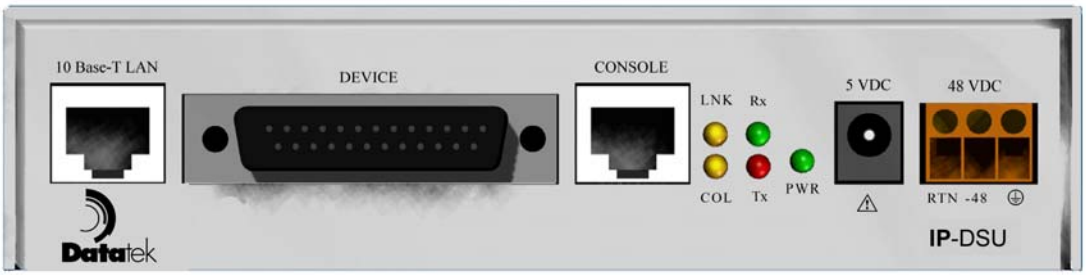
TeleComp
Research & Development Corp

IP-DSU

INTERNET PROTOCOL-

DATA SERVICE UNIT

USER'S MANUAL



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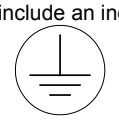
Important Safety Instructions

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

When installing, operating, or maintaining this equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- ❑ Read and understand all instructions.
- ❑ Follow all warnings and instructions marked on this product.
- ❑ For information on proper mounting instructions, consult the User's Manual provided with this product.
- ❑ The telecommunications interface should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection.
- ❑ This product should only be operated from the type of power source indicated in the User's Manual.
- ❑ This unit is intended to be powered from either –48 V DC or AC voltage sources. See User's Manual before connecting to the power source.
- ❑ The –48 V DC input terminals are only provided for installations in Restricted Access Areas locations.
- ❑ Do not use this product near water, for example, in a wet basement.
- ❑ Never touch uninsulated wiring or terminals carrying direct current or leave this wiring exposed. Protect and tape wiring and terminals to avoid risk of fire, electric shock, and injury to service personnel.
- ❑ To reduce the risk of electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect re-assembly can cause electric shock when the unit is subsequently used.
- ❑ For a unit intended to be powered from –48 V DC voltage sources, read and understand the following:
- ❑ This equipment must be provided with a readily accessible disconnect device as part of the building installation.
- ❑ Ensure that there is no exposed wire when the input power cables are connected to the unit.
- ❑ Installation must include an independent frame ground drop to building ground. Refer to User's Manual.



This symbol is marked on the IP-DSU, adjacent to the ground (earth) area for the connection of the ground (earth) conductor.

- ❑ This Equipment is to be Installed Only in Restricted Access Areas on Business and Customer Premises Applications in Accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70. Other Installations Exempt from the Enforcement of the National Electrical Code May Be Engineered According to the Accepted Practices of the Local Telecommunications Utility.
- ❑ For a unit equipped with an AC Wall Plug-In Unit, read and understand the following:
- ❑ Use only the K'TRON, Model KA-52A Wall Plug-In Unit shipped with this product.
- ❑ Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- ❑ Do not staple or otherwise attach the power supply cord to the building surfaces.
- ❑ Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
- ❑ The socket outlet shall be installed near the equipment and shall be readily accessible.
- ❑ The Wall Plug-In unit may be equipped with a three-wire grounding type plug, a plug having a third (grounding) pin. This plug is intended to fit only into a grounding type power outlet. Do not defeat the safety purpose of the grounding type plug.
- ❑ Do not allow anything to rest on the power cord. Do not locate this product where the cord may be abused by persons walking on it.
- ❑ Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

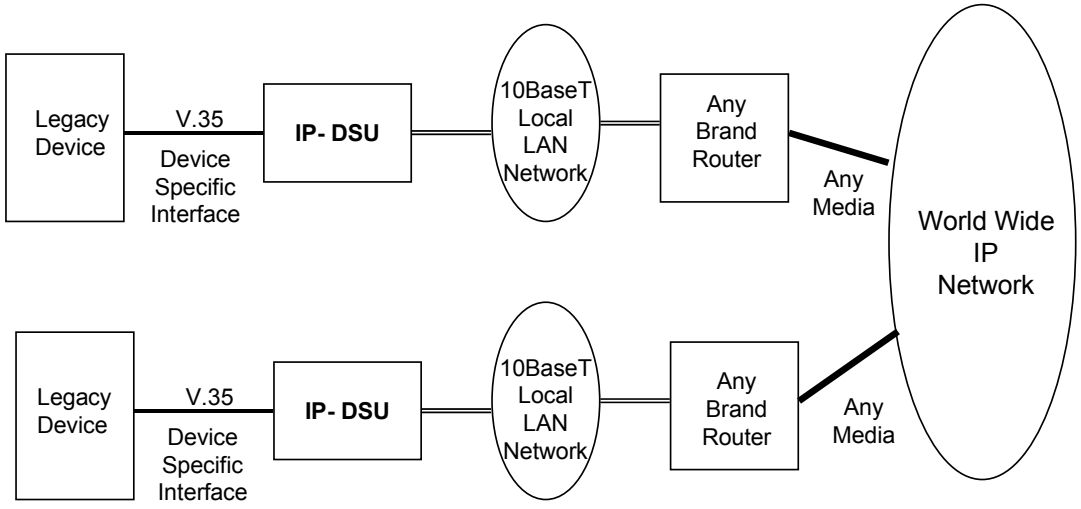
a) When the powers supply cord or plug is damaged or frayed.
b) If liquid has been spilled into the product.
c) If the product has been exposed to rain or water.
d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by 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

1 INTRODUCTION

The ***Internet Protocol-Data Service Unit (IP-DSU)*** allows for an incremental transition from your existing network to the more flexible world of seamless interoperability that is inherent in routed IP networking technology.

The ***IP-DSU*** allows IP networks to carry both their original traffic and BNS-2000/BNS-2000 VCS (or similar legacy device) trunk traffic simultaneously. It replaces an existing, conventional DSU on each end of a private-line circuit and eliminates the interconnecting dedicated facility, since the BNS traffic can now be carried over an IP network. This represents enormous savings for each trunk facility eliminated. Existing cabling between the BNS-2000/BNS-2000 VCS entity and the conventional DSU can usually be reused. Typical use of the ***IP-DSU*** is illustrated in the following diagram.



The ***IP-DSU*** supports a wide range of interface trunk types, allowing for flexible installation and the ability to re-deploy ***IP-DSU*** units as the network evolves.

TRUNK TYPES	DESCRIPTION
NS-2000/BNS-2000 VCS Digital Data Service (DDS) Trunks	This option supports all the trunks in the BNS-2000/BNS-2000 VCS product line that use the DDS transport protocol (SAMML, SAMSL, SAMDBL, TRK-64, TRK-DDS and TRK-PQ).
BNS-2000/BNS-2000 VCS Standard Wire (SWT)Trunks	This option supports all the trunks in the BNS-2000/BNS-2000 VCS product line that use the SWT transport protocol.
BNS-2000/BNS-2000 VCS Trunk-T1 Trunks	This option supports the BNS-2000 TRK-T1 and T1-TRK modules.
Generic SDLC/HDLC	Any version of SDLC or HDLC is supported with this port configuration. Supported speeds range from 9600 bps to T1 (1.544 Mbps). Line encoding of NRZ, NRZI, and inverted NRZI are supported.

The ***IP-DSU*** is easy to manage, providing several easy ways to configure and access status/diagnostic information. A telnet connection to the ***IP-DSU*** using the standard telnet server port (port 23), gives access to a command-line-based configuration application. In addition, a serial RS232-C connection offers the same configuration capability. Finally, the ***IP-DSU*** is another network element that the StarKeeper® II NMS can administer, manage and maintain.

The **IP-DSU** can field upgraded. Upgrades are accomplished through two different I/O interfaces accessed via its I/O board: Telnet or RS-232C.

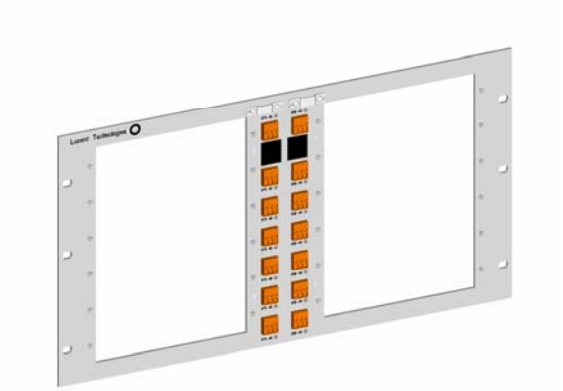
The **IP-DSU** houses an SNMP Version 1 agent and supports a large array of MIB variables. **Trap**, **Set** and **Get** operations are available as well.

