

# **DDS CSU/DSU and T1 CSU/DSU and FrameStart™ FSE Reference Manual**

**October 2002  
34-00291.F**



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## Trademarks

Verilink is a registered trademark Verilink Corporation. FrameStart is a trademark of Verilink Corporation.

Any named products herein are trademarks of their respective companies.

## FCC Requirements

This equipment (DDS CSU/DSU and T1 CSU/DSU) 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 the 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 is required to correct the interference at his own expense. This device must also accept any interference received, including interference that may cause undesired operation.



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**CAUTION:** For use only with a certified Class 2 power supply. See Power Source in Specifications on page -9.

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**CAUTION:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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This equipment complies with Part 68 of the FCC Rules. On the rear or bottom of the unit is a label that contains the FCC registration number and other information. If requested, provide this information to the telephone company.

- 1 All direct connections to the network lines must be made using standard plugs and jacks (compliant with Part 68). The tables below present a list of applicable registration jack USOCs, facility interface codes (FICs), and service order codes (SOCs). These are required to order service from the telco.

### T1 CSU/DSU

Port ID	REN/SOC	FIC	USOC
1.544 Mbps SF	6.0N	04DU9-BN	RJ-48C jack
1.544 Mbps SF, B8ZS		04DU9-DN	
1.544 Mbps ANSI ESF		04DU9-1KN	
1.544 Mbps ANSI ESF, B8ZS		04DU9-1SN	

### DDS CSU/DSU

Port ID	REN/SOC	FIC	USOC
56 kbps	6.0F	04DU5-56	RJ-48S jack
64 kbps		04DU5-64	

- 2 If the unit appears to be malfunctioning, it should be disconnected from the network lines until the source of trouble is determined to be your equipment or the telephone line. If your equipment needs repair, it should not be reconnected until it is repaired.

- 3 The unit has been designed to prevent harm to the network. If the telephone company finds that the equipment is exceeding tolerable parameters, it can temporarily disconnect service. In this case, the telephone company will give you advance notice, if possible.
- 4 No customer is authorized to repair this equipment, regardless of warranty status.
- 5 If the telephone company alters its equipment in a manner that will affect the use of this device, it must give you warning so that you have the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.
- 6 In the event of equipment malfunction, all repairs should be performed by our company or an authorized agent. It is the responsibility of users requiring service to report the need for service to our company or to one of our authorized agents.
- 7 The affidavit at the end manual must be completed by the installer.

## Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

**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.

Users should ensure for their own protection that the electrical ground connections 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.




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

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## Warranty

Verilink's product warranty is included at the back of this document.

## Customer Service

Verilink offers the following services:

- Technical Assistance Center for free 24x7 telephone support during installation, maintenance, and troubleshooting at (800) 285-2755 (toll free) or 256-327-2255 (local) and support@verilink.com
- Maintenance contracts and leasing plans (800) VERILINK (837-4546)
- Web site at [www.verilink.com](http://www.verilink.com)

## Returning Products

Instructions for returning a product are included in Verilink's product warranty at the back of this document.

## Safety Precautions

When handling this equipment, follow these basic safety precautions to reduce the risk of electric shock and injury:

- Follow all warnings and instructions marked on the product and in the manual.
- Unplug the hardware from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a slightly damp cloth for cleaning.
- Do not place this product on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
- Slots in the unit are provided for ventilation to protect it from overheating. These openings must not be blocked or covered. Never place this product near a radiator or heat register.
- This product should be operated only from the type of power source indicated on the marking label and manual. If you are unsure of the type of power supply you are using, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord interferes with the free movement of people.
- Do not overload wall outlets and extension cords, as this can result in fire or electric shock.
- Never push objects of any kind into the unit. They may touch dangerous voltage points or short out parts that could result in fire or electric shock. Never spill liquid of any kind on this equipment.
- Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - When the power supply cord or plug is damaged or frayed.
  - If liquid has been spilled into the product.
  - If the product has been exposed to rain or water.
  - If the product has been dropped or if the housing has been damaged.

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# ABOUT THIS MANUAL

## What is a Reference Manual?

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This is a reference manual. It provides information about unit installation, configuration, testing and troubleshooting on a function-by-function basis. It is not a user's guide containing step-by-step procedures. This manual contains specific information about a command, menu field, port, etc. Unless otherwise noted, the information in this manual applies only to the Verilink DDS CSU/DSU, and T1 CSU/DSU, and FrameStart FSE (all of which are referred to, collectively, as "the unit.")

## Where to go for Information

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The chapters and appendices in this manual are arranged for quick reference. It is not necessary to read previous chapters to understand the subsequent chapters.

- *General* - This chapter introduces the unit, lists the features, and provides specifications.
- *Installation* - This chapter describes unit port and power connections.
- *General Operation and Conventions* - This chapter describes the front panel buttons, LEDs, and conventions for the LCD interface.
- *Operation* - This chapter describes the menus for the unit's operation.

# Conventions

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The following table lists the conventions used throughout this manual.

Convention	Description
	<i>Notices</i> call attention to important features or instructions.
	<i>Cautions</i> alert you to personal safety risk, system damage, or data loss.
	<i>Warnings</i> alert you to the risk of severe personal injury.
<i>Italics</i>	Italics denote <i>new terms</i> or <i>emphasis</i> .
<u>underline</u>	Default settings are underlined.

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**GENERAL****Introduction**

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FrameStart is an intuitive frame-relay configuration, analysis, and diagnostic feature set that incorporates the capabilities of expensive test analysis equipment into the functionality of a high-quality line of CSU/DSU products.

The Verilink FrameStart engine operates at wire-speed to deliver the most economical frame relay diagnostic information in the industry today for the price. The price-to-performance ratio of this product line is unequaled when compared to any of the major brand providers.

The DDS CSU/DSU Network unit is a synchronous Digital Data Service CSU/DSU with FrameStart capability targeted at frame-relay applications. The DDS CSU/DSU also provides many useful diagnostic features and operates in standard DDS I and DDS II modes. This product operates in a frame-relay environment or on private (leased) line applications in a point-to-point environment.

The T1 Network unit is a T1 CSU/DSU with FrameStart capability and operates at fractional T1 rates up to a full T1 carrier service. This product also operates in a frame-relay environment, leased line service, or LDM (limited distance modem) private-line applications.

The FrameStart FSE E1 Network unit is an E1 CSU/DSU with FrameStart capability and operates at fractional E1 rates up to a full E1 carrier service. This product also operates in a frame-relay environment, leased line service, or LDM (limited distance modem) private-line applications.

Verilink has two options available in the FrameStart family of products--FrameStart Install and FrameStart Monitor--for both the DDS and T1 CSU DSU units. The FrameStart FSE unit has an option for the FrameStart Monitor only.

## FrameStart Install Mode

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FrameStart Install has four major benefits that offer significant value when comparing to other products:

- LMI Sourcing - A frame relay polling function that determines the LMI type and qualifies the traffic to the frame relay switch. All DLCI information for virtual circuits is collected and displayed on the LCD.
- End-to-End Integrity - PVC discovery modes determine critical parameters from the remote units to verify the integrity of the network upon initial installation.
- PVC Delay Testing - test capabilities for each virtual circuit regarding delay characteristics. The delay measurement can be used to detect a problem circuit upon installation by providing a snapshot of the network delay.
- WAN Receive Level - isolate WAN problems very quickly upon installation by monitoring network quality during installation.

FrameStart Install is a network-intrusive mode that does not require any data equipment such as a router or FRAD to operate. If a router is connected, operation is halted to perform the installation diagnostics.

## FrameStart Monitor Mode (optional)

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FrameStart Monitor adds more capabilities to monitor real-time network conditions in a non-intrusive state when connected in real-world applications:

- LMI Monitoring - during normal operation to update DLCI tables and indicate local and remote alarm conditions on the frame relay network.
- LMI Auto Sourcing - automatically initiates LMI sourcing if the router fails and indicates an alarm condition.
- SOS Mode - frame broadcasts from failed units in the field to quickly isolate failed circuits within the network and indicates an alarm condition.
- New Circuit Install - detects when new DLCIs are added in the network and allows for network information to be collected from the remote unit during installation.
- Real-time PVC delay testing is not supported in Monitor Mode.



