---        MidN:---        LstN:---        Total:---
LastPkt:  Delay(mS):      55             55             55             55
History:
ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]    Close[X]    NextPage[+]    AutoUpdate[AU]
>
```

Figure 5-10 PVC Statistics Summary Screen (Full Delay Mode)

FullDlay and NetwDlay Modes - Display the round-trip network delay for each PVC based on Delay measurement packets received back from a distant FrameSaver NP. Applies only to PVCs configured for Delay packet measurement.

> **Full Delay -** Delay compiled from ALL Delay packets received.

> **Network Delay -** Delay compiled using only Delay packets which did not encounter congestion as they passed through the elements of the network (based on there being sufficient flags between packets).

> **1stN, MidN,** & **LstN** - Average and Maximum delay for each Network (up to three) through which the Delay packets passed.

> **Total: Avg & Max** - Average and Maximum delay for the Total round-trip of the Network through which the Delay packets passed.

> **LastPkt** - Delay based on the last Delay measurement packet received.

> **History** - Field unused in this mode.

> **NOTE:** Sending of Delay and Loss measurement packets is suspended for ALL PVCs while a "Test Pkts to Netw" (operator initiated) test is performed on any PVC.

Additional commands on this screen are:

ResetStats [RS] - Clears all counters (including 24-hour history).

ViewHistory [VH current_time (optional)] - Advances to Page 1 of the PVC Statistics History screen.

The "current_time" optional parameter causes the history interval count to reflect the actual time-of-day rather than a simple count of intervals. The entry is in 24-hour format, using three or four digits. Example: 1445 = 2:45 PM

PVC Statistics History

The PVC Statistics History screen displays performance parameters for Frame Relay Traffic for each of the 96 possible intervals on a per-PVC basis.

The first history screen is accessed by selecting ViewHistory [VH] from the PVC Statistics Summary screen.

The first page of the PVC Statistics History screen is shown in Figure 5-11.

The first page begins with Interval # 1.

```
*************************** PVC Statistics History ***************************
Name: F@43802                          Mode[M=P,TC,RC,TL,RL,FD,orND]:Pkt&Oct
   (P=Pkt&Oct,TC=TxCir,RC=RxCir,TL=TxLoss,RL=RxLoss,FD=FullDlay,orND=NetwDlay)
 Past     FirstInterval[F=#]: 2 of 96    DLCI[D=#,All,orSum]:All     Delay(mS)
 Int. DLCI   RxPkts    TxPkts     BECN      FECN      RxDE     TxDE    Avg  Max
   2    25        0         0        0         0         0        0     55   70
       234        0         0        0         0         0        0     55   70
   3    25        0         0        0         0         0        0     55   70
        33        0         0        0         0         0        0     55   70
       234        0         0        0         0         0        0     55   70
   4    25        0         0        0         0         0        0     55   70
        33        0         0        0         0         0        0     55   70
       234        0         0        0         0         0        0     55   70
   5    25        0         0        0         0         0        0     55   70
        33        0         0        0         0         0        0     55   70
       234        0         0        0         0         0        0     55   70
   6    25        0         0        0         0         0        0     55   70
        33        0         0        0         0         0        0     55   70
       234        0         0        0         0         0        0     55   70


Help[?]    Close[X]    NextPage[+]
>
```

Figure 5-11 PVC Statistics History Screen

Mode [M=] - Selects one of the displayed modes. (Refer to the PVC Statistics Summary Screen for descriptions.)

First Interval [F=#] - Selects the interval of the indicated number (max of 96) to begin the display of data. The data lines (16 lines per screen) will be filled by as many subsequent intervals as can fit without placing only part of their DLCIs on the screen. The selection defaults to 1 when first entering the History screen.

DLCI [D=#,All,or Sum] - selects the PVC(s) for which the historical statistics will be produced. Choices are:

Specific PVC or "Etc"- Enter DLCI number for the desired PVC (or "Etc"). Provides a display of the activity for the selected DLCI beginning with the selected interval. If an interval contains no activity, a single line with DLCI number and all other values = "0" is displayed.

All PVCs - Enter All (or only "A"). Displays a listing by intervals providing an individual line of statistics for each DLCI found within that interval. Within the interval, the DLCIs are listed in numerical DLCI order, with the interval number (count) placed only on the first line of statistics for that DLCI. If an interval contains no activity, a single line with DLCI = "Etc" and all other counts = "0" is displayed.

Sum - Enter Sum (or only "S"). Provides one line of statistics for each interval, containing the sum of all PVC counts within the interval. The Average and Maximum time measurement values are set to "0" (zero). The DLCI value is displayed as "Sum."

Additional commands on this screen are:

Next Page [+] - Advances to the next page of historical statistics until all intervals (up to 96) have been displayed.

Protocol Monitor Statistics Summary

The Protocol Monitor Statistics Summary screen displays summary performance information and provides access to detailed performance information for the Frame Relay Traffic for each protocol specified.

The Protocol Monitor Statistics Summary screen is accessed from the System View screen, selecting [MS] by typing "MS" followed by ENTER.

The Protocol Monitor Statistics Summary screen is shown in Figure 5-12.

```
******************** Protocol Monitor Statistics Summary ********************
     Name: F243802

                         DLCI [D=#orSum]: Sum

                  Current Interval Count: 455 of 900 secs
                15 Minute Interval History Count: 96 Valid

                  ----- Current -----  ---- 10 Second ----  ----- History -----
      Protocol        RxBps     TxBps        RxBps     TxBps      RxBps     TxBps
 IP                ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 IPX(SNAP)         ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 NETBIOS(SNAP)     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 SNA(SNAP)         ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 APPLETALK(SNAP)   ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 DECNET(SNAP)      ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
 OTHER             ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0
                   ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0     ,  ,  0  ,  ,  0


ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]    Close[X]     AutoUpdate[AU]
>
```

Figure 5-12 Protocol Monitor Statistics Summary Screen

DLCI [D=#orSum] - selects which portion of the statistics history will be used to produce the current 10 Second and History statistics.
Choices are:

Specific PVC - Enter DLCI number (#) or "Etc," for that PVC.

Sum of all PVCs - Enter Sum (or only "S").

Current Interval Count: - Displays the number of seconds that have elapsed in the current interval.

n **Minute Interval History Count** - Displays the number of user-defined (1-15 Minute) intervals that have been accumulated since the last reset of the counters.

Protocols - Lists up to eight protocols for which statistics are displayed.

Current - Displays total counts for each parameter within the current interval.

10 Second - Displays total counts for the latest completed 10-second period.

History - Displays total counts for each of the performance parameters over all valid intervals up to the maximum of 96 intervals.

RxBps & **TxBps** - Data rate calculated from the total count of octets counted for the particular protocol category and specified PVC.

Additional commands on this screen are:

ResetStats [RS] - Clears all Protocol Monitoring *and* PVC Monitoring statistics counters (including history).

ViewHistory [VH current_time (optional)] - Advances to Page 1 of the Protocol Monitor Statistics History screen.

The "current_time" optional parameter causes the history interval count to reflect the actual time-of-day rather than a simple count of intervals. The entry is in 24-hour format, using three or four digits. Example: 1445 = 2:45 PM.

Protocol Monitor Statistics History

The Protocol Monitor Statistics History screen displays all performance parameters for the Frame Relay Traffic on a per-interval basis for each of the 96 possible intervals for each protocol specified.

The first history screen is accessed by selecting ViewHistory [VH] from the Protocol Monitor Statistics Summary screen.

The first page of the Protocol Monitor History screen is shown in Figure 5-13.

```
********************* Protocol Monitor Statistics History *********************
     Name: F243802                                     DLCI [D=#orSum]: 16
                      First Interval [F=#]: 2 of 96
 Past
 Int. Protocol            RxBps     TxBps  Protocol              RxBps      TxBps
  2   IP               ,   ,  0  ,   ,  0  IPX(SNAP)        ,   ,  0  ,   ,  0
      NETBIOS(SNAP)    ,   ,  0  ,   ,  0  SNA(SNAP)        ,   ,  0  ,   ,  0
      APPLETALK(SNAP)  ,   ,  0  ,   ,  0  DECNET(SNAP)     ,   ,  0  ,   ,  0
      OTHER            ,   ,  0  ,   ,  0                   ,   ,  0  ,   ,  0
  3   IP               ,   ,  0  ,   ,  0  IPX(SNAP)        ,   ,  0  ,   ,  0
      NETBIOS(SNAP)    ,   ,  0  ,   ,  0  SNA(SNAP)        ,   ,  0  ,   ,  0
      APPLETALK(SNAP)  ,   ,  0  ,   ,  0  DECNET(SNAP)     ,   ,  0  ,   ,  0
      OTHER            ,   ,  0  ,   ,  0                   ,   ,  0  ,   ,  0
  4   IP               ,   ,  0  ,   ,  0  IPX(SNAP)        ,   ,  0  ,   ,  0
      NETBIOS(SNAP)    ,   ,  0  ,   ,  0  SNA(SNAP)        ,   ,  0  ,   ,  0
      APPLETALK(SNAP)  ,   ,  0  ,   ,  0  DECNET(SNAP)     ,   ,  0  ,   ,  0
      OTHER            ,   ,  0  ,   ,  0                   ,   ,  0  ,   ,  0
  5   IP               ,   ,  0  ,   ,  0  IPX(SNAP)        ,   ,  0  ,   ,  0
      NETBIOS(SNAP)    ,   ,  0  ,   ,  0  SNA(SNAP)        ,   ,  0  ,   ,  0
      APPLETALK(SNAP)  ,   ,  0  ,   ,  0  DECNET(SNAP)     ,   ,  0  ,   ,  0
      OTHER            ,   ,  0  ,   ,  0                   ,   ,  0  ,   ,  0
Help[?]    Close[X]    NextPage[+]
>
```

Figure 5-13 Protocol Monitor Statistics History

DLCI [D=#orSum] - selects which portion of the statistics history will be used to produce the History statistics.
Choices are:

Specific PVC - Enter DLCI number (#) for that PVC.

Sum of all PVCs - Enter Sum (or only "S").

First Interval - Selects the interval of the indicated number (max of 96) to begin the display of data.

Performance data is displayed as described on the Protocol Monitor Statistics Summary screen.

Additional commands on this screen are:

NextPage[+] - Advances the display to the next highest page of DLCI numbers, when applicable.

Top Talker/ Conversation Statistics Summary

The Top Talker/Conversation Statistics Summary screen displays summary performance information and provides access to detailed performance information for the Top IP Traffic irrespective of PVC divisions.

The Top Talker/Conversation Statistics Summary screen is accessed from the System View screen, selecting [TS] by typing "TS" followed by ENTER.

An example of a Top Talker/Conversation Statistics Summary screen, in Tx Conversation mode ranked by Octet, is shown in Figure 5-14.