The **IP-DSU** supports up to two TACACS+ RADIUS servers for login authentication. These are a primary, and a secondary, although each is individually enabled. The TACACS+ support is for either encrypted, or clear authorization. Encryption keys may contain spaces.

2 PHYSICAL DESCRIPTION

Stand-Alone ***IP-DSU***

Rack-Mount ***IP-DSU*** panel



The compact ***IP-DSU*** is available as a stand-alone unit and can also be configured to mount into an available rack-mount panel, to fit various space and configuration requirements. It can be configured as either a 115V/220V AC or 48V DC powered unit. It must be placed at a location with cable access to both the BNS trunk I/O board and the local IP network.

2.1 Device Interface

Through a DB25 RS530 connector, the IP-DSU supports two software-selectable device interfaces: V.35 and RS232-C. The female connector electrically presents a data communication equipment (DCE) interface.

For V.35, a 34-pin electrical interface used for connecting the BNS trunk I/O board to the IP-DSU, a standard RS530 to V.35 adapter is available.

The IP-DSU DB25 RS530 connector directly supports RS232-C, which, in this case, is a 25-pin electrical interface for connecting the BNS trunk I/O board to the IP-DSU.

2.2 10BaseT LAN Interface

This interface requires a standard RJ45-terminated Category 5 twisted-pair data cable. It connects to a 10BaseT hub or router on the local LAN segment.

2.3 Console interface

This interface requires a standard RJ45-terminated twisted-pair data cable. It connects as data terminating equipment (DTE) to an asynchronous device, and uses RS232-C signaling. Connection to the ***IP-DSU*** console is required for initial administration or StarKeeper® II NMS alarm collection. Otherwise, the console can be disconnected during normal operation.[1]

2.4 Rack-mount Panel

The ***IP-DSU*** rack-mount panel contains twelve slots to accommodate that number of ***IP-DSU*** units. Each rack-mount panel fits in a 19 or 23 inch EIA standard-equipment rack (use extension ears when mounting in a 23-inch rack). The rack-mount panel supports 1 inch, 1.75 inch and 2 inch spacing between vertical rail mounting holes. Mounting ears for ***IP-DSU*** placements in the rack-mount panel are available.

2.5 Power Interfaces

Dual power interfaces are present on the ***IP-DSU*** faceplate. A circular interface labeled "5 VDC" mates with the barrel connector of a standard wall outlet AC to DC power transformer for 115V AC installations. A three position (accepting return, minus and ground power wires) terminal block labeled "48 VDC" is commonly used in central-office installations.

The ***IP-DSU*** is factory configured for 115V AC usage. 48V DC operation requires a different jumper setting on the ***IP-DSU*** system board. *(*See *Installation* Section*)*

2.5.1 Stand-alone AC Power

For this application, a separate AC power supply is available. The power supply has a six-foot cable that terminates with a barrel connector. The power supply plugs into a standard 115V AC outlet. The barrel connector plugs into the circular connector labeled "5 VDC" on the ***IP-DSU*** faceplate.

2.5.2 Rack-mount AC Power

IP-DSU rack-mount AC power is the same as in the stand-alone case. This configuration requires one AC power supply for each ***IP-DSU*** unit. However, it is recommended that

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[1] The ***IP-DSU*** also supports console access through a TCP telnet connection and makes use of the embedded device standard telnet server port (tcp **1023**). This service is available only when the unit is in service.

your equipment rack be outfitted with sufficient power strips to accommodate all of the AC power supplies.

2.5.3 Stand-alone DC Power

The stand-alone ***IP-DSU*** accepts DC power input directly from a 48V DC power source and connects into the three position (accepting return, minus and ground power wires) terminal block labeled "48 VDC" on the faceplate. The terminal-block connectors accommodate 14 awg to 24 awg (American Wire Gauge) wire. A strain-relief clamp is available separately for DC wire stabilization.

2.5.4 Rack-mount DC Power

The rack-mount ***IP-DSU*** accepts DC power input directly from a 48V DC power source and connects into a main, three position (accepting return, minus and ground power wires) terminal block labeled "48 VDC" on the rack-mount panel faceplate. Power is distributed to six terminal blocks vertically below the main terminal block, where each individual terminal block powers a single ***IP-DSU***. Each rack-mount panel accepts two 48V DC power feeds. Twelve ***IP-DSU*** units can be powered in this manner. The terminal block connectors accommodate 10awg to 14awg (American Wire Gauge) wire. A strain-relief clamp is available separately for DC wire stabilization

2.6 LEDs

The ***IP-DSU*** faceplate contains light emitting diodes (LEDs) used to report ***IP-DSU*** activity and status.

LED Function	LED Color	LED Description
Transmit (Tx)	Yellow	10 Base-T Transmit Packet Indicator
Receive (Rx)	Yellow	10 Base-T Receive Packet Indicator
Link (LNK)	Green	10 Base-T Link Indicator
Collision (COL)	Red	10 Base-T Collision Indicator
Power (PWR)	Green	Unit Power Indicator

3 INSTALLATION

This chapter contains the steps needed to install and configure the ***IP-DSU***.[2]

3.1 Equipment

Unpack and inspect the ***IP-DSU*** units and other components, and have on hand a #2 phillips and medium-sized flathead screwdriver.

3.1.1 Stand-alone IP-DSU Equipment

For stand-alone ***IP-DSU*** installations, the following items are needed.

- A minimum of two ***IP-DSU*** units.
- For AC operation, a power supply for each ***IP-DSU*** (DC is directly wired into the unit).
- A V.35 or DB25 (RS-232-C) cable for each connection between an ***IP-DSU*** and a BNS trunk I/O board. (V.35 requires a DB25 to V.35 adapter)
- An RJ45-terminated twisted-pair data (RS232-C) cable for each connection between the ***IP-DSU*** console port and an asynchronous device.
- A category 5 RJ45-terminated twisted-pair data cable for each connection between the ***IP-DSU*** and the local 10BaseT LAN hub or router.
- 10BaseT LAN hubs or routers with 10BaseT access to the Intranet or Internet.
- For DC operation, a strain-relief clamp for wire stabilization

3.1.2 Rack-mount IP-DSU Equipment

When installing ***IP-DSU*** units in a rack-mount configuration, it is necessary to gather the items listed above for stand-alone ***IP-DSU*** installation, plus the following equipment.

An EIA-standard 19-inch or 23-inch equipment rack with internal, vertical mounting rails. Hole spacing on the vertical mounting rail may be 1 inch, 1.75 inch or 2 inch. Use the dimension specifications in the appendix to calculate how high the rack needs to be to support a specified number of rack-mount panels. For example, seven rack-mount panels measuring 10.5 inches each will fit in a data equipment rack with internal

[2] Cabling configurations, describing proper cabling between the ***IP-DSU*** device interface (V.35/RS-232C) and BNS I/O boards is available in the *Data Networking Products Cabling Guide*.

mounting rails 75 inches in height. This configuration would support a maximum of 84 ***IP-DSU*** units.

A rack-mount panel for each set of twelve ***IP-DSU*** units.

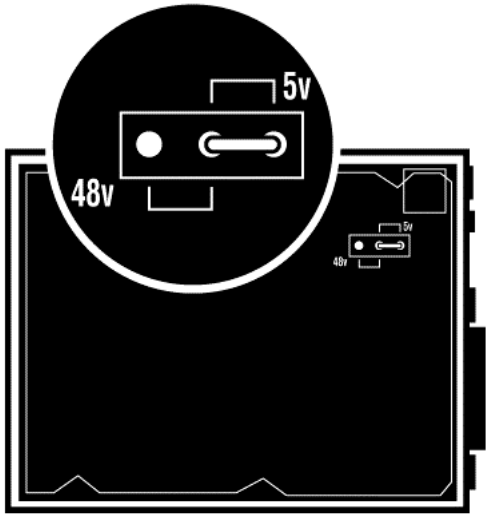
A pair of mounting ears for each ***IP-DSU***.

Strain-relief clamps for DC wire stabilization.

Power distribution module(s) (1 for every 6 ***IP-DSU*** units)

3.2 Power Configuration Steps for 48V DC Operation

The ***IP-DSU*** is factory configured for 115V AC usage. 48V DC operation requires a different jumper setting on the ***IP-DSU*** system board.



Disconnect any power connectors to the IP-DSU.

Remove the IP-DSU cover, exposing the top portion of the system board

Locate the jumper connector and move the jumper to the 48V setting *(see adjacent figure).*

Replace the IP-DSU cover.

The IP-DSU is ready for 48V DC operation

3.3 Stand-alone Installation

3.3.1 AC ONLY

Attach the provided feet to the bottom of the unit.