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**NOTICE:** *FrameStart Monitor is available from the factory or as a field upgrade using an EPROM replacement.*

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The DDS and T1 CSU/DSU units perform all of these functions without expensive software packages or a separate GUI interface. The integral LCD shows this information.

We believe that the best solutions are still the simple ones, that actually provide the data you need to quickly configure, install, test, and validate the integrity of your data network. The Verilink FrameStart feature set was created with this in mind, and simplifies the installation and troubleshooting of frame-relay circuits and ongoing maintenance of the overall data network.

## What is LMI Sourcing and why is it important?

In the most basic implementation, Frame Relay is a simple interface that offers bandwidth on demand with low latency and high throughput. The UNI is the user-to-network interface and the LMI (local management interface) enables both the user and the network to gather information about the UNI. The LMI allows the user and frame relay network to signal each other about several activities pertaining to the permanent virtual circuits (DLCIs) on the link and their physical link status. The LMI provides the following services:

- A polling function to test whether the user or network machine is connected to the interface
- A set of operations that inform the user of the addition or deletion of virtual circuits at the interface
- A report on the status of all virtual circuits on the interface that states whether or not a virtual circuit is active
- A report on the availability of a new virtual circuit.

LMI information is published in ANSI T1.617, Annex D; ITU-T Q.933, Annex A; and LMI Revision 1.0.



## What is a DLCI?

A DLCI is a data link connection identifier, and is a unique number for each permanent virtual circuit (PVC) in the frame relay network. The following DLCI values have been designated for the frame relay network:

0	LMI Channel for ANSI and ITU
1–15	Reserved
16–991	For user virtual circuits
992–1007	Layer 2 management of bearer service
1008–1022	Reserved
1023	In-channel layer management for LMI Revision 1.0

## What messages does LMI provide?

LMI provides for two message types that include a status (S) message and a status enquiry (SE) message. The SE message is invoked based on a timer with an upper and lower limit, and the receiving machine responds with a status message. Depending on the timers and counters used for LMI, the status element can be either a status request that acts as a link verification request, or a full status (FS) request that also includes information on all PVCs on the circuit.

## What is PVC Discovery in FrameStart?

Verilink has included support for PVC discovery at the remote end of each end-to-end permanent virtual circuit. For the DDS and T1 CSU/DSU units, this mode is initiated by the user upon installation and configuration of each logical port in the network. Verilink takes advantage of RFC 1490 rules for encapsulating data within the Frame Relay frame, and incorporates PVC extensions for establishing a virtual loopback on each PVC to determine the remote link characteristics. This information includes remote DLCI numbers, unit identification, link status, and optional fields such as committed information rates (CIR) and circuit delay. The user enables this operation for all active DLCIs on the circuit by setting LMI Mode to On.

## What is PVC Delay Testing?

FrameStart allows the user to test an active PVC for delay characteristics. A DLCI can be selected and a delay calculation is performed end-to-end to determine the performance characteristics of a particular circuit. This operation is enabled by the user for any active DLCI on the circuit.

## What is a WAN receive level?

On any transmission network, the signal level indicates the strength of the physical transport system. The better the signal level, the better the performance of the transmission system. Expensive analyzers are used today to measure the signal level performance of the transmission network before data networks are installed. The DDS and T1 CSU/DSU units provide a simple diagnostic to display the receive level from the network unit. This removes the need to have additional test equipment on site when installing data networking components.

## What is LMI Monitoring?

During normal operation conditions, FrameStart Monitor continually monitors LMI traffic on the network to update DLCI tables in the unit. FrameStart automatically detects new circuits or indicates an Alarm condition for inactive circuits.

## What is LMI Auto Sourcing?

During normal operating conditions, FrameStart automatically detects a failure with the data equipment (router) and takes control of the circuit to keep the network alive. This allows for quick fault isolation of the problem. When the data equipment returns to service, FrameStart reverts to monitor mode.

## What is SOS Mode?

During LMI Auto Sourcing, the unit can be configured to send a SOS frame to the host site and indicate an alarm condition on a particular virtual circuit. This makes remote troubleshooting and fault isolation quick and easy.

## What is New Circuit Install?

In normal FrameStart Install mode, data-flow from the Router is stopped. This feature allows FrameStart to detect new circuits and perform PVC discovery on new installations without interrupting service to the rest of the network.

## How does FrameStart work in a typical application?

FrameStart includes three different operating modes for ease of operation.

### **INSTALL: LMI Mode is ON**

In Install mode, the unit performs LMI sourcing based on the assumption that data equipment is not available. The DDS and T1 CSU/DSU units source LMI to the frame relay network, and record the status information for display on the LCD. This includes the type of LMI, the number of DLCIs, and the status of each PVC. User initiated menus exist in the LCD to activate PVC discovery and PVC delay measurements on active DLCIs. After installation is complete, set LMI Mode to OFF for normal operation.

### **MONITOR: LMI Mode is MON (Optional Feature)**

In Monitor mode, the unit is in a non-intrusive state between the network and the data equipment monitoring the activity on the frame relay circuit. If the unit stops receiving LMI status responses from the network, the unit will automatically SOURCE LMI to verify the network connection is still active. After verification, the unit will revert to a non-intrusive monitoring mode. Real-time PVC delay testing is not available in this mode. Also, SOS mode can be enabled or disabled to generate alarms to a host unit. New circuits can be added to a network and automatically detected based on the LMI information. A specific DLCI can be selected to perform PVC discovery in order to verify the end-to-end integrity of the new circuit without disrupting normal operation of the overall network.

### **OFF: LMI Mode is OFF**

In the OFF mode, FrameStart is not required based on the unit operating in a private-line application or after the installation of frame relay circuits is complete. Receive Levels are still displayed for the TDM network unit.

## FrameStart Benefits

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FrameStart equipment presents a distinct advantage over routers with integral CSU/DSU transmission devices. FrameStart Install and Monitor provide test capabilities that traditional CSU/DSUs cannot provide. Also, FrameStart is a more economical solution than routers with integral CSU/DSUs that sell for around \$1,000 or more, and provide minimal diagnostic capabilities. Verilink DDS and T1 CSU/DSU units bring your application back to the true functions of “Intelligent” CSUs/DSUs to provide a clear point of demarcation between

the WAN and router. Fault isolation is greatly simplified with FrameStart during installation and normal service. FrameStart Install reduces the cost of installation and allows service providers to quickly install new frame relay circuits. FrameStart Monitor makes fault isolation quick and easy, and reduces the overall support needs and costs of managing a complex data-critical network.

## Ordering Numbers

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DDS CSU/DSU Install and Monitor . . . . .	F-FSD-001--112
T1 CSU/DSU Install and Monitor . . . . .	F-FST-001--112
FrameStart FSE Install and Monitor (Mexico) . . . . .	F-FSE-001--112
FrameStart FSE Install and Monitor (International) . . . . .	F-FSE-001--111
T1 CSU/DSU Monitor Upgrade . . . . .	9-305-020--3
DDS CSU/DSU Monitor Upgrade . . . . .	9-305-020--4

## Feature Summary

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Data Interface	V.35 Winchester/M34 connector
Data Type	Synchronous
User Interface	LCD display, 8 LEDs, and 3 push button switches for navigation
LCD	2×16 non-backlit liquid crystal display
Power	
<i>Units for South America:</i>	Compact 110-VAC to 9-VAC wall-mount transformer
<i>FrameStart FSE for Europe:</i>	IEC 100-240 VAC to 9 VCD Stand-alone transformer
Diagnostics	Test modes including standard loops, BERT, and test pattern generator
LCD Security	Password to prevent unauthorized access to the option menus
FrameStart	Embedded frame relay test set
Alarms	Programmable alarm thresholds, 15-minute and 24-hour statistics
Operating Modes	Public frame relay services with the DDS CSU/DSU; standard private line networks and public frame relay services with the T1 CSU/DSU and FrameStart FSE

# General Specifications

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## Management Interface

Front Panel: Three buttons, eight LEDs, and one LCD

## Alarms

Activation: Programmable thresholds  
Reporting: LCD user interface

## Power Source

*External (units-Mexico):*

Input: 115 VAC

Output: 9 VAC, 750 mA

*External (FrameStart FSE-International):*

Input: Auto-ranging 100–240 VAC

Output: 9 VDC, 750 mA

## Mechanical

Mounting: Desktop  
Dimensions: 1.50" (3.81 cm.) high, 8.25" (20.96 cm.) wide,  
6.00" (15.24 cm.) deep  
Weight: 1 pound (0.45 kg)