```
***************** Top Talker / Conversation Statistics Summary *****************
     Name: F243802                                       Mode[M=Tx,Rx]: Tx

                              Tx Conversation

                      Current Interval Count: 455 of 900 secs
                   15 Minute Interval History Count: 96 Valid

             -------------- Most Recent Completed Interval --------------
                                       ----- Near ---- > ----- Far -----
      Rank        Bps       Octs    %Rate         Source    Destination
      #1:           0         0    0.000         0.0.0.0    0.0.0.0
      #2:           0         0    0.000         0.0.0.0    0.0.0.0
      #3:           0         0    0.000         0.0.0.0    0.0.0.0
      #4:           0         0    0.000         0.0.0.0    0.0.0.0
      #5:           0         0    0.000         0.0.0.0    0.0.0.0
      #6:           0         0    0.000         0.0.0.0    0.0.0.0



ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]    Close[X]    AutoUpdate[AU]
>
```

Figure 5-14 Tx Conversation Mode, Ranked by Octet

Mode [M=] - Selects Tx (Transmit) or Rx (Receive) for displaying information. The mode displayed is a result of the combination of the Tx or Rx mode selected on this screen and the "Top Stats" basis configuration (set on the Protocol Monitor Configuration Screen.) The four possible modes are:
Tx Conversation, Rx Conversation, Tx Talker, or Rx Listener.

Note: The parameters displayed depend on whether the "Rank Top By" setting (set on the Protocol Monitor Configuration Screen) is Octet or Packet.

Interval Count:
　　　Current Interval Count - Displays the number of seconds that have elapsed in the current 15-minute interval.
　　　15 Minute Interval History Count - Displays the number of 15-minute intervals that have been accumulated since the last reset of the counters (max. of 96).

Most Recent Completed Interval - Totals for the following performance parameters are displayed for the most recent interval (i.e., interval 1 of the history).

Rank - Number 1 to 6, showing the rank (with 1 being the highest) the line of statistics holds compared to other talkers/conversations.

For Rank by Octet, the following are displayed:

Bps - The displayed Bps is calculated from the total count of Octets for the particular talker/conversation in the indicated direction.

Octets - Count of bytes within packets for that particular talker/conversation. The count includes only traffic passing from Network to User and User to Network.

% Rate - The displayed % of rate is calculated from the total count of Octets for the particular talker/conversation in the indicated direction, based on the current data rate.

Near - Indicates the IP address(es) of the User Port Router. The heading shows "**Source**" in Tx mode or "**Destination**" in Rx mode.

Far - Indicates the IP address(es) of the Network Router. The heading shows "**Destination**" in Tx mode or "**Source**" in Rx mode.

NOTE: The "Far" fields are *not* displayed in Talker/Listener mode.

For Rank by Packet, the following are displayed:

Pkts - Count of packets for the talker/conversation. The count includes only traffic passing from Network to User and User to Network.

Near & **Far** - As described above.

Additional commands on this screen are:

ResetStats [RS] - Clears all counters associated with Top statistics.

ViewHistory [VH current_time (optional)] - Advances to Page 1 of the Top Talker/Conversation Statistics History screen.

The "current_time" optional parameter causes the history interval count to reflect the actual time-of-day rather than a simple count of intervals. The entry is in 24-hour format, using three or four digits. Example: 1445 = 2:45 PM.

Help [?] - Advances to "Help" for Top Talker/Conversation Statistics Summary screen.

Close [X] - Returns to System View screen.

AutoUpdate [AU] - Provides automatic screen update and refresh (every five seconds) of all statistics. No changes can be made while in this mode. AutoUpdate is exited by pressing ENTER.

Rx Conversation Mode

An example of a Top Talker/Conversation Statistics Summary screen, in Rx Conversation mode ranked by Octet, is shown in Figure 5-15.

```
***************** Top Talker / Conversation Statistics Summary *****************
    Name: F243802                                          Mode[M=Tx,Rx]: Rx

                              Rx Conversation

                    Current Interval Count: 455 of 900 secs
                  15 Minute Interval History Count: 96 Valid

            -------------- Most Recent Completed Interval --------------
                                    ----- Near ---- < ----- Far -----
     Rank        Bps       Octs     %Rate      Destination   Source
      #1:          0          0     0.000          0.0.0.0   0.0.0.0
      #2:          0          0     0.000          0.0.0.0   0.0.0.0
      #3:          0          0     0.000          0.0.0.0   0.0.0.0
      #4:          0          0     0.000          0.0.0.0   0.0.0.0
      #5:          0          0     0.000          0.0.0.0   0.0.0.0
      #6:          0          0     0.000          0.0.0.0   0.0.0.0


ResetStats[RS]     ViewHistory[VH current_time(optional)]
Help[?]    Close[X]     AutoUpdate[AU]
>
```

Figure 5-15 Rx Conversation Mode, Ranked by Octet

Performance data is displayed as described on the previous pages.

Note that the Near (User Port Router) heading indicates "Destination", and the Far (Network Port Router) heading indicates "Source".

Rx Listener Mode   An example of a Top Talker/Conversation Statistics Summary screen, in Rx Listener mode ranked by Packet, is shown in Figure 5-16.

```
***************** Top Talker / Conversation Statistics Summary *****************
     Name: F243802                                          Mode[M=Tx,Rx]: Rx

                                 Rx Listener

                        Current Interval Count: 455 of 900 secs
                      15 Minute Interval History Count: 96 Valid

              -------------- Most Recent Completed Interval --------------
                                        ----- Near ----
     Rank                 Pkts                Destination
      #1:                  0                   0.0.0.0
      #2:                  0                   0.0.0.0
      #3:                  0                   0.0.0.0
      #4:                  0                   0.0.0.0
      #5:                  0                   0.0.0.0
      #6:                  0                   0.0.0.0



ResetStats[RS]    ViewHistory[VH current_time(optional)]
Help[?]   Close[X]    AutoUpdate[AU]
>
```

Figure 5-16 Rx Listener Mode, Ranked by Packet

Performance data is displayed as described on the previous pages.

Note that only the Near (User Port Router) heading and IP Address(es) are displayed when ranked by "Packet".

Top Talker/ Conversation Statistics History

The Top Talker/Conversation Statistics History screen displays detailed performance information for the Top Talker/Conversation of IP Traffic irrespective of PVC divisions.

The Top Talker/Conversation Statistics History screen is accessed from the Top Talker/Conversation Statistics Summary screen, selecting [VH] by typing "VH" followed by ENTER.

An example of a Top Talker/Conversation Statistics History screen, in Rx Conversation mode ranked by Octet, is shown in Figure 5-17.

```
***************** Top Talker / Conversation Statistics History *****************
     Name: F243802                                        Mode[M=Tx,Rx]: Rx
 First Interval [F=#]: 2 of 96     Rx Conversation
 Past                                       ----- Near ---- < ----- Far -----
 Int. Rank        Bps        Octs    %Rate      Destination  Source
  2   #1:           0          0     0.000          0.0.0.0   0.0.0.0
      #2:           0          0     0.000          0.0.0.0   0.0.0.0
      #3:           0          0     0.000          0.0.0.0   0.0.0.0
      #4:           0          0     0.000          0.0.0.0   0.0.0.0
      #5:           0          0     0.000          0.0.0.0   0.0.0.0
  3   #6:           0          0     0.000          0.0.0.0   0.0.0.0
      #1:           0          0     0.000          0.0.0.0   0.0.0.0
      #2:           0          0     0.000          0.0.0.0   0.0.0.0
      #3:           0          0     0.000          0.0.0.0   0.0.0.0
      #4:           0          0     0.000          0.0.0.0   0.0.0.0
      #5:           0          0     0.000          0.0.0.0   0.0.0.0
      #6:           0          0     0.000          0.0.0.0   0.0.0.0