Place the ***IP-DSU*** in the desired location, such as a shelf in a data equipment rack.

Plug one end of the RJ45-terminated category 5 twisted-pair data cable into the ***IP-DSU*** 10BaseT LAN interface, and the other into a 10BaseT LAN hub or router.

Plug one end of the RJ45-terminated twisted-pair data cable into the ***IP-DSU*** console interface, and the other into the port of the asynchronous device that will be used to configure or manage the ***IP-DSU***.

Plug one end of the V.35 (requires DB25 to V.35 adapter) or RS232-C device cable into the ***IP-DSU*** device interface, and the other end into the existing trunk cable or BNS trunk I/O board.

Plug the power supply into a standard 115V AC outlet and plug the barrel connector from the power supply into the circular connector on the ***IP-DSU*** faceplate labeled "5 VDC".

3.3.2 DC ONLY

Attach the provided feet to the bottom of the unit.

Fasten the strain-relief bracket to the side of the ***IP-DSU***.

Place the ***IP-DSU*** in the desired location, such as a shelf in a data equipment rack.

Plug one end of the RJ45-terminated category 5 twisted-pair data cable into the ***IP-DSU*** 10BaseT LAN interface, and the other into a 10BaseT LAN hub or router.

Plug one end of the RJ45-terminated twisted-pair data cable into the ***IP-DSU*** console interface, and the other into the port of the asynchronous device that will be used to configure or manage the ***IP-DSU***.

Plug one end of the V.35 (requires DB25 to V.35 adapter) or RS232-C device cable into the ***IP-DSU*** device interface, and the other end into the existing trunk cable or BNS trunk I/O board.

Run your 48V DC (return, minus and ground) wires from a central source through the strain-relief clamp for DC wire stabilization. On the ***IP-DSU*** faceplate, attach the return, minus and ground wires to the return, minus and ground connections, respectively, of the terminal block labeled "48 VDC".

3.4 Rack-mount Installation

3.4.1 AC ONLY

Prepare each ***IP-DSU*** for rack mounting by attaching the mounting ears to each side of the unit.

Fasten the twelve-slot rack-mount panel to a 19-inch equipment rack, or use extension ears for a 23-inch rack. Slide each ***IP-DSU*** with mounting ears into one of the twelve rack-mount panel slots. Secure the ***IP-DSU*** to the rack mount panel with screws.

For each ***IP-DSU***, plug one end of the RJ45-terminated category 5 twisted-pair data cable into the ***IP-DSU*** 10BaseT LAN interface and the other end into a 10BaseT LAN hub or router.

For each ***IP-DSU***, plug one end of the RJ45-terminated twisted-pair data cable into the ***IP-DSU*** console interface, and the other end into the asynchronous device.

For each ***IP-DSU***, plug one end of the V.35 (requires DB25 to V.35 adapter) or RS232-C device cable into the ***IP-DSU*** device interface, and the other end into the existing trunk cable or BNS trunk I/O board.

Plug the power supply into a standard 115V AC outlet, and plug the barrel connector from the power supply into the circular connector on the ***IP-DSU*** faceplate labeled "5 VDC".

3.4.2 DC ONLY

Prepare each ***IP-DSU*** for rack mounting by attaching the mounting ears to each side of the unit.

Attach the power distribution panel(s) to the rack-mount plate.

Make sure the rack mount panel toggle switches are set to the **OFF** position.

To the rack mount panel faceplate, fasten the strain-relief clamp(s).

Fasten the twelve-slot rack-mount panel to a 19-inch equipment rack or use extension ears for a 23-inch rack. Slide each ***IP-DSU*** with mounting ears into one of the twelve rack-mount panel slots. Secure the ***IP-DSU*** to the rack mount panel with screws.

For each ***IP-DSU***, plug one end of the RJ45-terminated category 5 twisted-pair data cable into the ***IP-DSU*** 10BaseT LAN interface, and the other end into a 10BaseT LAN hub or router.

For each ***IP-DSU***, plug one end of the RJ45-terminated twisted-pair data cable into the ***IP-DSU*** console interface, and the other end into the asynchronous device.

For each ***IP-DSU***, plug one end of the V.35 (requires DB25 to V.35 adapter) or RS232-C device cable into the ***IP-DSU*** device interface and the other end into the existing trunk cable or trunk module I/O board.

Run the 48V DC (return, minus and ground) wires from a central source through the strain-relief clamp used for DC wire stabilization. On the rack-mount panel, attach the return, minus and ground wires to the return, minus and ground connections on one of the main terminal blocks labeled "48 Vin". Power is distributed to six terminal blocks vertically below the main terminal block and labeled "48 Vout". Each individual 48 Vout terminal block below the main 48 Vin terminal block powers a single ***IP-DSU***. This is accomplished by jumping short return, minus and ground wires between the panel terminal block and the ***IP-DSU*** terminal block. All terminal-block connectors accommodate 14 awg to 24 awg wire. Strain-relief clamps are used for DC wire stabilization.

Make sure the rack-mount panel toggle switches are set to the **ON** position.

3.5 Console Installation/Configuration

The ***IP-DSU*** is managed through its console port by a terminal, PC, dial-up modem, or BNS asynchronous connection (see next figure).[3] Network administrators can access the ***IP-DSU*** console port through the StarKeeper® II NMS.

Specific instructions for configuration of SAM, TY12 and MSM asynchronous ports are available in the appropriate BNS-2000 *Module Reference Guide*. ***IP-DSU*** specific configuration guidelines are as follows:

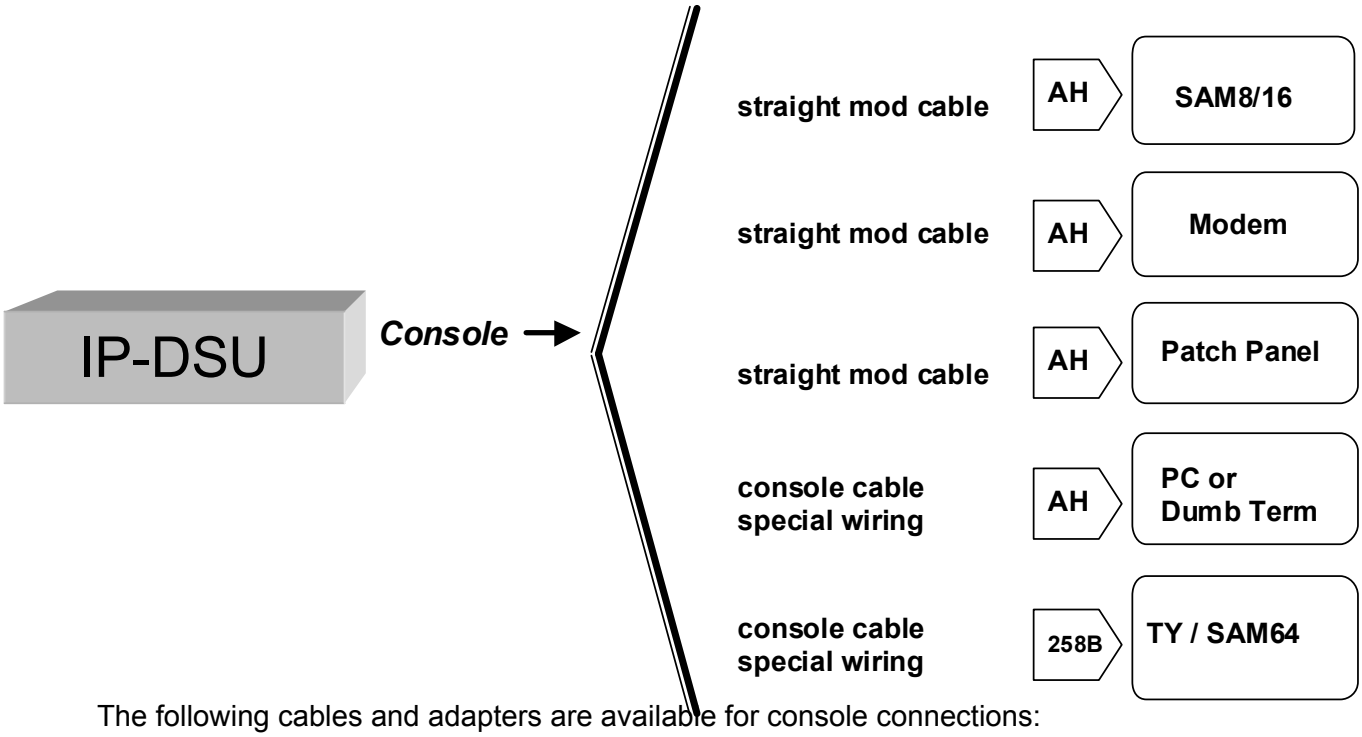
Configure SAM, TY12 or MSM console connections as 9600 bps with 8 bits and no parity, and use a DCE type cable.