## Environmental

Operating Temperature: 32 to 122°F (0 to 50°C)  
Storage Temperature: –4 to 185°F (–20 to 85°C)  
Humidity: 95% maximum (non-condensing)  
Protection: Lightning protection compatible with GR1089

## Industry Listings

FCC Compliance: Part 15 Subpart B, Class A, Part 68  
Industry Canada: CS-03  
US Safety: UL1950, 3<sup>rd</sup> Edition  
Canadian Safety: CSA C22.2, No. 950-95

# Specifications Chart

Specification	DDS CSU/DSU	T1 CSU/DSU	FrameStart FSE
<b>Network Interface</b>			
Line Rate	56 and 72 kbps	1.544 Mbps ( $\pm 50$ ppm)	2.048 Mbps ( $\pm 50$ ppm)
Line Framing	DDS I and DDS II CC64K	D4 or ESF	Unframed, FAS, CAS, CCS, CRC4
Line Code	Bipolar AMI	AMI or B8ZS	HDB3
Input Signal	0 to $-43$ dB	0 to $-36$ dB ALBO	0 to $-43$ dB
Connection	RJ-48S, $135 \Omega$ ( $\pm 5\%$ )	RJ-48C, $100 \Omega$ ( $\pm 5\%$ )	RJ-48C, $120 \Omega$ ( $\pm 5\%$ ) Dual BNC $75 \Omega \pm 5\%$
Timing Source	Network	Internal, network	Internal, network
Output Signal	not applicable	3.0 V ( $\pm 10\%$ ) base-peak into $100 \Omega$ with protection	3.0 V ( $\pm 10\%$ ) base-peak into $120 \Omega$ or $75 \Omega$ with protection
Line Build Out	not applicable	0, $-7.5$ , $-15$ , $-22.5$ dB attenuation	not applicable
Jitter Control	not applicable	per TR 62411 and T1.403	per TBR12
Ones Density	not applicable	B8ZS, N $\times$ 56 bit stuffing, alternate fill; complies with TR 62411	not applicable
<b>Equipment Interface</b>			
Line Rate	56 kbps or 64 kbps synchronous	56 kbps to 1.536 Mbps ( $\pm 50$ ppm)	64 kbps to 2.048 Mbps ( $\pm 50$ ppm)
Connection	-----> female, 34-pin Winchester-type connector (all units) <-----		
<b>Diagnostics</b>			
Performance	LOSS, OOSS, and BPVS monitoring	Monitoring per TR 54016 and T1.403	LOSS, OOFS, ES, AISS, RAS, SES, DS, UAS, BPVS, CSS, and CRCES monitoring
Network Loops	Line loop, data loop, and V.54 loop	Line loopback or payload loopback	Line loopback or payload loopback
Fractional Loop	not applicable	Responds to in-band V.54 loop code	Responds to in-band V.54 loop code
DTE Port Loops	local loop	local loop	local loop
BERT	-----> 511, spaces, marks, and 2047 patterns (all units) <-----		
<b>Standards Compatibility</b>			
	TR 62310, August 1993	TR 54016, September 1989 TR 62411, December 1990 T1.403, 1995	

# INSTALLATION

## Introduction

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This chapter contains information and instructions required to prepare the units for use. Included are initial inspection procedures, mounting instructions, configuration guidelines, connection and powering information.

## Safety Summary

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This manual contains information and warnings that must be followed by the user to ensure safe operation and to retain the equipment in a safe condition.



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**NOTICE:** *The WARNING sign denotes a potential hazard to the operator. It calls attention to a procedure or practice that, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.*

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## Unpacking and Inspection

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This unit is carefully packaged to prevent damage in shipment. Upon receipt, inspect the shipping container for damage. If the shipping container or cushioning material is damaged, notify the carrier immediately and make a notation on the delivery receipt that the container was damaged (if possible, obtain the signature and name of the person making delivery). Retain the packaging material until the contents of the shipment have been checked for completeness and the unit has been checked both mechanically and electrically.

If the contents of the shipment are incomplete or, if there is mechanical damage or defect, notify Verilink. If the shipping container is also damaged, or the cushioning material shows signs of stress, notify the carrier of the damage as well as Verilink. Keep the shipping materials for carrier's

inspection. Verilink will arrange for repair or replacement without waiting for claim settlement.

## Supplied Materials

---

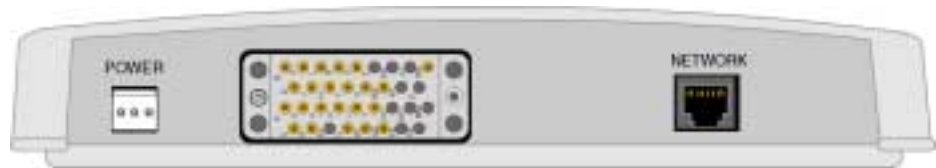
The FrameStart family of products are shipped from the factory with the following standard equipment:

- AC power supply for the DDS and T1 CSU/DSU, DC power supply for the FrameStart FSE (see Figure 2.3 on page 15)
- Reference manual
- 8-pin to 8-pin network cable (p.n. 9-1544-009)
- RJ48 to BNC adapter (for FrameStart FSE)

## Rear Panels

---

The rear panel of the DDS and T1 CSU/DSU are identical as shown in Figure 2.1.



**Figure 2.1** *DDS and T1 CSU/DSU Rear Panel*

The rear panel of the FrameStart FSE is shown in Figure 2.2.



**Figure 2.2** *FrameStart FSE Rear Panel*

# Data Connections

---

## V.35 Data Port

Table 2.1 shows the pinout for the V.35 data port. The form factor is a female 34-pin Winchester-type connector.

**Table 2.1** *Customer Equipment Connector Pinout*

Pin	Signal
A	Frame Ground
B	Signal Ground
C	Request to Send
D	Clear to Send
E	Data Set Ready
F	Data Carrier Detect
H	Data Term Ready
P	Transmit Data (A)
R	Receive Data (A)
S	Transmit Data (B)
T	Receive Data (B)
U	Terminal Timing (A)
V	Receive Clock (A)
W	Terminal Timing (B)
X	Receive Clock (B)
Y	Transmit Clock (A)
AA	Transmit Clock (B)

## DDS CSU/DSU Network Port

Table 2.2 shows the pinout for the network connector. The connector interface is RJ-48S.

**Table 2.2** *Network Connector Pinout*

Pin	Signal
1	R (output to network)
2	T (output to network)
3–6	not used
7	T1 (input from network)
8	R1 (input from network)

## T1 CSU/DSU and FrameStart FSE Network Connection

The network side of the unit is referred to as the network interface. This interface contains an ALBO (automatic line build out) that allows the unit to be located a substantial distance away from the telco network interface with a

receive signal level to -30 decibels for T1 systems and -43 decibels for E1 systems.

## Receive Levels

Receive levels from the network for the Verilink FSx units are listed in Table 2.3.

**Table 2.3** *Receive Levels*

FSx Unit	Maximum	Minimum
DDS CSU/ DSU	0	-30 dB
T1 CSU/DSU	0	-40 dB
FrameStart FSE	0	-43 dB

## RJ-48C Network Connector

The network connector interface is an RJ-48C with the pinout shown in Table 2.4 below.

**Table 2.4** *Network Connector Pinout*

Pin	NET
1	R1 (ring, receive from network)
2	T1 (tip, receive from network)
4	R (ring, transmit to network)
5	T (tip, transmit to network)
3, 6– 8	not used

## BNC Network Connectors

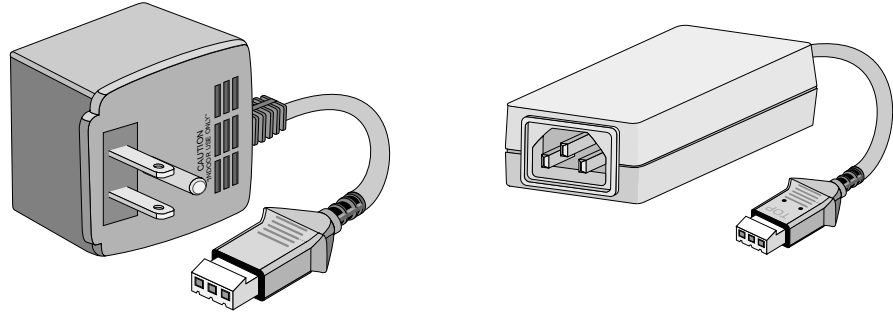
These BNC (Bayonet-Neill-Concelman) network connectors are 75Ω Transmit towards the network and 75Ω Receive from the network.