 Help[?]     Close[X]     NextPage[+]
 >
```

Figure 5-17 Top Talker/Conversation Statistics History Screen (Rx Conversation Mode)

Mode [M=] - Selects Tx or Rx mode for displaying information.

First Interval [F=] - Selects the interval of the indicated number (max of 96) to begin the display of data.

The first six lines display Top Talker/Conversation statistics for the first interval, the next six lines for the next interval. Additional intervals are displayed on subsequent pages.

Performance data is displayed as described on the Top Talker/Conversation Statistics Summary screens.

Additional commands on this screen are:

NextPage[+] - Advances the display to the next page of intervals.

Alarms

FrameSaver NP 64+ generates "traps" (SNMP alarms or alerts) in response to certain detected network conditions. (In the case of FrameSaver NP 64+ with dual DSUs, each DSU generates Traps). The traps are reported either In-band utilizing the Management PVC, or via Dial-Out utilizing the internal Modem. Alarm conditions are also displayed on FrameSaver NP 64+ status screens and on front panel indicators.

Traps

The conditions (objects) which generate traps are included in the FrameSaver NP 64+ Private MIB Extension and are listed in Table 5-2.

Table 5-2 Traps - Private MIB Extension

Component	Object	Description	Trap Reported In-Band/ Modem
DDS Facility	Carrier Loss	Carrier status of DDS facility.	Modem*
	Out of Service	Status DDS facility.	Modem*
DSU	DSU Fault	Unit subsystem failed self-test. (Test initiated as a result of DDS carrier loss or unit reset.)	Modem*
LMI	LMI Netw Failure	Errored LMI response per N392/393 counters on Network side.	Modem*
	LMI User Failure	Errored LMI enquiries per N392/393 counters on User side.	In-Band
Link Data	Network Frame Errors Secs	Errored seconds based on the current interval performance.	In-Band
	User Frame Errors Secs	Errored seconds based on the current interval performance.	In-Band
	BECN/FECN Secs (max PVC)	Highest BECN/FECN seconds of all PVCs based on the current interval performance.	In-Band
	PVC Dropped Monitor Packets	Highest Dropped packet count of all PVCs based on the current interval performance.	In-Band
	PVC Delay msec (max PVC)	Highest PVC round trip delay of all PVCs based on the current interval performance.	In-Band
	PVC Delivered Packets (%)	Lowest percentage of Delivered packets of all PVCs based on current interval performance.	In-Band
	PVC Available	PVC going from non-Active to Active as reported by frame switch.	In-Band
	PVC Unavailable	PVC going from Active to Non-Active as reported by frame switch.	In-Band
DTE	DTR Loss	Returns state of DTR lead.	In-Band
	DTE Power Loss	Returns state of DTE Power indication.	In-Band
Power	Power Loss	State of AC power into unit. Reports on loss only. Sent to first trap manager only.	In-Band
Modem	Modem Failure	Modem failed self-test which is initiated periodically.	In-Band
	Dial Line Failure	Dial line failed self-test which is initiated periodically.	In-Band
Security	Security Violation (Login)	Identifies access point of failed login attempts (3 consecutive): Console, Modem, Telnet, UDP, or SNMP.	In-Band
	Authentication Failure	Unauthorized SNMP Community Access detected (community not configured for access).	In-Band
Aux Functions	External Alarm	Sensed contact closure.	In-Band

* Modem-Reported Traps are only issued on the occurrence of a primary facility failure and provided that the modem is not already in use when the trap occurs.

Fault Isolation

Figure 5-18 shows a typical application with potential fault locations marked (a) through (i). Table 5-3 describes the corresponding indications, reporting mechanisms including the traps for each fault, and suggested test options.
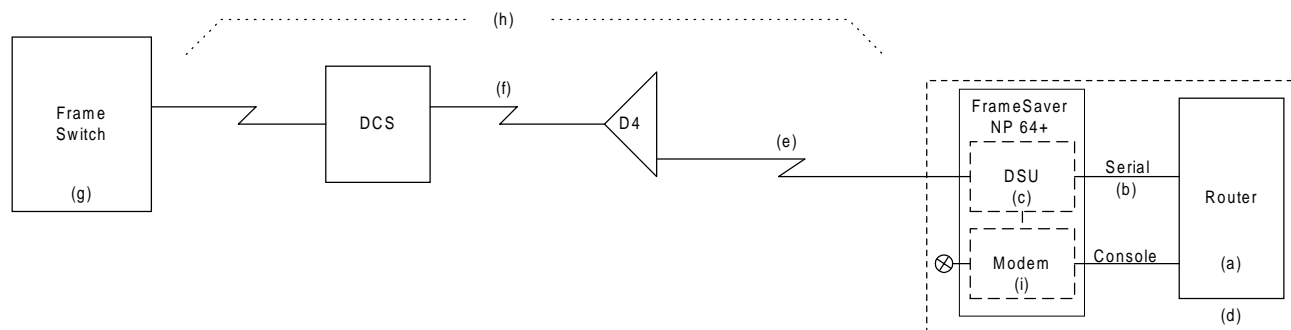
Figure 5-18 Fault Locations

Table 5-3 Fault Conditions

Fault	Loc	Indication(s)	Fault Sensing	Trap Transport	Test Options
Router Failure	(a)	No LMI from Router DTR low at Router	DSU senses lack of LMI or no DTR.	DSU sends inband Trap	Ping Router Dial into router console port
Router - DSU Cable disconnected or router powered down	(b)	No LMI from Router DTR low at Router	DSU senses lack of LMI and no DTR, and/or no power @ serial interface	DSU sends inband Trap	DSU loop code from network Dial into router console port
DSU	(c)	No LMI at Frame Switch and NP 64+	DSU self check	Modem sends Trap	Call in to Modem Frame Switch CSU/DSU loop tests
Local Power	(d)	No LMI at Frame Switch	DSU senses AC Power loss	DSU sends inband Trap	Dial in and check for answer
DDS Local Loop	(e)	No LMI at Frame Switch No LMI at NP 64+	DSU senses carrier failure NP 64+ senses no LMI enquiries.	Modem sends Traps	Call in to Modem Frame Switch CSU/DSU loop tests
T1 Facility	(f)	No LMI at Frame Switch T1 Alarm	DSU senses fault codes	Modem sends Trap	Frame Switch OCU loop test
Frame Switch	(g)	No LMI response to DSU Frame Switch Alarm	DSU senses no response to LMI Frame Switch detects loss	Modem sends Trap Frame Switch sends Trap	Loopback at Frame Switch toward itself
High Error Rate	(h)	Trap from Frame Switch, NP 64+ or Router	DSU monitors Frame Relay frames	DSU sends inband Trap	BER from Frame Switch to loop at NP 64+, from NP 64+ to loop at Frame Switch, or from application at management station View 24 hr. statistics
Modem or Dial Line	(i)	Fails periodic Dial Tone Test	Modem can't detect/break dial tone	DSU sends inband Trap	Routine Modem and Dial Line

LED Indicator Troubleshooting

The FrameSaver NP 64+ front panel LED indicators may also be used to troubleshoot a problem. Table 5-4 describes the Base unit LED indicator's normal states, and some possible causes for abnormal indications.

.

Table 5-4 FrameSaver NP 64+ Base Unit LED Diagnostics

FrameSaver NP 64+ LED Status									Condition	Possible Cause(s)
POWER	READY	DDS ALARM	NETW LMI	USER LMI	HS PORT TxD	HS PORT RxD	FR MGMT.	MODEM IN USE		
ON	ON	OFF	ON	ON	ON	ON	ON	---	NORMAL. No problem.	Normal LED status for FrameSaver NP 64+.
OFF	---	---	---	---	---	---	---	---	Loss of power to FrameSaver NP 64+.	Check AC power cord to FrameSaver NP 64+. Verify AC outlet is powered.
ON	Flash	---	---	---	---	---	---	---	FrameSaver NP 64+ performing self-test.	Normal on power-up or reset, duration of test approx. 45 seconds. Successful completion sets READY LED On steady. Continuous cycles of flashing indicate critical internal circuit fault, replace with known good unit.
ON	OFF	---	---	---	---	---	---	---	FrameSaver NP 64+ fails self-test.	Internal circuit fault. Replace with known good unit.
ON	ON	Flashing Slowly or Rapidly	---	---	---	---	Flashing Slowly or Rapidly	---	FrameSaver NP 64+ is waiting for, or in the process of receiving a download* of its software.	A command was issued to the unit to upgrade its software, or an error was detected in the internal program storage. Once a download has started, do not disturb the unit until this process completes.
ON	ON	ON	---	---	---	---	---	---	Loss of DDS data	Check DDS facility.
ON	ON	OFF	OFF or Flashing	---	---	---	---	---	None or intermittent LMI response from network.	Check network (Frame Switch) and FrameSaver NP LMI configurations. Check network for receipt of LMI requests from FrameSaver NP.
ON	ON	OFF	ON	OFF or Flashing	---	---	---	---	None or intermittent LMI requests from user (DTE).	Check user (DTE) and FrameSaver NP LMI configurations. Check that user is issuing LMI requests to FrameSaver NP.
ON	ON	OFF	ON	ON	OFF	---	---	---	Loss of Data from DTE.	Check power to DTE and interconnection cable.
ON	ON	OFF	ON	ON	---	OFF	---	---	Loss of Data to DTE.	Check for data from Network and/or for LMI traps from Network.
ON	ON	OFF	ON	ON	---	---	OFF	---	Loss of management channel data.	Check for valid DLCI.
ON	---	---			---	---	---	OFF	Dial Line on hook.	Normal for no Dial-In or Dial-Out.
ON	---	---			---	---	---	ON	Modem in use.	Normal for Dial-In or Dial-Out.

NOTE: A table entry of "---" means status of that LED is not relevant to the condition described.
  *Refer to Software Download on the next page of this manual for description.

Additional Descriptions

The paragraphs in this section provide additional information, notes, or tips about some of the specific operating features of the FrameSaver NP 64+.