Configure SAM or MSM console connections as type "host" and as a "pap" (permanently active port).

Configure TY12 console connections as type "console".

See Section 10 for wiring diagrams for special console cabling.

[3] Console cables required for connections to TY12 and MSM modules, Modems, SAM64/504 Multiplexors, **4000**, PCs, or terminals are available.



The following cables and adapters are available for console connections:

Cable or Adapter	Order Information (Lucent)	Order Information (TeleComp R&D Reseller)
modular cable (10')	407981646	modular cable (length)
modular cable (special wiring)	408198133	modular cable (special wiring)
AH male connector	ED5P055-31 G-139	AH male connector
Ortronics Patch Panel	406485755	Ortronics Patch Panel
258 Adapter	ED5P055-31 G(155)	258 Adapter

3.6 Configuration Quick Start

An ***IP-DSU*** shipped from the factory has already undergone an initial burn-in process where sample configuration data has been entered. However, the unit must be appropriately configured for operation on your local area network.

The following command sequence can be followed to quickly configure an ***IP-DSU*** for operation. The command sequence may also be performed before field installation, since configuration parameters are non-volatile once entered.

The **IP-DSU** is pre-configured with a valid, licensed, MAC address. If the MAC address is lost, refer to the MAC address on the **IP-DSU** bottom label and re-enter it.

When the ***IP-DSU*** is powered, **<IP-DSU>** is displayed at the console.

Execute the following command sequence to configure the unit.

<IP-DSU>

Type: **login passwd=initial [RETURN]**

Display: **M LOGIN**

USER IS LOGGED IN IP-DSU

<IP-DSU>

Type: **lo ipaddr=<this unit's IP address> submask=<this unit's subnet mask> [RETURN]**

Display: **<IP-DSU>**

Type: **dest ipaddr=<remote unit's IP address> [RETURN]**

Display: **<IP-DSU>**

Type: **gateway ipaddr=<gateway's IP address> [RETURN]**

Display: **<IP-DSU>**

Type: **port type=< SWT|SAMWT|T1|DDS|HDLC** (select one)**> [RETURN]**

Display: **<IP-DSU>**

Type: **restore [RETURN]**

Display: **M RESTORE**

IP-DSU RESTORED TO SERVICE

3.7 Field Upgrade and Software Registration

The **IP-DSU,** when initially delivered, is fully registered and does not need any keys to activate the software. Software keys are required when an optional individual feature packages is added to the device. Finally, when the **IP-DSU** is upgraded with revised software, one or more software keys are required to register the installed software and any feature packages registered for the device.

When performing an upgrade, the revised software is initially downloaded by **upgrade**[4] into a staging area and is not active. The software then is activated by a ***reboot***. The new software will execute normally prior to registration. However, no backup, reloads, or upgrades can be performed. Module level parameters, such as the device IP address, may be changed and activated. If a user port is taken out of service, the port cannot be restored.

The procedure for performing a software registration has been mechanized. Manual procedures are error prone and not recommended. They are no longer covered in this user manual.

The mechanized Software Upgrade Registration procedure allows simplified administration of one or more devices. When a quantity of devices are upgraded, manual software registration of each device has the potential of becoming increasingly tedious. The mechanized software upgrade registration process was designed to alleviate the problems associated with multiple device upgrades. It is also preferred for single device upgrades as it eliminates any potential for error.

The new software is downloaded to the **IP-DSU** via the **upgrade** command. This may be performed for one or more devices. The "-r" option to the dtupgrade command will restart the device on the new software after the download completes successfully. It is highly recommended. In the alternative, the device may be downloaded without a restart and restarted at a later time during a scheduled maintenance window. Restarting the device on the new software prior to registration is required. After the restart, the devices will continue to operate normally on the new software without registration. Some operations interface functions are inhibited pending software registration. Below is an example of a typical **upgrade** invocation. Note the use of the "-r" option as it is recommended.

upgrade –v –d –r –i –mIP-DSU 10.0.1.42 ipdsu.21.1

[4] The utilities may be renamed to any desired mnemonic. The names shown are those on the distribution.

Mechanized registration is performed in three steps. Each of which does not require user intervention.

The steps are as follows:

1. The **getinfo** utility is invoked on a file containing a list of devices to be administered. This file is called the master device list file and is typically named "dt_device.master". The master device list file may have any name and it is provided as an argument to the **getinfo** utility. The master device list may also contain devices that do not require registration. The **getinfo** utility makes inquiry of each device in the master device list and creates a device information file named "dt_device.info" in the current directory.
2. The "dt_device.info" file is then sent via email to **keys@trdcusa.com** for registration processing.
3. A file name "dt_device.register" file is returned via email to be used as input in the next step. A file named "dt_device.msgs" is a text file that may be displayed or printed showing the results of the registration function.
4. The **setreg** utility is invoked and uses the "dt_device.register" file provided as an argument. If no argument is provided, the file is assumed to be in the current directory. The **setreg** utility contacts each device that requires registration and have been assigned keys. One or more keys are installed during the dialogue.
5. The "dt_device.info" file and the "dt_device.register" file are deleted as they are transient and have no further value. Neither can be reused for the purpose of registration. However, the dt_device.info file may be used for inventory reports..

The source for the registration procedure is the inventory master device list file that is created, and maintained, by the administrator using their favorite text editor.

The master device list file contains one IP address per line, with an optional TCP port, and an optional password override, to access the device. The IP address is the console *connection address*, and not necessarily the actual device IP address. Registration via the serial console is explicitly supported. Comments are allowed between addresses, and after addresses. A password override is only required if the default password of "initial" has been changed.

The master device file line format is as follows:

<IP ADDRESS> [<TCP PORT>] [-P<Password>] # Comment

An example "device.master" file follows:

This is a Sample master device list file "device.master".
Note that there is one device (Connect IP Address) per line.
TCP Port Override is allowed. Registration may use the serial console.
Password Override is allowed.
It is OK to have devices that do not need registration listed for inventory.
Comments in this file are preceded with a pound symbol.
Blank Lines are treated as comments.
Basic Line Format is as follows:
10.0.1.80 # Device at Location 'A'
192.168.7.82 # Device at Location 'B'
192.168.7.155 50001 # Example of TCP port Override.
192.168.7.156 50001 –pcustom1 # Example of Password Override.

Once the "dt_device.master" file is prepared, it is used as an input to the **getinfo** utility.

getinfo dt_device.master

This **getinfo** utility will collect information on each device in the master file. The **getinfo** utility will also make a determination if a registration is actually required. Consequently, the **getinfo** utility is also useful in performing inventory functions outside of the device registration. The output of the **getinfo** utility is a file named "dt_device.info" that is always created in the current directory.

The file "dt_device.info" is attached to an email and sent to the address **keys@trdcusa.com.** The registration procedure is performed and a file named "dt_device.register" is attached to return email to the original sender. A messages file named "dt_device.msgs" is also attached and may be printed as a report of the key generation function.

After receiving the "dt_device.register" file, the **setreg** utility is invoked with the relative path of the "dt_device.register" file as it's sole argument. The **setreg** utility will only

contact the devices that actually need registration, and for which one or more keys were successfully generated. All of the appropriate keys, including a device key and multiple per port feature package keys, are installed by the **setreg** utility. The device is not restarted and this operation may occur during normal transport operation.

A report utility **devrep** is available. The **devrep** utility uses the "dt_device.info" file to display the inventory information. The usage is as follows:

devrep [-v] dt_device.info

If the file is not specified, the **devrep** utility attempts to use the "dt_device.info" file resident in the current directory.

4 IP-DSU COMMANDS REFERENCE

The following is the complete ***IP-DSU*** command set. Except where noted, commands are visible only when the user is logged in to the console interface.

4.1 Login

Syntax #1: login passwd=<password> (default password is: initial)
Syntax #2: login

This command is a security command required for accessing the bulk of the command set. It is only available when the user is logged off. The command has two forms, and three modes of operation.

The first syntax example provides legacy compatibility for operations systems that use that form. The password must contain between one and seven alphanumeric characters. The typed password is case sensitive.

In the second example, the password is not provided on the command line. The login command will then prompt for a password. A password given at the prompt will not be echoed. There is a timeout of approximately 30 seconds on the password prompt.

If one or more **TACACS+** RADIUS Servers are defined, the *second* form is used to log into the device. When used, a connection is made to the first available server. Prompts for "Username" and "Password" are requested. These Usernames and Passwords are administered on the **TACACS+** RADIUS server; and not on the device.