## T1 Network Disconnection

In accordance with FCC Rules, Part 68.218(b), the telephone company must be notified before disconnecting the T1 CSU/DSU.

## Power

Connect the appropriate power supply (Figure 2.3) to the unit, then connect the wall plug to the appropriate outlet. This applies power to the unit.



**Figure 2.3** *Power Supplies for the units-Mexico (left) and FrameStart FSE-International (right)*



# GENERAL OPERATION AND CONVENTIONS

## Introduction

---

This chapter describes the front panel buttons, LEDs, and conventions for the LCD interface.

### DDS CSU/DSU Front Panel

Table 3.1 references the front panel controls and indicators and provides a brief description.

**Table 3.1** *Front Panel Controls and Indicators*

Control or Indicator	Function
liquid crystal display	This 2-line, 16-character display provides access to unit alarms, configuration, diagnostics, and utilities.
EXIT	The EXIT button allows exiting a menu option which then places the unit in the next higher level in the menu hierarchy. If in the main menu, pressing EXIT logs off the unit.
SCROLL	The SCROLL button allows reviewing the available options or selections for a given level in the menu hierarchy.
SELECT	The SELECT button allows choosing the option or value for a given field.
RTS (green)	This indicator is on when RTS is active.
DTR (green)	This indicator is on when DTR is active.
DCD (green)	This indicator is on when DCD is active.
TxD (green)	This indicator is on when the unit transmits data.
RxD (green)	This indicator is on when the unit receives data.
TEST (yellow)	This indicator is on when the unit is in a test mode.
ALARM (red)	This indicator turns on when the unit is in an active alarm condition.
POWER (green)	This indicator turns on when power is applied to the unit.



**NOTICE:** The units have the same buttons and indicators at the locations shown in .

## LCD Access

When power is applied, the DDS and T1 CSU/DSU display the Idle screen as shown in Figure 3.1. Press any one of the front panel buttons to leave the Idle screen and access the interface.

```
FRAME START DDS
N:LS D:LD F:LI
```

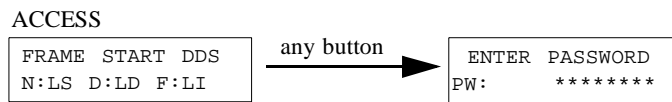
**Figure 3.1** Idle Screen



**NOTICE:** For an explanation of the screen shown in Figure 3.1, see page 4-21.

## Password Protection

The unit is factory shipped without a programmed password. If a password has been established, the password screen (Figure 3.2) appears. Enter a correct password to advance to the Main Menu screen. An eight-character password must be entered.



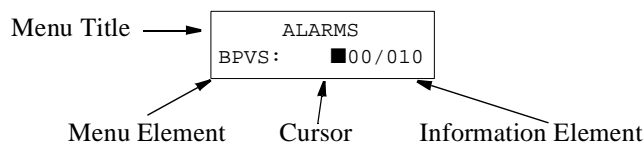
**Figure 3.2** Accessing Password Screen

## To Enter an Established Password

Press the SCROLL button until the desired character appears. Remember that the password is *case-sensitive*. Then, press the SELECT button. Continue selecting the appropriate characters until the last character is entered. Then, press the EXIT button. A correctly entered password advances the unit to the Main Menu screen. An incorrectly entered password returns an Idle screen. If unsuccessful, reenter the password.

## Interface Conventions

Figure 3.3 shows a front panel display consisting of a menu title, menu element, information element, and a cursor.



**Figure 3.3** Example Showing Screen Elements

## Menu Title

The menu title shows the general classification for a group of accessible functions.

## Menu Element

The menu element is a menu or submenu accessible by pressing the SELECT button. When selecting a menu element, it becomes the menu title and the next lower level in the hierarchy becomes the menu element.

## Information Element

The information element is a user-selectable field allowing changes to the setting. To access the information elements, press the SELECT button until the desired option is displayed. From this point, EXIT goes back to the menu title; SCROLL goes to the next menu element. Scroll through the available menu elements by pressing the SCROLL button. Press the SELECT button to change information elements.

## Cursor Elements

The cursor appears on the left side of the “selected” information element (see Figure 3.3).

Move the cursor to the right by choosing SELECT. Use the SCROLL button to change field elements (i.e.: 0, 1, 2...). Press EXIT to escape without changing the information field.



---

**NOTICE:** *Every time the EXIT button is pressed, the cursor returns to the next highest level in the menu hierarchy.*

---

## Hardware Reset

---

To execute a hardware reset, press the SELECT and EXIT buttons while applying power to the unit and hold them for five seconds. A hardware reset restores the unit to factory default settings just like a Restore Factory Settings. The following screen (Figure 3.4) appears as the unit comes out of hardware reset.

```
FRAME START DDS
***UNIT RESET***
```

**Figure 3.4** *DDS CSU/DSU Hardware*

## Utilities

---

The Utilities screen allows performing various functions such as viewing revision numbers, restoring factory settings, and establishing a password.

## Software Version

This selection shows the software version loaded in the unit.

## Restore Factory Settings

This field clears all memory, including the password, and uses defaults from the ROM.

## Set Password

This field establishes the unit password used for entering the front panel interface. A password must be eight characters. Scroll increments the characters (0–9, A–Z, a–z). The cursor blinks over the character or digit to be selected or modified. Select accepts the current value and moves the cursor right. When the eighth character is selected, a verification screen appears. Reenter the password.

ENABLE



DISABLE



**Figure 3.5** *Enable and Disable Password Screen*

# OPERATION

## Introduction

---

This chapter describes the menus for the units' operation.

### Menu Start-up Display

The unit starts up with the menu display shown in Figure 4.1.

```
FRAME  START  DDS  
N:OK  D:OK  F:OK
```

**Figure 4.1** *Start-Up Screen*

### **N (Network Status)**

- OK No alarms.
- LS Loss of signal.
- LI LMI Mode is Off.
- LM The unit is in LMI Monitor mode.
- NA Not available.
- LD Loss of DTR.
- RA Receiving yellow alarm, T1 CSU/DSU only.
- LF Loss of frame (T1 CSU/DSU only).

### **D (DTE Status)**

- OK No problems.
- LS Loss of Signal, when RTS and DTR are not present. When RTS and DTR are lost, D intermediately toggles LD and LS for a few seconds then settles on NA. When RTS and DTR are restored, NA takes up to a minute to clear.
- NA In FrameStart mode, the DTE is not available.

LD Loss of DTR.

## **F (Frame Relay Status)**

-- Deciding LMI type.

LQ Qualifying LMI type.

SL Sourcing LMI.

SP Sourcing LI and PVC delay testing.

LM LMI Monitor: non-intrusive but individual PVC testing for new circuits. This indicator is only with FrameStart Monitor.

SM Sourcing LMI in Monitor mode for fault condition (NO PVC).

SOS (optional) This indicator is only with FrameStart Monitor.

## **Main Menu**

The front panel interface is designed on a hierarchical menu system as shown in Figure 4.2 for the DDS CSU/DSU, Figure 4.3 for the T1 CSU/DSU, and Figure 4.3 for the FrameStart FSE. The units allow choosing from submenu options beginning at the main menu.