This information is intended to assist anyone in the use of these features or in trouble-shooting problems concerning these features.

Software Download

A new version of the FrameSaver NP 64+ system software can be downloaded to the unit for software upgrade, or to restore damaged system software. Separate software is used in the Base unit and the Option Adapters, and it is loaded separately.

Initiation of the download process is by command or as the result of a detected error. The FrameSaver NP 64+ indicates the initiation of the download process by simulta-neously flashing the "DDS FAULT" and "FR MGMT." front panel LEDs. The rate of flashing is relatively slow (approximately 2/sec.) while waiting for the actual transfer of data to begin. The rate of flashing becomes noticeably faster (blinking) when the transfer of data begins, and will continue until the download is complete.

Once the download process is initiated, the FrameSaver NP 64+ must complete the download before it is able to perform any other functions.

Upon completion of the download, the FrameSaver NP 64+ reinitializes by performing its start-up self-test.

The actual download is performed using a special application for this purpose, with an in-band or dial-in connection to the FrameSaver NP 64+.

DTE Dialing Using AUX Ports & Internal Modem

In addition to the internal DSU and Option cards, the FrameSaver NP 64+'s internal modem may be shared by external devices, which interface the FrameSaver NP 64+ through AUX ports 1 and 2. The modem sharing process is controlled by the DTR lead of each connected device.

Before making the modem available to a requesting device, the FrameSaver NP 64+ loads a user-configurable AT command string for that device from its database.

The DSR lead for the FrameSaver NP 64+ AUX ports is OFF until that port is connected to the modem. Once the DSR lead is ON for a given port, the associated Router (DTE) can issue its own AT strings to the modem.

RLSD follows DSR. CTS can be programmed to always be ON, follow RTS, or provide flow control in response to RTS. Modem configuration is done through the AUX Setup fields on the System Configuration screen.

Outbound calling is accomplished in one of two ways:

- DTR Dialing - the phone number to be called is stored in the FrameSaver NP 64+.

- AT Dialing - the Router issues the phone number.

Note: It is important that the Router does not have DTR ON unless it wants to use the modem, because this will prevent other devices from gaining access to the modem.

DTR Dialing

1. The call is initiated by the Router turning DTR ON.

2. The FrameSaver NP 64+ responds in one of two ways, based on the AT Commands included in the Setup String for the AUX Port:

   a. DSR comes ON as soon as the modem is available.

   b. DSR follows the status of the far-end connection.

3. The Router lowers DTR at the end of the call.

4. If the FrameSaver NP 64+ was configured per 2a) above, DSR will go OFF after the Router turns DTR OFF. If configured per 2b), DSR will go off after the connection is broken by either end or if DTR is turned OFF.

AT Dialing

AT dialing is similar to DTR dialing, but the Router can issue the dialing command strings.

1. The call is initiated by the Router turning DTR ON.

2. The FrameSaver NP 64+ turns DSR ON when the modem is available.

3. The Router issues the necessary AT commands.

4. Connect messages can be enabled to indicate the connection status.

5. The Router lowers DTR at the end of the call.

6. DSR goes OFF after the Router turns DTR OFF.

Management Access

Dial-In

When using a PC (desktop or laptop) to establish management access to a FrameSaver NP 64+, ensure that the VT-100 configuration is set to use flow control, and that the BAUD rate does not exceed 57600 (56Kbps).

Some emulation programs will automatically configure to the highest rates available (such as 115200), and this may cause the dropping of characters while FrameSaver NP is returning a screen to the PC terminal.

Direct Connect (AUX 2)

When AUX 2 Console Mode is enabled (a console terminal is direct-connected), the internal Modem is disabled and unavailable for incoming or outgoing calls.

6 Options

This section contains installation, operation and diagnostic information specific to factory Options which are available with FrameSaver NP 64+ units.

The Options currently available and covered in this manual are:

- ISDN Adapter Option

- Second DSU Option

    Contact Paradyne Corporation for information regarding the latest release of the Second DSU Option.

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ISDN Adapter Option

This section contains installation, operation and diagnostic information specific to the ISDN Adapter option for FrameSaver NP 64+.

The front panel of FrameSaver NP 64+ with ISDN Adapter option is shown in Figure 6-1.
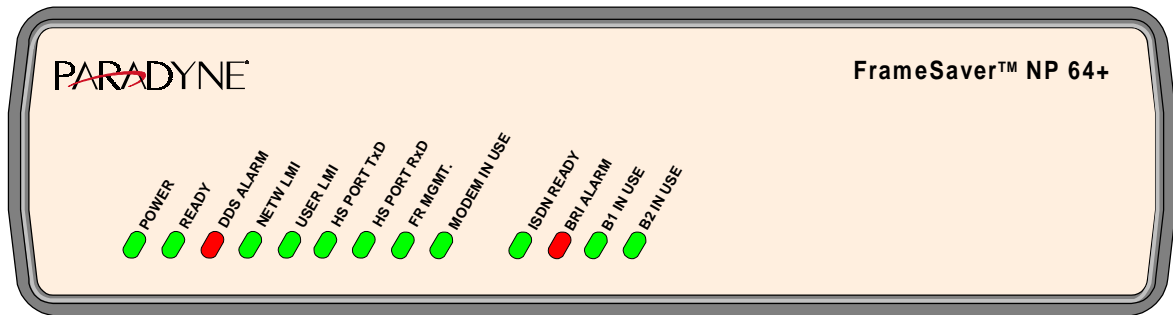
Figure 6-1 FrameSaver NP 64+ Front Panel with ISDN Adapter

Installation

Installation for the ISDN portion of FrameSaver NP 64+ consists of making the Data Port and ISDN Line connections.

Input/Output Connections

FrameSaver NP 64+ rear panel ISDN connectors are shown in Figure 6-2.
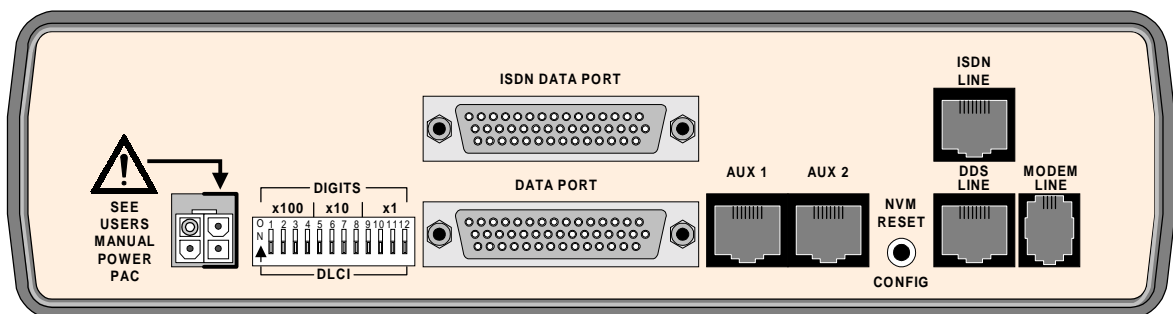
Figure 6-2 FrameSaver NP 64+ Rear Panel with ISDN Adapter

FrameSaver NP 64+ ISDN connectors are described in Table 6-1.

Table 6-1 FrameSaver NP 64+ ISDN Input/Output Connectors and Specifications

Connectors	Description

ISDN Data Port	DB-44, high-density connector provides the following interfaces, selected by the interface cable used:
	    EIA-232
	    EIA-530
	    EIA-530-A
	    ITU-V.35

ISDN Line	RJ49C, 8-pin modular connector.

ISDN Data Port Connection

The ISDN Data Port supports the same electrical interface types as the base unit Data Port (except for ITU-X.21-NS), and the connector pinouts are also identical.

Refer to Section 3, "Installation," in this manual for Data Port pinout and cable details.

ISDN Line Connection

Use cable assembly # 135-981-0006, or per pinout shown in Table 6-2.
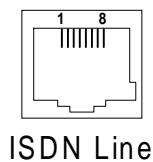
ISDN Line

Table 6-2 ISDN Line Pinout RJ49C Connector

Pin	Description
1,2,3	No Connection
4	R (Ring)
5	T (Tip)
6,7,8	No Connection
NOTE: Use Twisted Pair cable conductors for pins 4 & 5.	

ISDN Configuration

With the ISDN connections and base unit connections completed, the FrameSaver NP 64+ is ready to be powered on and the ISDN Adapter configured for operation.

Power On with Connections Completed

With all connections completed, the FrameSaver NP 64+ with ISDN will complete its power-on self-test sequence with front panel LED indications as follows:

a. The POWER LED will light immediately and stay on.

b. The READY and ISDN READY LEDs may flash several times and then remain OFF while the unit performs its self-test (test duration - approx. 45 secs.)

c. The READY LED will be ON steady after successful completion of the self-test.

d. The DDS ALARM and FR MGMT. LEDs should *not* be flashing together.

e. All other LED indications should be ignored until configuration has been completed.

If the LED indications are not as described above, refer to section 5 Diagnostics of this manual.

If operation looks normal and the WAN DLCI has not yet been set, do so by following the WAN DLCI DIP Switch Setting instructions in section 4 of this manual. Then proceed by establishing a Management Session and entering the operating parameters as described on the next pages of this section in the manual, or contact the Network Control Center to have the parameters set remotely.

NOTE: If the Dial Line has not been connected to the FrameSaver NP 64+ prior to powering the unit on, the unit will issue a Dial Line Failure In-Band Trap to the Trap Manager after it completes its Modem and Dial Line self test.

Establish Management Session

The FrameSaver NP 64+ sends a Startup/Login Prompt when a management connection has been established (in-band Telnet, dial-in VT-100 console connection or direct connected VT-100 terminal), provided that another management session is not currently in use.

Login

The startup display and prompt are:

```
FrameSaver NP 64 - Frame Relay Service Unit
(C) Paradyne Corporation 1996-2000.
All Rights Reserved
Base:00.64/09.04.15.03i  Opt:00.23/01.25.01

Please enter your SYSTEM access password:
Please enter your USER access password:
```

Only the User access password prompt will be displayed if the System-level password feature is disabled. If enabled, the System access password prompt will be displayed, and the User access password prompt will be displayed only after entering a valid System Password.

At the User access prompt, enter the Configuration or Supervisor Password followed by ENTER (factory default Configuration Password is "33333333").

NOTE: Only Configuration or Supervisor-level USER Password will allow configuration changes. View level displays all screens but allows no configuration changes or testing; and Test level displays all screens, allows performance of tests, but no configuration changes.

The next prompt asks for your name and phone number:

```
Please enter your USER access password:
Please enter your name and phone #:
```

Enter name and phone number followed by ENTER. If this information is provided, it will be displayed to any other operator attempting to Login (via other access port) while in use, so they may contact you in case they have to gain immediate access.

NOTES:

1. Console session will be terminated and must be reinitiated if there are three invalid password attempts, or a timeout resulting from no attempt for one minute.

2. If the unit's NVM has been cleared since the last successful login, this will be indicated on the Startup screen display as shown below:

```
FrameSaver NP 64 - Frame Relay Service Unit
(C) Paradyne Corporation 1996-2000.
All Rights Reserved
Base:00.64/09.04.15.03i  Opt:00.23/01.25.01

System Database Reset to Factory Defaults.