4.2 Logout

Syntax: logout

The **logout** command returns the ***IP-DSU*** to its logged-out mode, thus preventing unauthorized access.

4.3 Change Password

Syntax: chgpass old=<password> new=<password> confirm=<password>

The **chgpass** command allows the user to change a previously-configured password. The old password is the one currently in effect. The new and confirm passwords should be identical. The password must contain between one and seven alphanumeric characters. The typed password is case insensitive. All arguments are required to complete the command.

4.4 Local

Syntax: local ipaddr=<IP address> submask=<submask>

The **local** (or **lo**) command sets the address of the ***IP-DSU***, to facilitate communication with a peer ***IP-DSU***. [5]

The ipaddr is the IP address of this unit. The submask is the subnet mask of this unit, with a default value of 8 bits (255.255.255.0).

4.5 Destination

Syntax: dest [ipaddr=<IP address>] [trans=< UDP | TCPORIG | TCPRCV >]

The **dest** (or **de**) command specifies the IP address of the peer ***IP-DSU***. All data leaving through the unit's 10Base-T LAN interface is destined for another ***IP-DSU*** with this configured IP address. Address resolution occurs when the unit is restored to service.

By default, UDP is used for data transport. This is the recommended transport protocol. The ***IP-DSU***, using UDP, will minimize delay, optimize throughput, and preserve the error handling methods of the network. This means that the connected network, whether it is BNS-2000, SNA, X.25, Frame Relay, or SMDS DXI, will maintain its inherent error recovery scheme. Re-transmissions (if necessary) will continue to be performed by the end devices.

The **trans** parameter allows the user to instead select TCP transport. TCP formalizes a set of rules by which lost data is re-transmitted, and by which out-of-sequence data is reorganized on a per-byte basis (neither of which is done by UDP). It is typically used for asynchronous terminal server connections (telnet over TCP). For using TCP, one ***IP-DSU*** is considered the call originator and the peer unit is considered the call receiver, hence the TCPORIG and TCPRCV options. For correct operation, the ***IP-DSU*** and its peer must have the opposite options if TCP is being used.

The TCP transport rate should not exceed 56 Kbps., whereas the default UDP transport option is capable of transmission rates up to T1 (1.544 Mhz).

4.6 Gateway

Syntax: gateway ipaddr=<IP address>

The **gateway** (or **ga**) command specifies the IP address of the local gateway router, if any. If the remote ***IP-DSU*** resides on a different LAN, the gateway is the first hop data travels through to reach it.

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[5] References to a peer ***IP-DSU*** include the use of a Universal Trunk Module (UTM) optioned for "IPDSU" trunk type as the peer.

4.7 Port

Syntax: port [type=<SWT|SAMWT|T1|DDS|HDLC>]
[phy=<232|V35>]
[speed=<dev_speed>]
[enc=<dev_encoding>]

The **port** (or **pt**) command specifies the BNS trunk I/O board interface used to connect to the ***IP-DSU***. The command consists of four attributes: **type**, **phy**, **speed**, and **enc**.

The **type** attribute may be set to T1, SWT, DDS, or HDLC. The T1 attribute is for a BNS Trunk-T1. The SWT attribute is for a BNS SWT with an AWJ9 I/O board. The DDS attribute is for a BNS Trunk that uses DDS conventions (e.g. SAMML, SAMDL, SAMSL, etc.). The HDLC attribute is for a generic device using SDLC or HDLC framing.

The **phy** attribute specifies the type of physical device interface to be used on the ***IP-DSU***. Options are v35 (V.35) or 232 (RS232-C). The hardware is also capable of RS530. Should that option be needed, please contact the author per the last page.

The **speed** attribute defaults to T1 rate for the Trunk-T1 and SWT Trunks. It may be changed to another value. The allowed values are T1, 768K, 512K, 256K, 128K, 56K, 38400, 19200, and 9600.

The **enc** attribute specifies the physical line encoding parameter. It is available for the generic HDLC interface type. It may take on the values of NRZ, INRZ, NRZI, and INRZI.

4.8 Remove

Syntax: remove

The **remove** (or **rm**) command takes the unit out of service. This command must be performed before any configuration changes can occur. It is only visible when the unit is logged in. The command has no arguments. However, the **remove** command requires confirmation by password.

4.9 Restore

Syntax: restore

The **restore** (or **rs**) command returns the ***IP-DSU*** to service, and it has no arguments. It will automatically restart the IP-DSU to make any changes effective. The **restore** command requires confirmation by password.

4.10 Reboot

Syntax: reboot

The **reboot** command restarts the unit. The command has no arguments, but is confirmed by password. A reboot should be performed after a software upgrade, and prior to software registration.

4.11 SNMP

Syntax: snmp [ipaddr=<Trap Mgr Addr>] [port=<Trap Mgr Port>]

The **snmp** command is used to configure the IP address of the SNMP trap manager. Since traps are unsolicited alarms, an agent can take the initiative to inform the manager of the occurrence of a predefined condition. Typical conditions include the cold-start or warm-start of equipment and a link-down or link-up condition.

A single or multiple SNMP managers can access the ***IP-DSU***. However, only one SNMP manager can be predefined as the trap manager. By administering this command, all traps will be directed to the chosen trap manager. The port number should be configured for 162 on new configurations, which is standard practice.

4.12 TACACS+ RADIUS Servers

Syntax: tac < PRI | SEC > [ipaddr=<IP Address>]
[port=<TCP Port>]
[key="Encryption Key" | NONE]
[ENABLE]
[DISABLE]

The **tacplus** command is only visible when the unit is logged in. The tac command allows the configuration of up to two **TACACS+** RADIUS servers for the device. the servers are used as a primary server and a secondary server, although they may be individually disabled.

The **< PRI | SEC >** syntax specifies which server is to be configured. A server may not be configured while enabled

The **[ipaddr=<IP Address>]** specifies the IP address of the configured server.

The **[port=<TCP Port>]** specifies the TCP port to use when communicating with the server. The TACACS+ service defaults to TCP port 49, but any port may be specified.

The **[key="Encryption Key" | NONE]** specifies an encryption key to use. The Encryption key must be enclosed in double quotes, and the double quotes are not part of the key. If no encryption is desired, the value of **NONE** is used to designate unencrypted service.

The **ENABLE** command allows this server to be used for service, and prevents further configuration.

The **DISABLE** command prevents this server from being used for service, and subsequently allows configuration.

4.13 Verify Configuration

Syntax: vcfg

The **vcfg** (or **vc**) command displays the current configuration of the unit, and is only visible when the user is logged in. The command has no arguments.

SAMPLE OUTPUT:

<IP-DSU> vcfg

Current Configuration:

Service State ==> In Service.

Actual Service State ==> Peer Connectivity Established.

Port Interface ==> V.35 DCE.

Port Type ==> Generic HDLC Interface.

Port Speed ==> 56K.

Port Physical Encoding ==> NRZ.

Local MAC Address ==> 0.96.29.2.48.43

Local IP Address ==> 135.17.59.241

Subnet Mask ==> 255.255.255.0

Destination IP Address ==> 135.17.59.242 Device Port 1

Gateway IP Address ==> 135.17.59.1

SNMP Trap Manager ==> Not defined.

Acquired Nhop MAC Address ==> 0.19.35.83.87.55

Loopback Status ==> Loopbacks are not enabled.

Data Encryption Status ==> Disabled.

Data Transport Protocol ==> Peer to Peer via UDP.

4.14 Display Measurements

Syntax: dmeas

The **dmeas** (or **dm**) command displays the current measurements of the unit, and is only visible when the user is logged in. The command has no arguments.

Sample Output:

<IP-DSU> dmeas

M Display Measurements

Current Measurements:

Ethernet Packets Received ==> 30411

Ethernet Packets Transmitted ==> 5137

DEVICE Frames Received ==> 5136

DEVICE Frames Transmitted ==> 30410

<IP-DSU>

The base measurements (shown above) are always displayed, while only non-zero error counters are displayed.