MAIN MENU	ALARMS	NETWORK: OK LOSS, <b>5</b> OOSS, <b>5</b> BPVS, <b>0</b> FR NET <sup>‡</sup> : OK, LOCAL, SOS, DLCI RESET TIMER: 000 – 900, <b>30</b> <sup>§</sup> RESET ALARMS?	The three-digit current and threshold values (###/###) range from 000 to 900. An asterisk (*) to the left of these values indicates that the current value has exceeded the threshold value. Pressing SELECT on a displayed alarm allows editing the threshold parameters for that alarm.  § This does not apply to frame relay alarms.
	PERFORMANCE	NET PERFORMANCE RCV LVL: 0.0 dB, 7.3 dB, 13.6 dB, 19.7 dB, 26.0 dB, 32.3 dB, 38.4 dB, 44.4 dB, 50.5 dB LOSS OOSS BPVS CLEAR HISTORY? FR PERFORMANCE LMI TYPE: ORIG, ANSI D, ITU A PKCT SRC: UNI, NI DLCI TOTAL: 000–999 <sup>†</sup> CLEAR DLCI? DLCI Screen TEST DLCI xxx? <sup>‡</sup>	The values are shown as (sss/tttt). The 15-minute current value (sss) ranges from 000 to 900. The 24-hour total values (tttt) range from 00000 to 65535.
MAINTENANCE	LOOP: NONE?, ENABLE LLB?, ENABLE DLB?, ENABLE LCL ENABLE V54?, ENABLE RMT V54?, ENABLE RMT DLB BERT: NONE, EN. NET BERT? EN. DTE BERT?	TP: MARKS, SPACES, 511, 2047 INJECT ERROR? ERR CNT = 00000–65356 CLEAR ERR CNT?	
DTE CONFIG	RATE: <b>56 Kbps</b> , 64 Kbps <sup>1</sup> DTE CLOCK: <b>NOR</b> , INV TXCC CLOCK: <b>EN</b> , DIS DTE DATA: <b>NOR</b> , INV CTS: <b>NORMAL</b> , <b>FORCED ON</b> CTS DELAY: <b>000</b> –255 DCD: <b>NORMAL</b> , <b>FORCED ON</b> DSR: <b>NORMAL</b> , <b>FORCED ON</b> DTR: <b>NORMAL</b> , <b>IGNORED</b>		<sup>†</sup> (Install mode only) If the DLCI TOTAL is greater than 000, a screen with the following format appears when SELECT is pressed: <pre> uuuu -&gt; vvvv:www xxxms yyykpbs uuuu - the local DLCI number vvvv - ACT, IDLE, NEW, DEL., or REMOTE DLCI (if discovered) www - remote unit ID xxxx - average delay (if discovered) yyyy - committed information rate </pre>
FRAME RLY CONFIG	LMI MODE: <b>OFF</b> , ON, MON <sup>‡</sup> UNIT ID: <b>000</b> –999 N391: 001–255, <b>006</b> N392: 01–10, <b>03</b> N393: 01–10, <b>04</b> T391: 05–30, <b>10</b> PVC MODE: <b>DIS</b> , EN SOS TX: EN, <b>DIS</b> <sup>‡</sup> SOS RX: EN, <b>DIS</b> <sup>‡</sup>		<sup>‡</sup> Monitor option only  <sup>*</sup> This field establishes the unit password used for entering the front panel interface. A password must be eight characters. SCROLL increments the characters (0–9, A–Z, a–z). The cursor blinks over the character or digit to be selected or modified. SELECT accepts the current value and moves the cursor right. When the eighth character is selected, a verification screen appears. Reenter the password.
UTILITIES	VERSION: z.zz RESTORE FACTORY? SET PASSWORD <sup>‡</sup> :		<sup>1</sup> The network configuration is automatically set when the DTE Rate is set. For example, 56 Kbps DTE Rate sets the network to DDS I and 64 Kbps DTE Rate sets the network to DDS II CC 64K.

Default values are shown in bold.

Figure 4.2 DDS CSU/DSU Menutree

MAIN MENU	ALARMS	NETWORK:	OK LOSS <i>The three-digit current and threshold values (###/###)</i> OOPS <i>range from 000 to 900. An asterisk (*) to the left of these values indicates that the current value has exceeded the threshold value. Pressing SELECT on a displayed alarm allows editing the threshold parameters for that alarm.</i> AISS RAS ES SES BES UAS BPVS CSS CRCES	
			FR NET <sup>‡</sup> : OK, LOCAL SOS, DLCI RESET TIMER: 000 – 900, <b>30</b> <sup>‡</sup> § <i>This does not apply to frame relay alarms.</i> RESET ALARMS?	
PERFORMANCE	NET PERFORMANCE		RCV LVL: 2 – 7.5 dB, 7.5 – 15 dB, 15 – 22.5 dB, <22.5 dB LOSS OOPS <i>The values are shown as (sss/TTTT). The 15-minute current value (sss) ranges from 000 to 900. The 24-hour total values (TTTT) range from 00000 to 65535.</i> AISS RAS ES SES BES UAS BPVS CSS CRCES CLEAR HISTORY?	
		FR PERFORMANCE	LMI TYPE: ORIG, ANSI D, ITU A PKT SRC: UNI, NI DLCI TOTAL: 000–999 <sup>†</sup> CLEAR DLCI?   DLCI Screen   TEST DLCI xxx <sup>‡</sup>	
MAINTENANCE	LOOP:		NONE?, ENABLE LLB?, ENABLE PLB?, ENABLE V54?, ENABLE RMT V54?, ENABLE RMT LLB?, ENABLE RMT PLB?	
	BERT:	NONE, EN. NET BERT? EN. IDLE BERT? EN. DTE BERT? EN. CH01–CH24 BERT?	TP: MARKS, SPACES, 511, 2047 INJECT ERROR? ERR CNT = 00000–65356 CLEAR ERR CNT?	
NETWORK CONFIG			FRAMING: D4, <b>ESF</b> LINE CODE: AMI, <b>B8ZS</b> ‡ <i>Monitor option only</i> CLOCK SRC: NET, INT SENSITIVITY: DIS, EN LBO: 0 dB, –7.5 dB, –15 dB, –22.5 dB YEL ALARM: EN, DIS † <i>(Install mode only) If the DLCI TOTAL is greater than 000, a screen with the following format appears when SELECT is pressed:</i> DENSITY: EN, DIS FDL: NONE, ANSL, AT&T CHANNELS: CONT, ALT START CHAN: 01 – 24 #CHANNELS: 00 – 24 uuuu -> vvvv:www xxxxms yyyykbps uuuu - the local DLCI number vvvv - ACT, IDLE, NEW, DEL., or REMOTE DLCI (if discovered) www - remote unit ID xxxx - average delay (if discovered) yyyy - committed information rate	
	DTE CONFIG		RATE: 56 Kbps, <b>64 kbps</b> DTE CLOCK: NOR, INV TXCC CLOCK: EN, DIS DTE DATA: NOR, INV CTS: NORMAL, <b>FORCED ON</b> DCD: NORMAL, <b>FORCED ON</b> DSR: NORMAL, <b>FORCED ON</b> DTR: NORMAL, <b>IGNORED</b>	
FRAME RLY CONFIG			LMI MODE: OFF, ON, MON <sup>‡</sup> UNIT ID: 000 – 999 N391: 001–255, <b>006</b> N392: 01–10, <b>03</b> N393: 01–10, <b>04</b> T391: 05–30, <b>10</b> PVC MODE: DIS, EN SOS TX: EN, <b>DIS</b> <sup>‡</sup> SOS RX: EN, <b>DIS</b> <sup>‡</sup>	* <i>This field establishes the unit password used for entering the front panel interface. A password must be eight characters. SCROLL increments the characters (0–9, A–Z, a–z). The cursor blinks over the character or digit to be selected or modified. SELECT accepts the current value and moves the cursor right. When the eighth character is selected, a verification screen appears. Reenter the password.</i>
	UTILITIES		VERSION: z.z.z RESTORE FACTORY? SET PASSWORD <sup>‡</sup> :	