Please enter your USER access password:
```

Management Command Flow

Figure 6-3 shows the general flow for management access for FrameSaver NP 64+ with the ISDN Option. It shows the screen displays and the general function for that screen. The ISDN related screens are at the bottom of the flow chart.
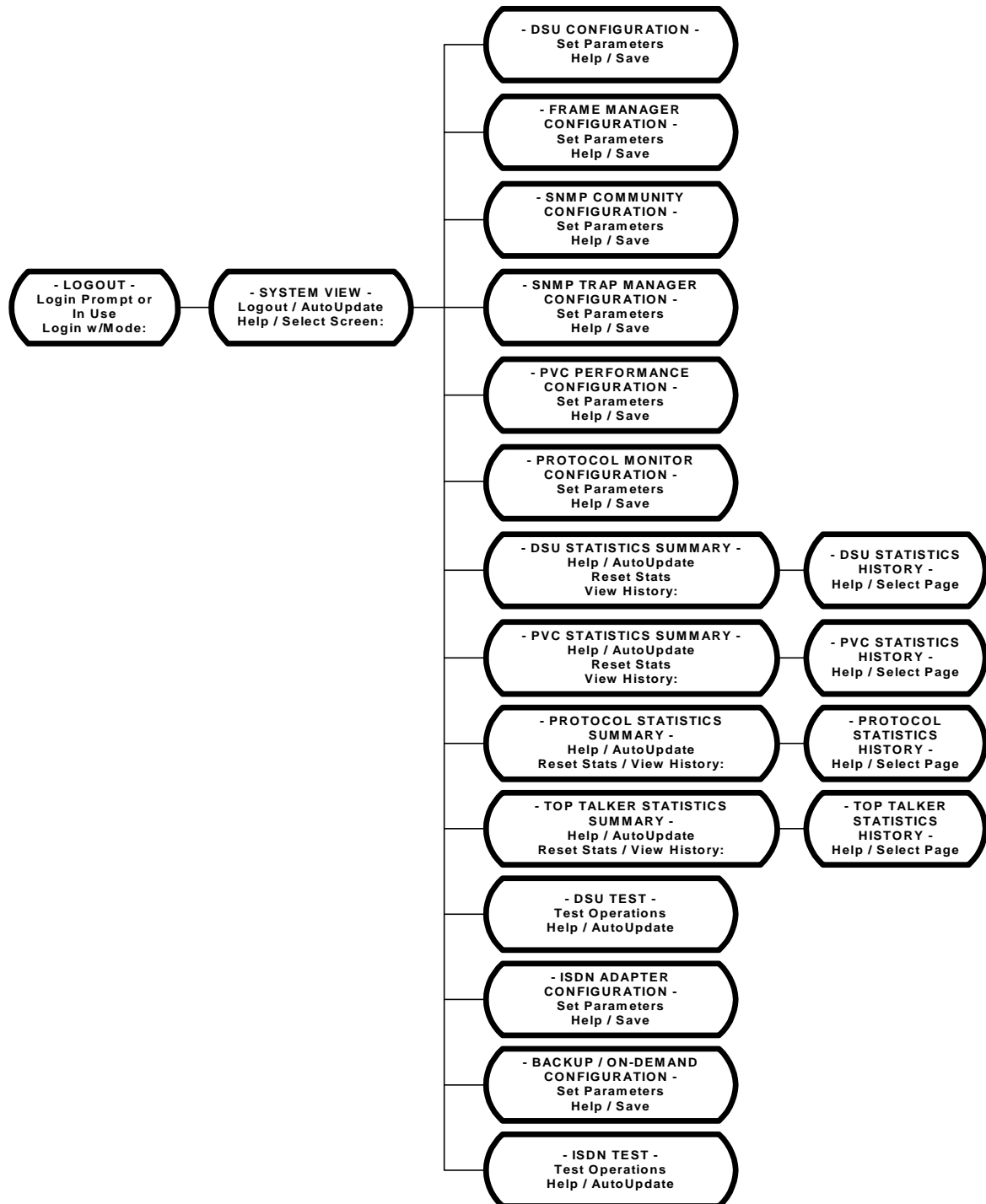

Figure 6-3 Management Control Flow for FrameSaver NP 64+ with ISDN Option

ISDN Parameter Setting

This section describes the additional screens and parameters used to configure the ISDN Adapter option. There are also some field changes on the System View Screen specific to the ISDN Adapter option. The ISDN configuration screens are; ISDN Adapter Configuration Screen and the Backup/On-Demand Configuration Screen. All basic FrameSaver NP 64+ screens are described in section 4 Operation of this manual.

System View Screen

The System View screen for FrameSaver NP 64+ with ISDN is shown in Figure 6-4.

```
*********************** FrameSaver NP 64 - System View ***********************
      Name: F@43802                                     Base S/W: 09.04.15i
  Location: Fair Lawn, NJ                                    S/N: 001812
   Contact: J. Jones


                    System Test/Fault:
    DSU Status                          High Speed Interface Status
     Rx Level: -10dB                                   DTR: On
    Data Rate: 56k                                     RTS: On
                                                     Power: On
    Modem Status                             Interface: ITU-V35
         Fault:                             ISDN Backup: Ready
     Connection:
                                      On-Demand Interface Status
    Aux Port Status                                   DTR: On
     Aux1 DTR: Off                                    RTS: On
     Aux2 DTR: Off                           Interface: ITU-V35
     Aux2 Alm:                              ISDN Demand: Ready
 DsuConfig[DC]   FrameConfig[FC]    PvcConfig[PC]   MonConfig[MC]
   DsuTest[DT]      DsuStats[DS]     PvcStats[PS]     MonStats[MS]    TopStats[TS]
SnmpConfig[SC]    TrapConfig[TC]   IsdnConfig[IC]  BkupConfig[BC]     IsdnTest[IT]
Help[?]    Logout[LO]    AutoUpdate[AU]
>
```

Figure 6-4 System View Screen (ISDN)

The ISDN-specific fields on the System View screen are as follows:

Base S/W - Software revision number currently operating the unit.
 The first two-digit number indicates the unit's feature set, the second indicates the base software revision, and the last indicates minor revision level.
 An Alpha character at the end of this field indicates the option type installed, if any. In the example shown in Figure 6-4 above, i = ISDN Adapter option.

ISDN Backup - State as reported by ISDN Adapter Card.
    Further detail is available on the ISDN Test Screen. This title and field
    will not be displayed unless the ISDN Adapter module is configured for
    Backup operation.

On-Demand Interface Status - If the ISDN Adapter is not configured for
    On-Demand operation, these fields will not be displayed. If
    configured for On-Demand, the fields are as follows:
  DTR: State of DTR lead, ON or OFF.
  RTS: State of RTS lead, ON or OFF.
  Interface: Interface adapter cable currently installed.
    Types are: ITU-V35, EIA-530, EIA-530-A, EIA-232 or
    (blank) if none.
  ISDN Demand: Displays the current state as reported by the ISDN Adapter.

ISDN Commands:

IsdnConfig [IC] - Advances to ISDN Adapter Configuration Screen.

BkupConfig [BC] - Advances to Backup / On-Demand Configuration Screen.

IsdnTest [IT] - Advances to ISDN Status / Test Screen.

To proceed setting ISDN operating parameters, select ISDN Adapter Configuration
screen [IC] by typing "IC" followed by ENTER.

ISDN Adapter Configuration

The ISDN Adapter Configuration screen allows you to view and alter parameters for the ISDN Adapter related operations.

The ISDN Adapter Configuration screen is shown in Figure 6-5.

```
************************* ISDN Adapter Configuration *************************
     Name: F@43802                                         ISDN S/W: 01.24

                B1/B2 Mode [M=]                 Switch Type [S=]
              >>1) Backup/unused<<            >>1) National/NI-1<<
                2) Demand/unused                2) 5ESS-PtoP/NonInit
                3) Demand/Backup                3) 5ESS-MultiP/Init
                4) Modem/Backup                 4) DMS100
                5) Modem/Demand




                Data Rate [R=]                  Modem Line [L=]
              >>1) 56kbs<<                     >>1) 3.1kHz Audio<<
                2) 65 kbs                        2) Speech

------------ B Channel # 1 ------------  ------------- B Channel # 2 -----------
       SPID [P1=]:                                SPID [P2=]:
Directory # [N1=]:                        Directory # [N2=]:


Help[?]    Save[SA]    Cancel[X]
>
```

Figure 6-5 ISDN Adapter Configuration Screen

ISDN S/W: Version number of the software currently operating the ISDN Adapter.

B1 / B2 Mode - Assigns operating functions to B1and B2 channels.

> **NOTE:** When B1 is configured for use with the unit's internal Modem (M=4 or M=5,) the Modem Setup Strings (DSU Configuration Screen) must be set to include the following "AT" command: **ATS91=12**

> For example, the default Modem Setup strings shown in Figure 4-4 of this manual, must be changed to the following:

> > Answer DSU [AD=]: **ATS91=12**

> > Aux1 Setup [A1=]: A96N8AT&K0Q1^**MATS91=12**^MATA

> > Aux2 Setup [A2=]: A96N8AT&K0Q1^**MATS91=12**^MATA

Switch Type - Selects the Protocol to match the ISDN Switch being used by the Telco providing the ISDN service.

Data Rate - Selects the synchronous data rate to be used for all data connections.

> **NOTE:** 64+ Kbps ISDN service is not consistently available from all Telcos.

Modem Line - Selects the quality of the line expected from Telco, when the modem places a call.

> **NOTE:** Option 2 (Speech) impairs operation of the modem and should be selected only when high-quality lines are not reliably available. (U.S. Telcos in general support the 3.1 kHz service exclusively).

B Channel # 1 & **2** - Fields for setting the SPID (Service Profile Identifier) and Directory for each of the B Channels, as assigned by Telco when the ISDN service was established.

The formats for these fields are as follows:

SPID - Telco ID #, numeric string (0 - 20 character) as assigned by Telco.

Directory # - Numeric string, (0 - 20 character) as assigned by Telco.
This is typically the phone number and may or may not include the area code, depending upon local Telco requirements.

> **NOTE:** In order for the FrameSaver NP 64+ to accept a Dial-In connection to the
> B Channels, the Directory # that is entered must match the called number passed from the carrier during the ISDN call setup.

CAUTION:

Observe the following configuration rules to ensure proper operation of ISDN "B Channel(s)":

SPID & Directory # must be entered for both B1 & B2, for 2B+D Service.

SPID & Directory # must be blank for B2, for 1B+D Service.

Commands

Help [?] - Advances to "Help" for ISDN Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

CAUTION

If any parameter on this screen was changed, the ISDN Adapter will perform a reset after the Save [SA] command is issued. The reset will interrupt ISDN data traffic.

Save the ISDN Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will return the user to the System View screen.

Backup / On-Demand Configuration

The Backup / On-Demand Configuration screen allows you to view and alter parameters for the ISDN Backup or On-Demand operations.

To proceed to Backup/On-Demand Configuration, from the System View Screen, type "BC" and press ENTER.

The Backup / On-Demand Configuration screen is shown in Figure 6-6.

```
********************** Backup / On-Demand Configuration **********************
    Name: F@43802

  ------------- Backup -------------          ------------ On-Demand -----------
  Activate Delay [A=#]: 1
   0 thru 240 mins

  Phone#1 [B1=]: Disabled              Phone#1 [D1=]: Disabled
  Phone#2 [B2=]: Disabled              Phone#2 [D2=]: Disabled
   X to Disable                         X to Disable
  Retry Count [C1=]: 1                 Retry Count [C2=]: 1
   1 thru 4                             1 thru 4
  Retry Holdoff [H1=]: 2               Retry Holdoff [H2=]: 2
   1 thru 15 minutes                     1 thru 15 minutes

  WAN IP Add#1 [I1=]: 0,0,0,0
  WAN IP Add#2 [I2=]: 0,0,0,0
  Learn IP Add [L=]
 >>1) Each Connect<<
   2) When Zero

Help[?]    Save[SA]    Cancel[X]
>
```

Figure 6-6 Backup / ON-Demand Configuration Screen

Backup: Establishes an ISDN data link and switches the Base Card Frame Manager from the DDS link onto the ISDN link. Backup is triggered by DDS outage, or loss of Network, or is operator-initiated. Configuration items are:

Activate Delay - Sets the time to wait after a DDS outage or loss of Network LMI is detected, before a backup attempt is initiated.
Valid range is from 0 to 240 minutes.

Phone # 1 & **2** - Enter the phone numbers to be dialed to establish a backup connection. Numeric string (0 - 20 characters) or "X" to disable.

Retry Count - Sets the number of retry attempts to establish a backup connection for each phone number. Valid range is from 1 to 4.

Retry Holdoff - Defines the delay between each retry attempt.
Valid range is from 1 to 15 minutes.

WAN IP Add # n - Sets the IP Address for management access while the unit is on backup. WAN IP ADD # 1 is used for Phone # 1, and WAN IP ADD # 2 is used for Phone # 2.

Learn IP Add - Sets IP Address to "Learning Mode," where unit will learn its IP Address from the first valid Frame received after connecting.
Set to "1" for learning on "Every Connection."
Set to "2" for learning only if "WAN IP Add # n" is set to zero.

NOTE: See "Management IP Address per Connection" later in this section of the manual for a detailed description of SNMP IP Address learning.

On - Demand establishes and maintains an ISDN data link for the ISDN Data Port while the DTE on that port holds DTR High. Does not affect Frame Manager. Configuration items are the same as the first four described for "Backup" above.

Commands

Help [?] - Advances to "Help" for ISDN Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

Cancel [X] - Returns to System View screen without saving changes.

CAUTION

If any parameter on this screen was changed, the ISDN Adapter will perform a reset after the Save [SA] command is issued. The reset will interrupt ISDN data traffic.

Save the Backup / On-Demand Configuration changes when they are all set correctly by entering "SA" followed by ENTER. This will also return the user to the System View screen.

Management IP Address per Connection

When optioned with ISDN, FrameSaver NP 64+ can have three different communications paths that allow it to connect to the frame relay network in different places. They are DSU, ISDN dial up Phone # 1 and ISDN dial up Phone #2. Each of these connection points could result in the management PVC routing through different IP sub-nets to reach the NCC (Network Control Center), or it may be desirable to have the FrameSaver NP 64+ appear as a logically different object in the SNMP manager, especially if static routing and dedicated backup ports are utilized.

The WAN IP Address to be used on the DDS link is automatically "learned" from the first valid IP message received over the unit's dedicated management PVC. Learning will take place as long as the value of the DSU's WAN IP Address in NVM (Non-Volatile Memory) is 000.000.000.000.

This approach is practical because the management PVC is dedicated to one FrameSaver NP 64+ and it will only carry traffic for that FrameSaver NP 64+. In this arrangement static routing is typically used, and the first message is either a manual PING initiated by an NCC operator or an automatic status POLL from the SNMP manager. In networks where dynamic routing of the management traffic is used, the WAN IP Address must be set manually because the messages cannot be sent specifically to the FrameSaver NP 64+ until it has established communications with its boundary router. This is done through the console port either locally or via VT 100 dial up. Once the IP Address is set or learned it is retained and used until the NVM is cleared or another address is manually set.

The WAN IP Address to be used on each of the ISDN dial up phone numbers can be established using two different options. The first option functions identically to the DDS line described above. The WAN IP Address will be automatically learned when the NVM value is 000.000.000.000. Once learned or set it will not be changed.

The second option is to learn the address on each dial up connection. In this case, after the connection is made, the OOB PPP (Out-Of-Band Point-to-Point Protocol) trap indicating the DDS failure is sent, and communication is established with the frame relay network, the learn function will be enabled. Upon receiving a good IP message the address will be stored in the NVM and displayed on the ISDN configuration display. This can be examined at any time as the address will remain in the display until a new address is learned.

NOTES:

1. Resetting an IP Address will momentarily disrupt all IP-level management traffic and potentially cause the loss of some messages. If the IP Address is set to a new address via a Telnet session it will break that session and require the operator to reconnect to the FrameSaver NP 64+ via the new IP Address.

2. Upon a DDS line failure the NP 64+ will (if so configured) create and send an OOB PPP trap indicating the problem(s). This will be sent with the IP Address currently configured for the DDS line. If ISDN dial backup is automatically initiated by the NP 64+, the system will not change its IP Address to the one associated with the ISDN dial line until the OOB PPP trap is complete or it has timed out. This should occur in less than two minutes using the default settings.

3. If a DDS failure is corrected while the FrameSaver NP 64+ is on ISDN dial backup, a clear trap will be sent indicating the problem is resolved. This trap will be sent "in-band" via the ISDN line and have the IP Address of the dial up line. This address may be different than the address the failure trap was reported on.

4. While on dial backup if the DDS clears and fails again, another failure trap will be sent indicating the current problem, even though the NP 64+ has not been affected by it. This trap will be sent in-band with the IP Address of the ISDN dial up line.

Diagnostics

This section contains diagnostic information specific to the ISDN Adapter option.

For diagnostic information regarding *basic* FrameSaver NP 64+ features, refer to Section 5, "Diagnostics" of this manual.

ISDN Adapter option diagnostic features include; ISDN Adapter Status information and Tests, Alarm reporting, and Front Panel LED Indicators.

LED Indicators

The ISDN front panel indicators are shown in Figure 6-7.
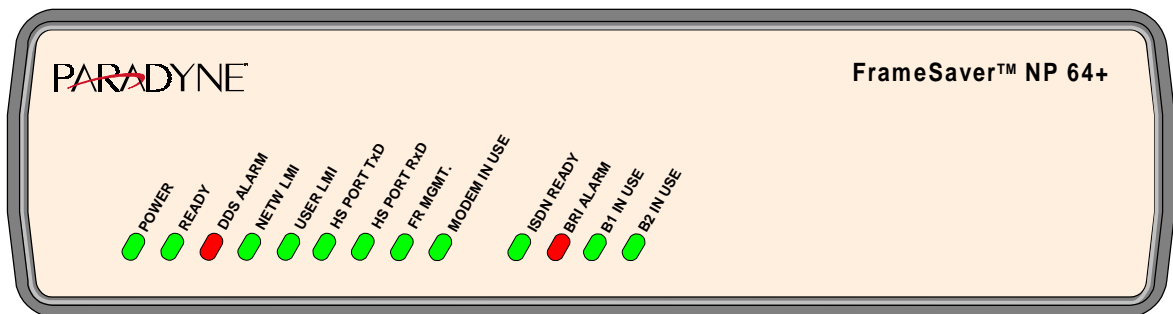
Figure 6-7 FrameSaver NP 64+ Front Panel View (with ISDN Adapter)

ISDN front panel indicators are described in Table 6-3.

Table 6-3 FrameSaver NP 64+ Front Panel Indicators (with ISDN Adapter)

Nomenclature	Description	Function
ISDN READY	Green LED	Steady ON, indicates ISDN module has successfully passed its internal self-test. FLASHING, indicates the ISDN module is performing its internal self-test (test time approx. 10 sec.). OFF after self-test, indicates a hardware failure was detected during the self-test.

BRI ALARM	Red LED	OFF, indicates the ISDN Facility is properly connected and available.
		FLASHING indicates an incorrect SPID.
		  1 Flash - B1 SPID incorrect.
		  2 Flashes - B2 SPID incorrect.
		  3 Flashes - Both SPIDs incorrect.

B1 IN USE	Green LED	ON, indicates B1 channel has a call which is active. FLASHING slowly (approx. 2 sec. ON, 4 sec. OFF) indicates an outgoing call is being initiated. FLASHING rapidly (approx. 2 / sec.) indicates an incoming call is being answered.
B2 IN USE	Green LED	ON, indicates B2 channel has a call which is active. FLASHING slowly (approx. 2 sec. ON, 4 sec. OFF) indicates an outgoing call is being initiated. FLASHING rapidly (approx. 2 / sec.) indicates an incoming call is being answered.

ISDN Tests

ISDN testing features include Network Loopback and Operator-Initiated Management Session Tests.

Loopback

The ISDN "B" channels may be looped back (toward the Network) for external testing.

Configured for Backup operation

Loopback of a B-Channel is automatically initiated when connection is made to a Dial-In call, provided the B-Channel is currently configured for Backup operation.

> **NOTE:** In some cases, the Directory # assigned (as entered and displayed on the ISDN Configuration screen), may not match the actual number to be dialed in order to establish a Dial-In connection to the B-Channels. Contact the Network Control Center or Telephone Service Provider to verify the Dial-In number if problems are encountered.

The Backup process has priority over loopback, and will automatically clear a B-Channel loopback and initiate the Backup process if Backup is triggered while a loopback is established.

Configured for On-Demand operation

The "Call Out/Loop" test feature on the ISDN Status / Test screen initiates a Bandwidth On Demand (BOD) call-out and sets a loopback toward the Network at the On-Demand configured data rate.

ISDN Status and Tests

The ISDN Status/Test screen provides ISDN Adapter (card) status and test capability.

The ISDN Status/Test screen is accessed from the System View screen, selecting [IT] by typing "IT" followed by ENTER.

The ISDN Status/Test screen is shown in Figure 6-8.