Base Measurements	Error Counters	Error Counters (continued)
Ethernet Packets Received	Ethernet Discards (Resource)	Frames aborted by CD lost (Port Rx)
Ethernet Packets Transmitted	DEVICE Port Discards (Resource)	Rx Overruns (Port Rx)
DEVICE Frames Received	Late Collisions (Ethernet Tx)	Rx CRC Errors (Port Rx)
DEVICE Frames Transmitted	Underrun (Ethernet Tx)	Rx Aborts (Port Rx)
	Retry Limit Exceeded (Ethernet Tx)	Rx Parity Errors (Port Rx)
	Carrier Sense Lost (Ethernet Tx)	Non-Aligned Frame Errors (Port Rx)
	Frame Collisions (Ethernet Rx)	Frame Length Violations (Port Rx)
	Rx Overruns (Ethernet Rx)	Frame DPLL Errors (Port Rx)
	Rx CRC Errors (Ethernet Rx)	Unsupported Protocol Frames Received
	Short Frame Errors (Ethernet Rx)	Invalid UDP Frames Received
	Non-Aligned Frame Errors (Ethernet Rx)	Rx Frames w/IP Header Checksum Errors
	Frame Length Violations (Ethernet Rx)	Rx Frames w/ICMP Checksum Errors
	Frames aborted by CTS lost (Port Tx)	Rx Frames from Non-Peer Entity
	Frames Underrun (Port Tx)	

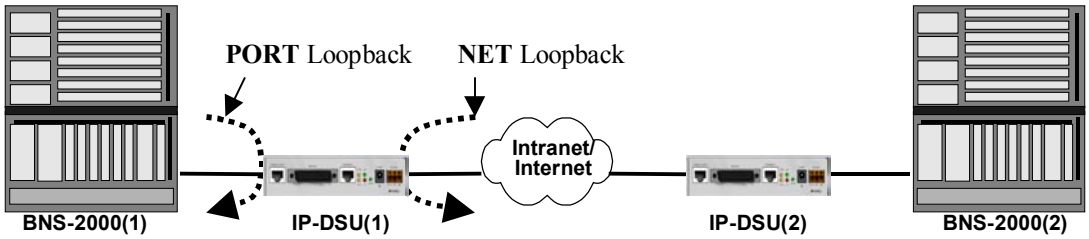
4.15 Clear Measurements

Syntax: clear

The **clear** (or **clr**) command sets all the measurement and error counters to zero, and is only visible when the user is logged in. The command has no arguments.

4.16 Loopback

Syntax: loopback [OFF | NET | PORT | BOTH]



The **loopback** command enables or disables loopbacks. The command has a single argument indicating which type of loopback is requested: **NET, PORT, BOTH,** or **OFF**. The command is only visible when the user is logged in.

The **NET** option enables a network loopback. It is the equivalent of a remote loopback between two modems. Any data arriving from the peer ***IP-DSU*** will be sent back to the originator until loopbacks are cancelled.

The **PORT** option enables a device loopback. It is the equivalent of a local loopback between two modems. Any data arriving from the device is sent back to the device until loopbacks are cancelled.

The **BOTH** option enables both network and device loopbacks. It is the aggregate of the net and port loopback options.

The **OFF** option disables any loopback(s) in effect. Loopbacks are cumulative until **OFF** is specified, e.g., if a network loopback was enabled, and a device loopback was subsequently enabled, the net effect is the same as if they were simultaneously enabled using the **BOTH** option.

Loopbacks are transient conditions. A loopback may only be specified while the unit is in-service, and does not survive a reset. Should the unit be reset for any reason (power outage, manual reset, etc.), the ***IP-DSU*** will revert to a normal non-loopback mode of operation.

4.17 Data Encryption

Syntax: encrypt [on | off]

The **encrypt** (or **enc**) command indicates if data is to be encrypted between peer ***IP-DSU*** units over the IP Intranet or Internet. It is only visible when the unit is logged in. The command has a single argument. The **on** option enables data encryption between peer ***IP-DSU*** units. The **off** option disables data encryption. The ***IP-DSU***s at both ends of a connection must have the same encryption state (either **on** or **off**).

4.18 Help

Syntax: help

The **help** (or **?**) command without arguments displays the entire ***IP-DSU*** command set and command syntax for the mode (logged-out or logged-in) the unit is currently in. Individual command syntax is available when the help command is followed by the command name.

4.19 Version

Syntax: ver

The **version** or **ver** command displays the current software and database revisions of the unit, and is only visible when the user is logged in. The command has no arguments.

SAMPLE OUTPUT:

<IP-DSU> ver

M version

IP-DSU - Build 17 made on Sat Sep 23 10:16:57 EDT 2000.

Software Version: 1.0.1

Hardware Version: V2

DB Version: V.1

4.20 Resetting the Password

Syntax: rstpass [key=<Password Key>]

The **rstpass** command is a command whose function is to reset the password(s) of the device to factory default values. This function was formerly performed as part of the software registration. Breaking it out into a separate command allows the software to be registered without password updates to take place.

When invoked without arguments, the **rstpass** command will display the relevant information needed to generate the **<Password Key>**. This information is relayed to the technical support staff. The generated key is then used with the **key=<Password Key>** argument. The **rstpass** command should not be run between the time the key data is generated and the **<Password Key>** is utilized. Similarly, if the device is restarted, the resultant **<Password Key>** will not perform its intended function.

4.21 INSTALL (Software Registration)

Syntax: install [key=<software key>]
[fpkey=<software key>]

The **IP-DSU** has a unique device software key, and multiple per port feature package keys. This section is included in the user manual for completeness. Under normal circumstances, only the mechanized utilities utilize this command. It may be executed manually under an emergency situation. Depending on the device, the keys may or may not be installed by the factory. The per port feature package keys may be added at any time, and do not affect the operation of the unit. The registration procedure does not require a restart to take effect on a device running the registered software.

When executed without arguments, the **install** command will display the significant information needed to manufacture the device software key. The device IP address may also be required. No additional information is needed to create the feature package keys.

The **key=<software key>** argument allows the entry of an eight-character alphanumeric software registration that is unique to this **IP-DSU** device. If an invalid key is entered, a MINOR alarm is generated to that effect. The passwords are not altered. The **rstpass** command has been created to reset the passwords should that become necessary.

The **fpkey=<software key>** argument allows the entry of an eight-character alphanumeric software registration that is unique to a port, and software feature package, on this **IP-DSU** device for the current software build. The specific feature package referenced by the software key becomes immediately available on the port without subsequent download. The <software key> has effect on only one port. Other ports on the device are not affected. If the same software feature package is needed on multiple ports, then multiple feature package keys are applied.

The **install** command is always available.

4.22 Console Timeout

Syntax: timeout [OFF | <Number of Minutes>]

The ***IP-DSU*** console uses a three-wire interface (RD, TD, GND), and the lead state of other signals is not relevant. This would imply that the only way to change the state of the console is to explicitly log in or log out, or via a reboot or reset, which forces the console to be logged out.

For those users that wish the console to automatically log off after a period of inactivity, there is the console timer. The console timer defaults to the disabled condition and may be activated by the timeout command.

The command is only visible when the console is logged in. The <Number of Minutes> must be between 1 and 255 inclusive. When the module determines a period of inactivity of the specified time, it shall automatically log off the console. An INFO level alarm is issued at that time.

4.23 ADMINISTER SECURITY BANNER

Syntax: banner [clear] [L#="Line # Message"]

The **banner** command is only visible when the unit is logged. It is used to administer the security banner. The default is a NULL banner. If a security banner is configured, it is displayed at each user login. The **clear** option is a shortcut to erase the entire message.

5 SNMP

The ***IP-DSU*** SNMP V1 agent supports a multitude of SNMP MIB variables, trap, set, and get operations.

5.1 SNMP Version 1 Commands

Command	Operational Results
Get	Requests the values of one or more Management Information Base (MIB) variables.
GetNext	Enables MIB variables to be read sequentially, one variable at a time.
Set	Permits one or more MIB values to be updated.
GetResponse	Used to respond to a Get, GetNext, or Set.
Trap	Indicates the occurrence of a predefined condition.