Figure 4.3 T1 CSU/DSU Menutree

MAIN MENU	ALARMS	NETWORK:	OK LOSS <i>The three-digit current and threshold values (###/###) range from 000 to 900. An asterisk (*) to the left of these values indicates that the current value has exceeded the threshold value. Pressing SELECT on a displayed alarm allows editing the threshold parameters for that alarm.</i> OOFs AISS RAS ES SES DS UAS BPVS CSS CRCES
			FR NET <sup>†</sup> : OK, LOCAL SOS, DLCI RESET TIMER: 000 – 900, 30 <sup>‡</sup> § This does not apply to frame relay alarms. RESET ALARMS?
PERFORMANCE	NET PERFORMANCE	RCV LVL: 2 – 7.5 dB, 7.5 – 15 dB, 15 – 22.5 dB, <22.5 dB	
		LOSS OOFs AISS RAS ES SES DS UAS BPVS CSS CRCES CLEAR HISTORY?	† (Install mode only) If the DLCI TOTAL is greater than 000, a screen with the following format appears when SELECT is pressed: uuuu -> vvvv:www xxxxms yyyykbps uuuu - the local DLCI number vvvv - ACT., IDLE, NEW, DEL., or REMOTE DLCI (if discovered) www - remote unit ID xxx - average delay (if discovered) yyyy - committed information rate
	FR PERFORMANCE	LMI TYPE: ORIG, ANSI D, ITU A PKT SRC: UNI, NI DLCI TOTAL: 000–999 <sup>†</sup> CLEAR DLCI?	‡ Monitor option only DLCI Screen TEST DLCI xxx <sup>‡</sup>
MAINTENANCE	LOOP:	NONE?, ENABLE LLB?, ENABLE PLB?, ENABLE V54?, ENABLE RMT V54?	
	BERT:	NONE, EN. NET BERT? EN. IDLE BERT? EN. DTE BERT? EN. TS01–TS31 BERT?	TP: MARKS, SPACES, 511, 2047 INJECT ERROR? ERR CNT = 00000–65356 CLEAR ERR CNT?
NETWORK CONFIG		FRAMING: CAS, CCS, FULL 2M CRC4 MODE: EN, DIS E-BIT MODE: EN, DIS <sup>^</sup> CLOCK SRC: NET, INT RAI ALARM: EN, DIS TIMESLT 01: ACT./IDLE <sup>~</sup> TIMESLT 02: ACT./IDLE <sup>~</sup> : TIMESLT 31: ACT./IDLE <sup>~</sup>	<sup>^</sup> This selection only appears if CRC4 Mode is set to EN.  <sup>~</sup> The TIMESLOT selections do not appear if Framing is set to FULL 2M. If FRAMING is set to CAS, TIMESLOT 16 is not displayed.
	DTE CONFIG	DTE CLOCK: <b>NOR</b> , INV TXCC CLOCK: EN, DIS DTE DATA: <b>NOR</b> , INV CTS: NORMAL, <b>FORCED ON</b> DCD: NORMAL, <b>FORCED ON</b> DSR: NORMAL, <b>FORCED ON</b> DTR: NORMAL, <b>IGNORED</b>	
FRAME RLY CONFIG		LMI MODE: <b>OFF</b> , ON, MON <sup>‡</sup> UNIT ID: 000 – 999 N391: 001–255, <b>006</b> N392: 01–10, <b>03</b> N393: 01–10, <b>04</b> T391: 05–30, <b>10</b> PVC MODE: <b>DIS</b> , EN SOS TX: EN, <b>DIS</b> <sup>‡</sup> SOS RX: EN, <b>DIS</b> <sup>‡</sup>	Default values are shown in bold.  * This field establishes the unit password used for entering the front panel interface. A password must be eight characters. SCROLL increments the characters (0–9, A–Z, a–z). The cursor blinks over the character or digit to be selected or modified. SELECT accepts the current value and moves the cursor right. When the eighth character is selected, a verification screen appears. Reenter the password.
	UTILITIES	VERSION: z.z.z RESTORE FACTORY? SET PASSWORD <sup>‡</sup> .	

Figure 4.3 FrameStart FSE Menutree

## Alarms

Press SELECT to view the current (within the last 15 minutes) and threshold alarm status for the network and DTE lines. To change the threshold parameters, press the SELECT button on its alarm value. Reset capabilities allow clearing the alarm values.

The three-digit current and threshold values (###/###) range from 000 to 900. An asterisk (\*) to the left of these values indicates that the current value has

exceeded the threshold value. Pressing SELECT on a displayed alarm allows changing the threshold parameters for that alarm. Table 4.1 provides a summary of the alarms.

**Table 4.1** *Alarms*

---

<b>E1 Network Alarms</b>	
LOSS	The Loss of Signal Seconds threshold is exceeded.
OOFS	The Out Of Frame Seconds threshold is exceeded.
AISS	The Alarm Indication Seconds threshold is exceeded.
RAS	The Remote Alarm Seconds threshold is exceeded.
ES	The Errored Seconds threshold is exceeded.
SES	The Severely Errored threshold is exceeded.
DS	The Degraded Seconds threshold is exceeded.
UAS	The Unavailable Seconds threshold is exceeded.
BPVS	The Bipolar Violation Errored Seconds threshold is exceeded.
CSS	The Controlled Slip Seconds threshold is exceeded.
<b>T1 Network Alarms</b>	
LOSS	The Loss of Signal Seconds threshold is exceeded.
OOFS	The Out Of Frame Seconds threshold is exceeded.
AISS	The Alarm Indication Seconds threshold is exceeded.
RAS	The Remote Alarm Seconds threshold is exceeded.
ES	The Errored Seconds threshold is exceeded.
SES	The Severely Errored threshold is exceeded.
BES	The Bipolar Errored Seconds threshold is exceeded.
UAS	The Unavailable Seconds threshold is exceeded.
BPVS	The Bipolar Violation Errored Seconds threshold is exceeded.
CSS	The Controlled Slip Seconds threshold is exceeded.
CRCES	The CRC Errored Seconds threshold is exceeded.
<b>DDS Network Alarms</b>	
LOSS	The Loss Of Signal Seconds threshold is exceeded.
OOSS	The Out Of Service Seconds threshold is exceeded.
BPVS	The Bipolar Violation Seconds threshold is exceeded.
<b>Frame Relay Network Alarms (Monitor option only)</b>	
Local	A router or network failure occurred on the local data interface.
SOS	The unit received a remote SOS alarm.
DLCI	An inactive DLCI was received in monitor mode.

---

**Note:** Go to the PERFORMANCE menu, then FR PERFORMANCE menu to see alarm conditions.

---

## Reset Timer

This field is the contiguous number of seconds that an alarm parameter must be clear before the alarm is reset. It is specific for each alarm parameter. Applicable values range from 000 through 900. The value 000 means that the alarm never resets. Press SELECT to change this threshold. This command does not apply to frame relay alarms.

## Reset Alarms?

This option clears the frame relay and network alarm counts. The choices are Yes and No.

## Performance

The network performance menu displays a history of the continuously monitored error parameters. The current 15-minute and 24-hour performance totals are reviewed and reset from the unit.

The Frame Relay performance parameters display the local and remote (if available) DLCI information.

## Network Performance

**Receive Level.** This selection shows the received signal strength in decibels. The DDS CSU/DSU DDS levels are 0.0, 7.3, 13.6, 19.7, 26.0, 32.3, 38.4, 44.4, and 50.5 dB. The T1 DDS/CSU and FrameStart FSE E1 levels are 2—7.5, 7.5—15, 15—22.5, and <22.5.

**15-Minute/24-Hour Performance.** The values are shown as (xxx/yyyy) for the network alarms. The three-digit 15-minute current value (xxx) ranges from 000 to 900. The 24-hour total values (yyyyy) range from 00000 to 65535. Use the SCROLL key to move through the alarm screens.

**Clear History.** This selection is used to reset the performance registers. When resetting the registers, the unit prompts for continuing the reset.

## Frame Relay Performance

**LMI Type.** Reports the frame relay circuit LMI type as ORIG, ANSI D, or ITU A.

**Packet Source.** Reports the frame relay interface type as User Interface UNI (User-to-Network Interface) or NI (Network Interface).