```
****************************** ISDN Status / Test ******************************
      Name: F@43802


   DSU Fault:                          Frame Mgr Fault:
    DSU Loop:


           Backup Setup [B=]              High Speed Interface Status
        >>1) Reset/Arm<<                             DTR: On
          2) Activate                                RTS: On
          3) Service Disable                       Power: On
          4) Time Disable
             Duration: hh:mm:ss         ISDN Backup: Ready

          Demand Setup [D=]              On-Demand Interface Status
        >>1) Reset/Arm<<                             DTR: On
          2) Call Out/Loop                           RTS: On
          3) Loop to User               ISDN Demand: Ready


Help[?]    Close[X]    AutoUpdate[AU]
>
```

Figure 6-8 ISDN Status / Test Screen

DSU Fault, **Frame Mgr Fault** and **DSU Loop** - Display (blank) or the highest priority Fault causing a disruption of the data path.

Refer to the Appendix in this manual for a list and description of all fault displays.

Backup Setup - Selects the current state for backup operations.
Selections are as follows:

Reset/Arm - Terminates any current activity and clears any Failed or Disabled conditions so that automatic backup initiation may occur. This is the default state.

Activate -Initiates backup connection process.

Service Disable -Terminates and/or disables all backup activity to prevent initiation of undesired backup while preforming service activity. Disable is automatically released to the Reset/Arm state after 15 continuous minutes of no service activity detected (service activity is indicated by the existence of fault conditions such as RLOS, OOS, etc.).

Time Disable - Terminates and/or disables all backup activity for the specified period of time. When selected, a prompt is displayed to select the time period (1 to 72 hours). After valid time period is entered, the "Duration" field is displayed, showing the time remaining before Disable is released to the Reset/Arm state.

High Speed Interface Status -
   DTR: State of DTR lead, when Power is being detected from the DTE. States are: ON, OFF or (blank) if Power OFF.
   RTS: State of RTS lead, when Power is being detected from the DTE. States are: ON, OFF or (blank) if Power OFF.
   Power: ON or OFF based on sensing voltage on Tx data lead(s) from the DTE.

ISDN Backup - Displays (blank) or the current status as reported by ISDN Adapter Card.

Refer to the Appendix in this manual for a list and description of all status displays.

Demand Setup - Selects the current state for demand operations.

   Reset/Arm - Terminates any current activity and clears any Failed or Disabled conditions so that automatic demand initiation may occur. This is the default state

   Call Out/Loop - Initiates Bandwidth On Demand (BOD) call-out and sets a loop-back toward the Network at the On-Demand configured data rate.

   Loop to User - Loops data back toward the User at the ISDN Data Port.

   NOTE: The Loop to User test can at times fail, if both B-Channels are simultaneously in-use. If this test fails, "Failed-000" will be displayed briefly in the "ISDN Demand:" field followed by "Armed," and the "Demand Setup" will return to the "Reset/Arm" state.

On - Demand Interface Status - Displays current state or activity for the interface.
   DTR: State of DTR lead, ON or OFF.
   RTS: State of RTS lead, ON or OFF.

ISDN Demand: Displays (blank) or the current status as reported by ISDN Adapter Card.

Refer to the Appendix in this manual for a list and description of all status displays.

Commands

Help [?] - Advances to "Help" for ISDN Configuration screen.

Save [SA] - Saves parameters and returns to System View screen.

AutoUpdate [AU] - Returns to System View screen without saving changes.

Alarms FrameSaver NP 64+ generates "traps" (SNMP alarms or alerts) in response to certain detected network conditions. Specific Traps apply to the ISDN Adapter option.

Traps ISDN-related conditions (objects) which generate traps are listed in Table 6-4.

.

Table 6-4 Traps - Private MIB Extension

Component	Object	Description	Trap Reported In-Band/ Modem
ISDN	ISDN Adapter Fault	Adapter failed self-test after reset or periodic check.	In-Band
	ISDN Line Failure	Loss of connectivity with CO Switch.	In-Band
	ISDN Backup	Issued for the following conditions: On-Line On-Line reminder (every 2 hrs) Idle Failed	Modem* and In-Band
	ISDN Demand	Issued for the following conditions: On-Line On-Line reminder (every 2 hrs) Idle Failed	Modem* and In-Band
* Modem-Reported Traps are only issued on the occurrence of a primary facility failure and provided that the modem is not already in use when the trap occurs.			

LED Indicator Troubleshooting

The ISDN Adapter front panel LED indicators may also be used to troubleshoot a problem. Table 6-5 describes the ISDN Adapter LED indicator's normal states, and some possible causes for abnormal indications.

.

Table 6-5 FrameSaver NP 64+ ISDN Adapter LED Diagnostics

FrameSaver NP 64+ ISDN Adapter LED Status				Condition	Possible Cause(s)
ISDN READY	BRI ALARM	B1 IN USE	B2 IN USE		
ON	OFF	---	---	NORMAL, No problem.	Normal LED status for ISDN Adapter.
Flashing	---	---	---	ISDN Adapter performing Self-test.	Normal on power-up or reset, duration of test approx. 10 seconds. Successful completion sets ISDN READY LED On steady. Continuous cycles of flashing indicate critical internal circuit fault, replace with known good FrameSaver NP 64+.
OFF	---	---	---	ISDN Adapter fails Self-test.	Internal circuit fault. Replace with known good FrameSaver NP 64+.
ON	Flashing Count	---	---	Incorrect SPID for one or both B-Channels.	1 Flash - B1 SPID incorrect 2 Flashes - B2 SPID incorrect 3 Flashes - Both SPIDs incorrect
ON	ON	---	---	Loss of ISDN facility.	Check ISDN facility.
ON	OFF	Flashing	---	B1 Channel is either initiating or answering a call.	Upon successful connection B1 IN USE LED will go On Steady.
ON	OFF	---	Flashing	B2 Channel is either initiating or answering a call.	Upon successful connection B2 IN USE LED will go On Steady.
NOTE: A table entry of "---" means status of that LED is not relevant.					

Additional Descriptions

This (these) paragraphs provide additional information, notes, or tips about some of the specific operating features of the ISDN Adapter option.

This information is intended to assist anyone in the use of these features or in trouble-shooting problems concerning these features.

Software Download

Initiation of the download process is by command or as the result of a detected error. The ISDN Adapter provides no LED indication for the download process.

Once the download process is initiated, the ISDN Adapter must complete the download before it is able to perform any other functions.

Upon completion of the download, the ISDN Adapter reinitializes by performing its start-up self-test.

The actual download is performed using a special application for this purpose, with an in-band or dial-in connection to the FrameSaver NP 64+.

Appendix

Fault & Test Screen Displays

FrameSaver NP 64+ screen displays include status fields which indicate Fault and/or Test conditions that relate to the selected screen. These fields are indicated on the screens by a title such as "System Test/Fault". After the title, the highest priority fault or test currently active is displayed, if any.

This section provides a list of entries for the Status, Fault or Test which may appear for each Title. The entries are listed in tables in the order of highest priority-first. Priority levels are within tables are separated by a double line between rows.

The tables are presented by title (screen field) in alphabetical order.

They are as follows:

- DSU Fault

- DSU Loop

- Frame Mgr Fault

- ISDN Backup

- ISDN Demand

- ISDN Connection Cause Codes

- Modem Status, Fault

- System Test/Fault

DSU Fault

DSU Fault shows the highest priority DSU fault currently detected. This is displayed on the DSU Test and ISDN Status / Test screens.

Table A-1 DSU Fault

Display	Description
DSU Fault	Failure of DSU related hardware detected by the unit.
Carrier Loss	Detected loss of DDS facility.
Out of Service	Threshold of errors exceeded on DDS facility

DSU Loop

DSU Fault shows the highest priority DSU fault currently detected. This is displayed on the DSU Test and ISDN Status / Test screens.

Table A-2 DSU Loop

Display	Description
CSU Lp to Netw	Telco initiated loopback in place at the unit's CSU, toward the Network.
DSU Lp to Netw	Telco initiated loopback in place at the unit's DSU, toward the Network.

Frame Mgr Fault

Frame Mgr Fault shows the highest priority Frame Manager fault currently detected. This is displayed on the DSU Test and ISDN Status / Test screens.

Table A-3 Frame Mgr Fault

Display	Description
Clear Channel	Frame Manager configured for and operating in "Transparent" mode.
LMI Netw Failure	Invalid or no response to LMI Status enquiries toward Network.
LMI User Failure	Invalid or no LMI Status requests from User equipment.
Netw Threshold Alarm	Network Link Error Threshold (Data Frame Error Seconds) reached or exceeded.
User Threshold Alarm	User Link Error Threshold (Data Frame Error Seconds) reached or exceeded.
PVC Drpd Mon Alarm	PVC Dropped Monitor Packet Threshold reached or exceeded.
PVC Dlvd Pkt Alarm	Percentage of delivered packets for a PVC has fallen below the PVC Dlvd Pkt Threshold value.
PVC Delay Alarm	PVC Delay Threshold reached or exceeded.
BECN/FECN Alarm	BECN/FECN Error Threshold reached or exceeded.

ISDN Backup

ISDN Backup shows the highest priority ISDN Backup related fault, test or status currently detected. This is displayed on the System View and ISDN Status / Test screens.

Table A-4 ISDN Backup

Display	Description
ISDN Adapt Fault	The ISDN hardware has failed (backup cannot be accomplished)
ISDN Line Failure	The ISDN line of at least one B-Channel is faulty (backup may not be possible).
ISDN SPID Failure	An invalid or incorrect SPID has been entered for at least one B-Channel (backup may not be possible).
B1 SPID Failure	A B2-Channel cannot operate due to a SPID failure on its associated B1-Channel.
Loop Up	LoopUp (Network) connection in place on any assigned B-Channel.
Connecting	Connection is being established.
Failed-xxx	Retry attempts exhausted. "xxx" indicates the latest Cause Code (See Note below.)
Service Disabled	"Service Disable" has been selected on the "ISDN Status / Test" screen.
Time Disabled	"Time Disable" has been selected on the "ISDN Status / Test" screen.
Online	Backup connection in place.
Bch In Use by Mdm	B-Channel is in use by the unit's internal modem.
Bch In Use by Dmd	B-Channel is in use for On-Demand operation.
Armed	Default state if not disabled and no failure exists.

NOTE: An ISDN switch will return a "Cause Code" indicating a status for the latest connection attempt. A "Ready" or "Failed" status and the latest returned code number are displayed in this field for each configured B-Channel. A list of codes and causes are shown in Table A-6 on page A-6.

ISDN Demand

ISDN Demand shows the highest priority ISDN On-Demand related fault, test or status currently detected. This is displayed on the System View and ISDN Status / Test screens.

Table A-5 ISDN Demand

Display	Description
ISDN Adapt Fault	The ISDN hardware has failed (Demand operation cannot be accomplished)
ISDN Line Failure	The ISDN line of at least one B-Channel is faulty (Demand operation may not be possible).
Loop to User	Operator-initiated loop toward the User at the ISDN Data Port is active.
ISDN SPID Failure	An invalid or incorrect SPID has been entered for at least one B-Channel (Demand operation may not be possible).
B1 SPID Failure	A B2-Channel cannot operate due to a SPID failure on its associated B1-Channel.
Failed-xxx	Retry attempts exhausted. "xxx" indicates the latest Cause Code (See Note below.)
Online	Backup connection in place.
Connecting	Connection is being established.
Loop Up	LoopUp (Network) connection in place on any assigned B-Channel.
Online Call/Lp	Call-out connection and LoopUp (Network) is in place.
Bch In Use by Mdm	B-Channel is in use by the unit's internal modem.
Bch In Use by Bkp	B-Channel is in use for Backup operation.
Armed	Default state if not disabled and no failure exists.

NOTE: An ISDN switch will return a "Cause Code" indicating a status for the latest connection attempt. A "Ready" or "Failed" status and the latest returned code number are displayed in this field for each configured B-Channel. A list of codes and causes are shown in Table A-6 on page A-6.

Table A-6 ISDN Connection Cause Codes

Code	Cause	Code	Cause
1	Unallocated (unassigned) number.	52	Outgoing calls barred.
2	No route to specified transit network.	53	Outgoing calls barred within CUG.
3	No route to destination.	54	Incoming calls barred.
4	Send special information tone.	55	Incoming calls barred within CUG.
5	Misdialed trunk prefix.	57	Bearer capability not authorized.
6	Channel unacceptable.	58	Bearer capability not presently available.
7	Call awarded and being delivered in an established channel.	62	Inconsistency in outgoing information element.
8	Preemption.	63	Service or option not available, unspecified.
9	Preemption - circuit reserved for reuse.	65	Bearer service not implemented.
16	Normal call clearing.	66	Channel type not implemented.
17	User busy.	69	Requested facility not implemented.
18	No user responding.	70	Only restricted digital information bearer capability is available.
19	User alerting, no answer from user.	79	Service or option not implemented, unspecified.
20	Subscriber absent.	81	Invalid call reference value.
21	Call rejected.	82	Identified channel does not exist.
22	Number changed.	83	A suspended call exists, but this call identity does not.
26	Non-selected user clearing.	84	Call identity in-use.
27	Destination out of order.	85	No call suspended.
28	Invalid number format (incomplete number).	86	Call having the requested call identity has been cleared.
29	Facility rejected.	87	User not a member of CUG.
30	Responses to STATus ENQuiry.	88	Incompatible destination.
31	Normal, unspecified.	90	Non-existent CUG.
34	No circuit/channel available.	91	Invalid transit network selection.
35	Call Queued	95	Invalid message, unspecified.
38	Network out of order.	96	Mandatory information element is missing.
39	Permanent frame mode connection out-of-service.	97	Message type non-existent or not implemented.
40	Permanent frame mode connection operational.	98	Message not compatible with call state or message type non-existent or not implemented.
41	Temporary failure.	99	Information element non-existent or not implemented.
42	Switching equipment congestion.	100	Invalid information element contents.
43	Access information discarded.	101	Message not compatible with call state.
44	Requested circuit/channel unavailable.	102	Recovery of timer expiry.
46	Precedence call blocked.	103	Parameter non-existent or not implemented - passed on.
47	Resources unavailable, unspecified.	110	Message with unrecognized parameter discarded.
49	Quality of service unavailable.	111	Protocol error, unspecified.
50	Requested facility not subscribed.	127	Interworking, unspecified.

Modem Status, Fault

Modem Status shows the highest priority internal modem related fault currently detected. This is displayed on the System View screen.

Table A-7 Modem Status, Fault

Display	Description
ISDN Adapt Fault	The ISDN hardware has failed.
ISDN Line Failure	The ISDN line of at least one B-Channel is faulty.
ISDN SPID Failure	An invalid or incorrect SPID has been entered for at least one B-Channel.
Modem Failure	Failure of Modem hardware detected by the unit.
Dial Line Failure	Failure of routine Dial Line test detected.
Bch In Use by Bkp	B-Channel is in use for Backup operation.
Bch In Use by Dmd	B-Channel is in use for On-Demand operation.

System Test/Fault

System Test / Fault shows the highest priority System related test or fault currently detected. This is displayed on the System View screen.

Table A-8 System Test/Fault

Display	Description
NVM Failure	Failure of NVM (Non-Volatile Memory) detected by the unit and the latest configuration may *not* have been saved.
BERT to User	Operator initiated BERT is being sent toward the Data Port.
Loop to User	Loopback is in place at the User Port toward the User Circuit.
LMI Netw Failure	Invalid or no response to LMI Status enquiries toward Network.
LMI User Failure	Invalid or no LMI Status requests from User equipment.
DSU Fault	Failure of DSU related hardware detected by the unit.
CSU Lp to Netw	Telco initiated loopback in place at the unit's CSU, toward the Network.
DSU Lp to Netw	Telco initiated loopback in place at the unit's DSU, toward the Network.
BERT to Netw	Operator initiated BERT is being sent toward the Network.
Loop to Netw	Operator initiated Loopback is in place toward the Network.
Carrier Loss	Detected loss of DDS facility.
Out of Service	Threshold of errors exceeded on DDS facility
Netw Threshold Alarm	Network Link Error Threshold (Data Frame Error Seconds) reached or exceeded.
User Threshold Alarm	User Link Error Threshold (Data Frame Error Seconds) reached or exceeded.
PVC Drpd Mon Alarm	PVC Dropped Monitor Packet Threshold reached or exceeded.
PVC Dlvd Pkt Alarm	Percentage of delivered packets for a PVC, has fallen below the PVC Dlvd Pkt Threshold value.
PVC Delay Alarm	PVC Delay Threshold reached or exceeded.
BECN/FECN Alarm	BECN/FECN Error Threshold reached or exceeded.
Test Pkts to Netw	Link Test Packets (40 -1590 octets) are being sent toward the Network Circuit.