5.2 *IP-DSU* SNMP MIB Variable Database

RO = Read Only Variable

R/W = Read Variable / Write Variable

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.1.1.0	SysDescr	MIB-II	Banner Message	RO	
1.3.6.1.2.1.1.2.0	SysObjectID	MIB-II	None	RO	
1.3.6.1.2.1.1.3.0	SysUpTime	MIB-II	None	RO	
1.3.6.1.2.1.1.4.0	SysContact	MIB-II	None	R/W	Storage is Volatile
1.3.6.1.2.1.1.5.0	SysName	MIB-II	None	R/W	Storage is Volatile
1.3.6.1.2.1.1.6.0	SysLocation	MIB-II	None	R/W	Storage is Volatile
1.3.6.1.2.1.1.7.0	SysServices	MIB-II	None	RO	
1.3.6.1.2.1.4.1.0	IpForwarding	MIB-II	None	RO	
1.3.6.1.2.1.4.2.0	IpDefaultTTL	MIB-II	None	RO	
1.3.6.1.2.1.4.3.0	IpInReceives	MIB-II	Number of Ethernet Pkts Rcvd	RO	

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.4.4.0	IpInHdrErrors	MIB-II	Nbr of Packets w/Header Errs	RO	
1.3.6.1.2.1.4.5.0	IpInAddrErrors	MIB-II	Nbr Rx Packets w/Wrong Addr	RO	
1.3.6.1.2.1.4.6.0	IpForwDatagrams	MIB-II	None	RO	
1.3.6.1.2.1.4.7.0	IpInUnknownProtos	MIB-II	Nbr of Packets w/Unk Protocol	RO	
1.3.6.1.2.1.4.8.0	IpInDiscards	MIB-II	Nbr of Packets Disc due to Resource	RO	
1.3.6.1.2.1.4.9.0	IpInDelivers	MIB-II	Inferred from DMEAS counters	RO	
1.3.6.1.2.1.4.10.0	IpOutRequests	MIB-II	Number of Device Frames Transmitted	RO	
1.3.6.1.2.1.4.11.0	IpOutDiscards	MIB-II	Nbr of Port frames Disc due to Resource	RO	
1.3.6.1.2.1.4.12.0	IpOutNoRoutes	MIB-II	None	RO	
1.3.6.1.2.1.4.13.0	IpReasmTimeout	MIB-II	None	RO	
1.3.6.1.2.1.4.14.0	IpReasmReqds	MIB-II	None	RO	
1.3.6.1.2.1.4.15.0	IpReasmOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.16.0	IpReasmFails	MIB-II	None	RO	
1.3.6.1.2.1.4.17.0	IpFragOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.18.0	IpFragFails	MIB-II	None	RO	
1.3.6.1.2.1.4.19.0	IpFragCreates	MIB-II	None	RO	
1.3.6.1.2.1.4.21.0	IpRoutingDiscards	MIB-II	None	RO	
1.3.6.1.2.1.5.1.0	IcmpInMsgs	MIB-II	None	RO	
1.3.6.1.2.1.5.2.0	IcmpInErrors	MIB-II	ICMP Errors	RO	

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.5.3.0	IcmpInDestUnreach	MIB-II	None	RO	
1.3.6.1.2.1.5.8.0	IcmpInEchos	MIB-II	Nbr of Pings	RO	
1.3.6.1.2.1.5.9.0	IcmpInEchoReps	MIB-II	None	RO	
1.3.6.1.2.1.6.1.0	TcpRtoAlgorithm	MIB-II	None	RO	
1.3.6.1.2.1.6.2.0	TcpRtoMin	MIB-II	None	RO	
1.3.6.1.2.1.6.3.0	TcpRtoMax	MIB-II	None	RO	
1.3.6.1.2.1.6.4.0	TcpMaxConn	MIB-II	None	RO	
1.3.6.1.2.1.6.5.0	TcpActiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.6.0	TcpPassiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.7.0	TcpAttemptFails	MIB-II	None	RO	
1.3.6.1.2.1.6.8.0	TcpEstabResets	MIB-II	None	RO	
1.3.6.1.2.1.6.9.0	TcpCurrEstab	MIB-II	None	RO	
1.3.6.1.2.1.6.10.0	TcpInSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.11.0	TcpOutSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.12.0	TcpRetransSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.13.X	TcpConnTable Entries	MIB-II	None	RO	
1.3.6.1.2.1.6.14.0	TcpInErrs	MIB-II	None	RO	
1.3.6.1.2.1.6.15.0	TcpOutRsts	MIB-II	None	RO	
1.3.6.1.2.1.7.1.0	UdpInDatagrams	MIB-II	Derived from other Counts.	RO	
1.3.6.1.2.1.7.2.0	UdpNoPorts	MIB-II	Non-Peer and Spurious UDP errors	RO	
1.3.6.1.2.1.7.3.0	UdpInErrors	MIB-II	Frame Errors	RO	
1.3.6.1.2.1.7.4.0	UdpOutDatagrams	MIB-II	Frames Sent, Keep Alive Messages sent, etc.	RO	
1.3.6.1.2.1.7.5.X	udpEntry Table	MIB-II	None	RO	
1.3.6.1.2.1.11.1.0	SnmpInPkts	MIB-II	None	RO	
1.3.6.1.2.1.11.3.0	SnmpInBadVersions	MIB-II	None	RO	
1.3.6.1.2.1.11.4.0	SnmpInBadCommunityNames	MIB-II	None	RO	

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.11.5.0	SnmpInBadCommunityUses	MIB-II	None	RO	
1.3.6.1.2.1.11.6.0	SnmpInASNParseErrs	MIB-II	None	RO	
1.3.6.1.2.1.11.30.0	SnmpEnableAuthenTraps	MIB-II	None	R/W	Storage is Volatile
1.3.6.1.2.1.11.31.0	SnmpSilentDrops	MIB-II	None	RO	
1.3.6.1.2.1.11.32.0	SnmpProxyDrops	MIB-II	None	RO	

5.3 Supported Traps

Alarm Text	Severity	Trap Type	Notes
None	N/A	ColdStart	Generated when the unit starts up
Lost Connectivity to Peer IP-DSU	Minor	LinkDown	Generated when Peer Connectivity is lost; DCD & CTS is dropped
Peer Connectivity Established	Info	LinkUp	Generated when Peer Connectivity is established; DCD & CTS is asserted
None	N/A	AuthFail	SNMP Authorization Failure

6 ALARMS

The following table reflects new alarm types generated by the ***IP-DSU***. Alarms are visible at the console and via StarKeeper® II NMS.

Alarm Text	Severity	Notes
None	N/A	Cold Start trap alarm generated when the unit starts up
Tx Error on 10BaseT. Check Physical Connection.	Major	Problem with 10BaseT physical connection
Lost Connectivity to Peer IP-DSU	Minor	Generated when Peer Connectivity is lost; DCD & CTS is dropped
Peer Connectivity Established	Info	Generated when Peer Connectivity is established; DCD & CTS is asserted
User Requested Reboot in Progress	Info	Due to manual reboot
Invalid Login Attempt	Minor	Error in login syntax
Invalid Password Change Attempt	Minor	Use of invalid password
Gateway Connectivity Established	Info	ARP Level Connectivity to Router
ICMP Destination Unreachable Msg Received	Minor	ICMP Destination Unreachable
None	N/A	Trap alarm for SNMP Authorization Failure
SNMP Trap Manager not reachable (ICMP)	Info	ICMP Destination unreachable on a Trap

7 TROUBLESHOOTING

Troubleshooting an ***IP-DSU*** configuration is often a direct correlation of symptom and cause. When armed with a few basic troubleshooting techniques, determining the source of a problem should be easy.

It will be necessary to observe problem indicators and take appropriate actions to localize the cause of problems. Problem indicators typically include non-zero error counters displayed to the console, the inability to communicate between ***IP-DSU*** units, and the inability to communicate between the ***IP-DSU*** and the BNS node. Problems may require the gathering of measurements and/or running of diagnostic tests from the ***IP-DSU*** console.

Become familiar with the **loopback** command. It is essential to diagnose failed communications between the ***IP-DSU*** and the BNS node.

The **ping** diagnostic is used in IP networks to test reachability of IP destinations by sending them an ICMP echo request and waiting for a reply. It is essential in the case of failed communications between peer ***IP-DSU*** units.

The StarKeeper® II NMS supports **ping**, and can be used to test ***IP-DSU*** 10BaseT interface functionality. From the StarKeeper console, execute the following:

/etc/ping <ip address> [return]

where **<ip address>** is the address of the ***IP-DSU*** (entered using the **local** command).

Further information on command parameters can be obtained by running the Unix® **man** command for **ping**.

e.g. **man ping [return]**

Faulty hardware is always a possible cause of problems. Having spare parts available, including a spare cable and an additional ***IP-DSU,*** can significantly reduce start-up time and communication outages.

7.1 Troubleshooting Strategies

A basic troubleshooting strategy can help pinpoint faults in an *IP-DSU* installation. The installation may vary between sites. One case may involve substituting *IP-DSU* units into a functioning DSU configuration. Another case may involve installing *IP-DSU* units in a new network of BNS nodes and IP devices. In either case, installation errors may cause an extended service outage.

Consider executing any or all of the following strategies to localize the point(s) of failure in an ***IP-DSU*** installation.

7.1.1 Examine *IP-DSU* and BNS Node Console Output

Example: Observing non-zero ***IP-DSU*** error counters, such as Ethernet Tx, which indicates carrier sense lost. This may be an integrity problem with a 10BaseT connection, so the LAN cable and hub should be checked for proper operation.