**DLCI Total.** This is the number of known local DLCIs. The count ranges from 000 to 999. If the DLCI Total is greater than 000, a screen with the following format appears when SELECT is pressed:

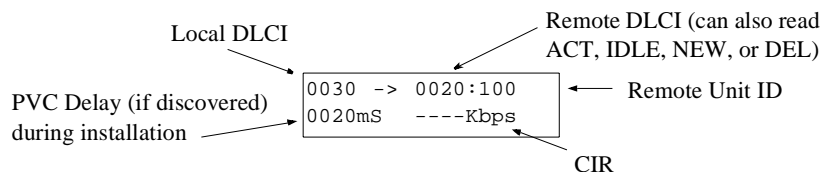
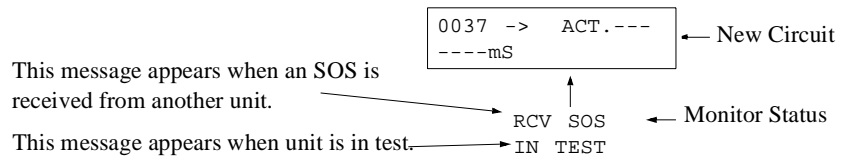


Figure 4.3 Example DLCI Total Screen

**Monitor Mode.** When the unit is in monitor mode (LM) and LMI Mode is configured for MON, individual selection of PVC discovery and delay is allowed by pressing SELECT while in the DLCI screen. Test DLCI xxx? is displayed. Pressing SELECT performs the test as follows. The unit sets up a mask for this one circuit and sends PVC discovery and PVC delay approximately every second. This minimizes the traffic disruption on the circuit. The screen then returns to the previous performance screen where the fields are updated when the information is collected. Choosing SELECT again displays End Test? where SELECT stops the test and the unit goes back to normal operation. If the unit is scrolled to another DLCI and another test is enabled, the unit stops the test on the existing DLCI and starts the new DLCI. Pressing SCROLL takes the unit to the previous performance screen.

The SOS message is displayed as shown in Figure 4.4. This allows the user to view the local and remote DLCI and unit ID numbers for fault isolation. As new circuits are added, information is displayed as shown in Figure 4.4.



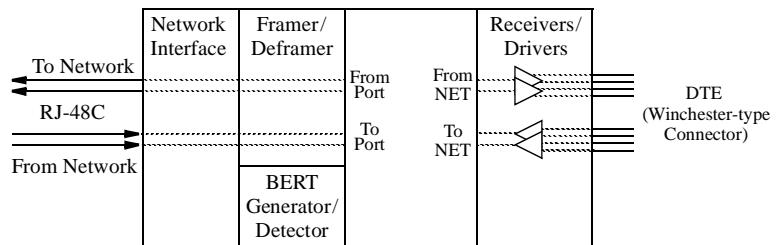
**Figure 4.4** Example DLCI Total Screen in Test

## Maintenance

The Maintenance menu allows performing loop tests, BERT functions, and error counts on the circuit. Loops, BERTs, and error counts are activated and cleared from the unit. No other test equipment is needed.

### Loop

This menu allows running diagnostic loop tests on the network. Figure 4.5 shows normal operation.

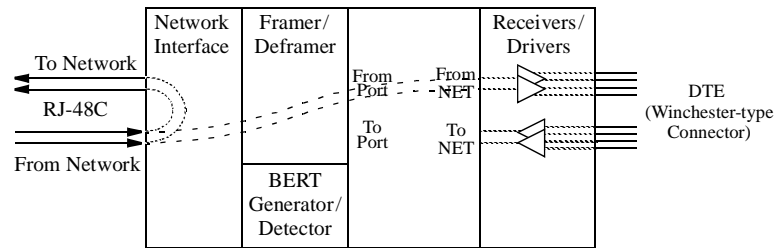


**Figure 4.5** Normal Operation

**None.** Selecting NONE leaves the unit in normal operation and forwards the unit to BERT.

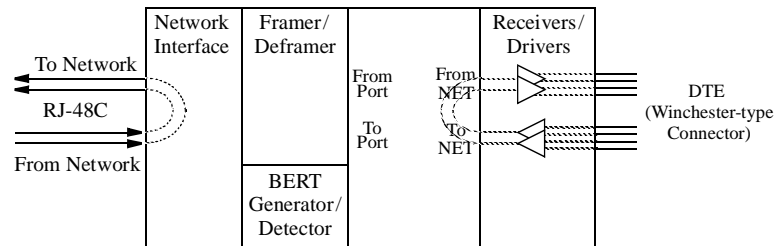
**Enable LLB (DDS CSU/DSU only).** (Line Loopback) - As shown in Figure 4.7, the received network signal is looped back toward the network.

The received data is passed through to the DTE port. The NET LLB is activated by detection of simplex current reversal.



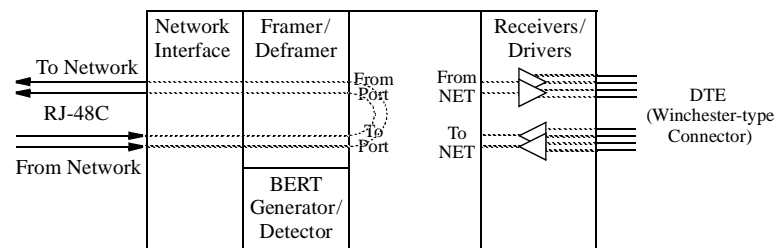
**Figure 4.6** Enable LLB for DDS CSU/DSU

**Enable LLB (T1 CSU/DSU and FrameStart FSE only).** (Line Loopback)  
 - As shown in Figure 4.7, the received network signal is looped back toward the network with signal regeneration only (framing and CRC intact). During the NET LLB, the DTE port is also looped. In T1 circuits, the NET LLB is activated by receiving in-band or out-of-band loop code on the network receive signal (E1 has no in-band loopcode enable) and by the front panel LCD selection.



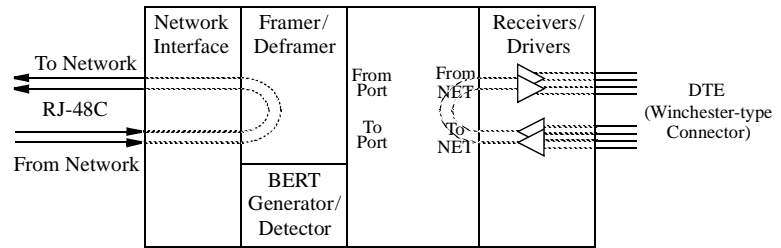
**Figure 4.7** Enable LLB for T1 CSU/DSU and FrameStart FSE

**Enable DLB (DDS/CSU/DSU only).** As shown in Figure 4.8, the received network signal is looped back toward the network in the local unit. This loop is invoked by an in-band pattern.



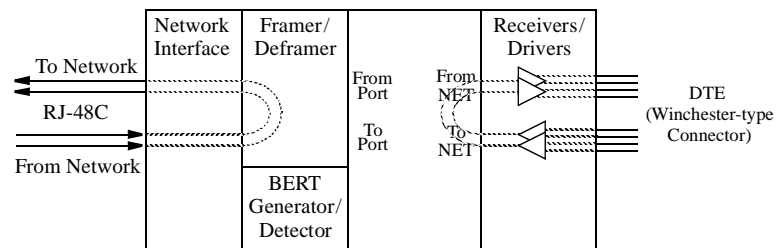
**Figure 4.8** Enable DLB

**Enable LCL (DDS CSU/DSU only).** As shown in Figure 4.9, the received network signal is looped back toward the network. During the LCL loop, the DTE is looped on itself.



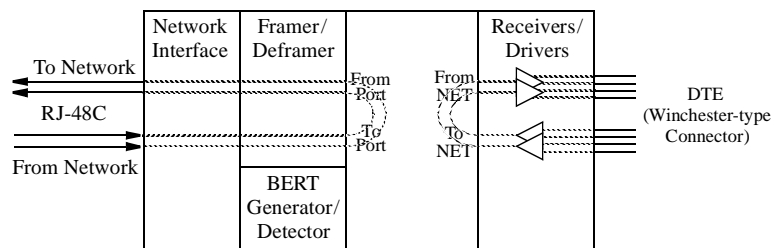
**Figure 4.9** Enable LCL

**Enable PLB (T1 CSU/DSU and FrameStart FSE only).** (Payload Loopback) - As shown in Figure 4.9, the received network signal is looped back toward the network with signal regeneration, framing and CRC regeneration. During the NET PLB, the DTE is looped on itself. In T1 circuits the NET PLB is activated by receiving out-of-band loop code on the network receive signal (E1 has no remote PLB enable) or by selection in the user interface maintenance screen.



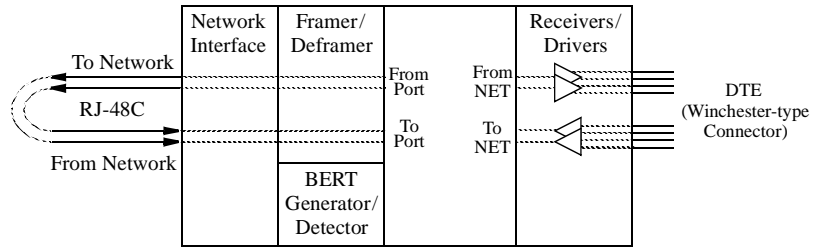
**Figure 4.10** Enable PLB

**Enable V54.** As shown in Figure 4.11, the network signal is looped back toward the network after the rate adaptation FIFOs. In this mode, the DTE is looped back on itself. This loop can be invoked from the unit or the remote-end equipment.