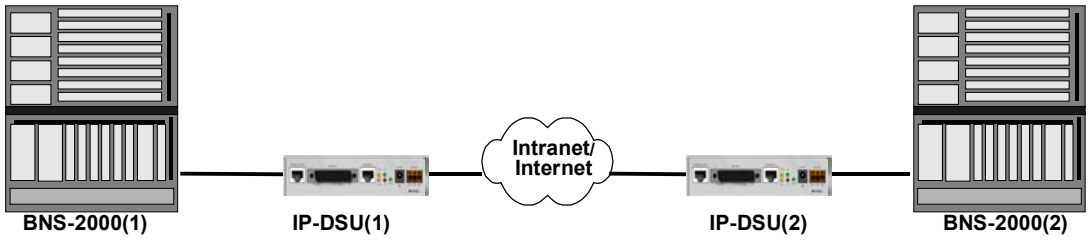
Example: On the BNS node console, observing Loss of Frame alarms coming from the BNS trunk module connected to the ***IP-DSU*** usually points to a clocking mismatch

between the BNS trunk and the ***IP-DSU***. Make sure the BNS trunk module and the device port on the ***IP-DSU*** have the same timing configurations.

7.1.2 Circuit Tracing

With the ***IP-DSU*** **loopback** command and **ping**, trace the complete circuit between BNS nodes. Start tracing from either end of the circuit, not the middle. A failed trace test points to the set of interfaces, cables, and facilities that make up the failing circuit.

Most of the following diagnostic steps can be done from a central location, such as from a StarKeeper® II NMS.



Step 1: Set ***IP-DSU*** (1) in port loopback mode. This instructs the ***IP-DSU*** to return any data it receives at its device interface. [6]

From BNS node (1) run a remote loopback test from the trunk module to ***IP-DSU*** (1).

If the test passes, move to step two.

If the test fails, check the facility between the two devices.

Step 2: Set ***IP-DSU*** (2) to net loopback mode. This instructs the far-end ***IP-DSU*** to return any data it receives at its 10BaseT LAN interface.

From BNS node (1) run a remote loopback test from the trunk module to ***IP-DSU*** (2).

If the test passes, move to step seven.

If the test fails, move to step three.

Step 3: Ping ***IP-DSU*** (1) from a device (e.g. router) on the same LAN segment.

[6] It is necessary to have first established peer-to-peer communication between the ***IP-DSU***s if you are using pre-build 17 software. Otherwise the BNS trunk diagnostic will fail due to EIA lead status on the device interface. Build 17 includes a modification to eliminate this requirement.

If the test passes, move to step four.

If the test fails, a problem exists on this LAN segment.

Step 4: Ping ***IP-DSU*** (1) from a device (e.g. router) on the same LAN segment as ***IP-DSU*** (2).

If the test passes, move to step five.

If the test fails, a problem exists between the two LAN segments.

Step 5: Ping ***IP-DSU*** (2) from a device (e.g. router) on the same LAN segment.

If the test passes, move to step six.

If the test fails, a problem exists on this LAN segment.

Step 6: Ping ***IP-DSU*** (2) from a device (e.g. router) on the same LAN segment as ***IP-DSU*** (1).

If the test passes, move to step seven.

If the test fails, a problem exists between the two LAN segments.

Step 7: Set ***IP-DSU*** (2) in port loopback mode.

From BNS node (2) run a remote loopback test from the trunk module to ***IP-DSU*** (2).

If the test passes, go back to step one and test the circuit again.

If the test fails, check the facility between the two devices.

The preceding troubleshooting strategy should help you localize and remedy most of your network problems. However, if problems are still unresolved after these recommended troubleshooting procedures, contact your customer support.

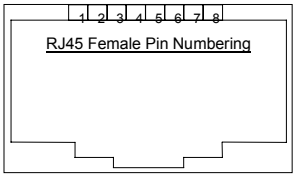
8 CONSOLE CABLING

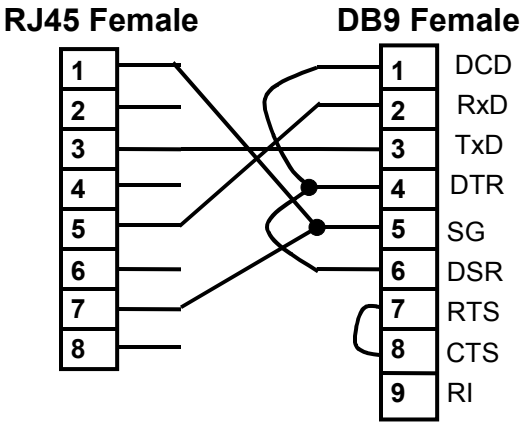
8.1 The DB9 Console Adapter

Some Personal Computers use a 9 pin DB9 interface for serial communications. The terminal emulation programs may require certain lead status. Since console connections are generally implemented as three wire interfaces (i.e. RxD, TxD, and SG); this may pose a problem for the terminal emulation programs.

Below is depicted the wiring of a DB9 adapter which eliminates the problems associated with these terminal emulation programs. It is used with a standard **straight** category 5 RJ45 cable.

DB9 Async DCE Console Adapter





Note: This cable for use on console ports only.

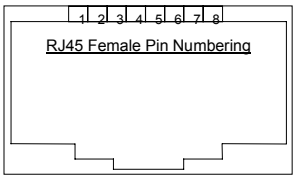
Use with a straight CAT-5 RJ45 cable.

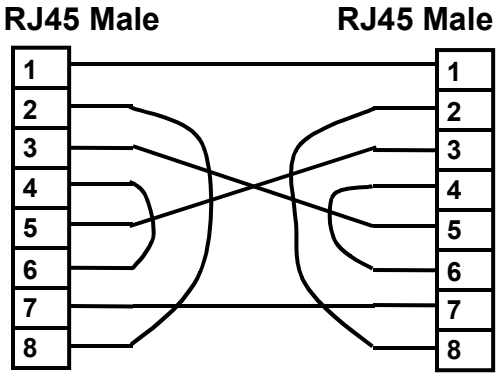
8.2 The RJ45 to RJ45 Crossover Console Cable

The RJ45 to RJ45 console cable implements the three wire interface for consoles with signal looping at either end. It is used to connect a serial console directly to a **4000** port, a SAM port, or a Datakit TY port. No adapter is required. It may also be used in conjunction with an Asynchronous DCE or DTE adapter to provide console interfaces for personal computers or terminals where looped signals are required.

The diagram for the console cable is as follows:

RJ45 to RJ45 Console Cable





Note: This cable for use on console ports only.

Comcode: 408198133

9 APPENDIX A:IP-DSU SPECIFICATIONS

9.1 Device Interfaces

9.1.1 CCITT V.35

The V.35 interface uses a 34-pin connector and operates at data rates up to 2.048Mbps.

9.1.2 EIA RS-232-C

The RS232-C interface uses a 25-pin (DB25) connector and up to 21 signal leads, and operates at data rates from 75 to 19200 bits per second (bps).

*The **IP-DSU** RS232-C device interface has been tested to run at rates up to 56 Kbps.*

9.2 10BaseT LAN Interface

This is an eight-pin, 10BaseT modular connector for a 10 Mbps baseband CSMA/CD local-area network.

9.3 EIA RS-232-C Console Interface

This RS-232-C interface uses an RJ45 connector and operates at 9600 bits per second (bps).

9.4 Physical Dimensions

IP-DSU:	L=6.0" x W=1.4" x D=7.5"
Rack-mount Panel:	L=19" x W=10.5" D=. 125"
Stand-alone AC/DC Power:	L=3.5" x W=1.75" x D=2.5"
Power distribution Panel:	L=10.4" x W=. 8" x D=. 823"

9.5 Environmental Operating Range

Operating Temperature:	5° to 40°C (41°F to 104°F)
Operating Humidity:	5% to 85%
Altitude:	From 60m (197 ft.) below sea level to 1800m (5905 ft.) above sea level

9.6 Power Requirements

IP-DSU Operating Voltage: 5V @ 800 mA Nominal

Stand-alone AC power supply: 115V @ 48mA Nominal
115V @ 90 mA Maximum

Stand-alone DC power supply: 48V @ 104 mA Nominal
48V @ 195 mA Maximum

Rack-mount DC (six units): 48V @ 624 mA Nominal

48V @ 1.17 A Maximum

9.7 Regulatory Information

Safety:	UL, CSA, VDE GS
EMC:	FCC Part 15B Class A, ICES-003 Class A
European EMC:	CE
NEBS:	Level 3

This Class A digital apparatus complies with Canadian ICES-003.

Note:

This equipment has been tested and found to comply with limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 own expense.

Warning!!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Special Accessories Note

In order to comply with the limits for Class A, Radio Frequency Devices, Subpart B-Unintentional Radiators (digital devices) Part 15 Rules, the user must use the cables available with this product, a RJ45 terminated shielded console cable and a DB25 to V.35 shielded adapter.

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