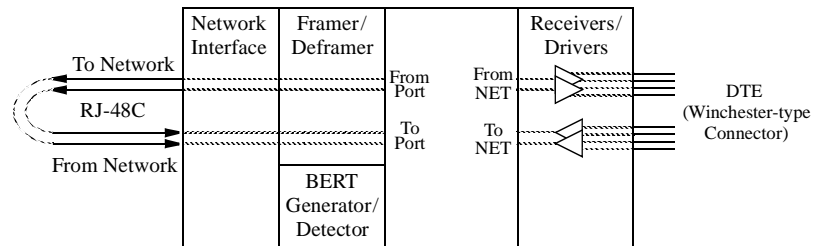
**Figure 4.11** Enable V54

**Enable Remote V54.** As shown in Figure 4.12, the Enable Remote V54 forces the remote-end unit into a V54 loop. A BERT and a loop can only be run simultaneously if the loop type is remote.



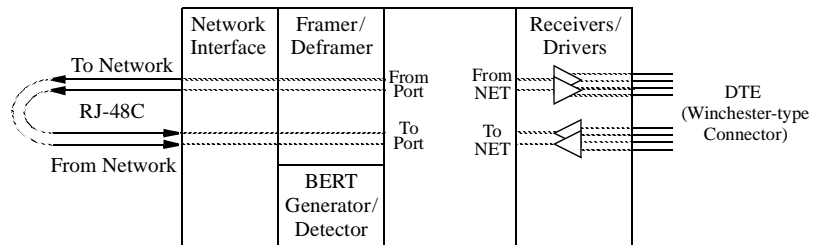
**Figure 4.12** Enable Remote V.54

**Enable Remote LLB (Line Loopback) (T1 CSU/DSU only).** As shown in Figure 4.13, the Enable Remote LLB forces the remote-end unit into a line loopback. A BERT and a loop can only be run simultaneously if the loop type is remote.



**Figure 4.13** Enable Remote LLB

**Enable Remote PLB (Payload Loopback) (T1 CSU/DSU only).** As shown in Figure 4.14, the Enable Remote PLB forces the remote-end unit into a payload loopback. A remote PLB is only possible if the FDL mode is set to AT&T or ANSI. A BERT and a loop can only be run simultaneously if the loop type is remote.



**Figure 4.14** Enable Remote PLB

## BERT

This command allows selecting the BERT to run. The selections are as follows.

**None.** No BERT selected.

**Enable Network BERT.** BERTs the full DDS in the DDS and T1 CSU/DSU bandwidth towards the network.

**Enable Idle BERT (T1 CSU/DSU and FrameStart FSE only).** BERTs the idle (unallocated) channels toward the network.

**Enable DTE BERT.** BERTs the DTE.

**Enable Channel 01 to 24 BERT (T1 CSU/DSU only).** BERTs the selected channel towards the network.

**Enable Timeslot 01 to Timeslot 31 BERT (FrameStart FSE only).** BERTs the selected channel towards the network.

## Test Patterns

This command allows selecting the test pattern. The selections are Marks, Spaces, 511, and 2047.

## Inject Error

This command injects a single error when operating in BERT mode.

## Error Count

Displays the number of bit errors that have been detected since the test began or since error statistics were last cleared.

## Clear Error Count

This selection is used to reset the BERT error count.

## DDS DTE Configuration

This menu establishes the necessary parameters for connection with the DTE for the DDS CSU/DSU. The network configuration is automatically set when the DTE Rate is set. For example, 56 Kbps DTE Rate sets the network to DDS I and 64 Kbps DTE Rate sets the network to DDS II CC 64K.

### Rate

The unit can operate at 56 or 64 kbps.

### DTE Clock

The polarity of the clock is either normal or inverted.

## TXCC Clock

This is used to enable or disable generation of the TXCC clock from the unit to the DTE.

## DTE Data

In the invert mode, transmit and receive data are inverted at the port interface. This function can be used as a means of guaranteeing ones density when the data is composed of SDLC- type protocols. The default setting is normal.

## CTS

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation where CTS follows the transition of RTS.

## CTS Delay

This field allows setting the delay from when RTS is asserted to when CTS is asserted. The delay ranges from 000 to 255 milliseconds in one-millisecond increments. Setting this field to 000 means RTS and CTS are asserted simultaneously.

## DCD

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

## DSR

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

## DTR

Setting this field to Forced On allows the forcing of the port control lead output state. Ignored allows for normal operation.

## T1 Network Configuration

The Network Configuration menu (see Figure 4.3 on page 24) allows establishing parameters for connection with the T1 network.

## Framing

Selects the type of framing for the network interface as D4 or ESF.

## Line Code

Sets the network interface line coding as AMI or B8ZS.

## Clock Source

Sets the timing source to synchronize the unit's internal timing generators. Slips are controlled to occur on frame boundaries at the network port when timing synchronization is lost. Network timing is derived from the network recovered clock (most applications use this selection). Internal uses the unit's internal frequency as the standard for all timing.

## Sensitivity

Sets the unit's receiver sensitivity. When enabled, the unit can respond to signals attenuated to 36 decibels. When disabled, the unit can only respond down to 30 decibels of attenuation.

## LBO

Shows the line build out signal attenuation for the network interface as 0, -7.5, -15, or -22.5 decibels.

## Yellow Alarm

Enables or disables the unit's ability to transmit a yellow alarm.

## Density

Enables or disables density enforcement. This does not apply if the line code is set to B8ZS.

## FDL

Selects the type of operation for the facilities data link. The choices are NONE, ANSI, and AT&T. This only applies when the Framing is set to ESF.

## Channels Assigned

Selects whether the channel assignment are made as a CONT (contiguous) group or as ALT (alternate) channels. Alternate channel mode assigns an idle channel following each data channel. For example, data is carried on channels 1, 3, 5, and 7. Channels 2, 4, 6, and 8 are idle (the idle setting is binary code 01111111). The advantage of alternate channel assignment is that T1 ones density requirements are maintained by the idle channels rather than placing any restrictions on the high-speed data but reduces the available bandwidth from 1.536 kbps to 768 kbps.

## Start Channel

The starting channel in the 24-channel DS1 bit stream must be selected in this field. The unit then assigns the following channels automatically according to the number of channels (#Channel) and the mode selected in Channels Assigned. The choices are 01 through 24.

## #Channel

Selects number of channels to be assigned to the network ranging from 0 through 24.

## T1 DTE Configuration

This menu establishes the necessary parameters for connection with the DTE.

### Rate

The unit can operate at any data rate that is a multiple of 56 or 64 kbps. When 64Kbps is selected, the ones density requirements of the T1 network line must be ensured. When 56Kbps is selected, the unit maintains ones density for the selected DS0 channel.

### DTE Clock

The polarity of the clock is either normal or inverted.

### TXCC Clock

This is used to enable or disable generation of the TXCC clock from the unit to the DTE.

### DTE Data

In the invert mode, transmit and receive data are inverted at the port interface. This function can be used as a means of guaranteeing ones density when the data is composed of SDLC- type protocols. The default setting is normal.

### CTS

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation where CTS follows the transition of RTS.

### DCD

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

## **DSR**

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

## **DTR**

Setting this field to Forced On allows the forcing of the port control lead output state. Ignored allows for normal operation.

## **E1 Network Configuration**

The Network Configuration menu (see Figure 4.3 on page 25) allows establishing parameters for connection with the T1 network.

### **Framing**

Selects the type of framing for the network interface as CAS, CCS, or FULL 2M.

### **CRC4 Mode**

Enables or Disables CRC4 multiframing mode.

### **E-Bit Mode**

Enables or Disables remote E-bit generation when operating in CRC4 multiframing mode.

### **Clock Source**

Sets the timing source to synchronize the unit's internal timing generators. Slips are controlled to occur on frame boundaries at the network port when timing synchronization is lost. Network timing is derived from the network recovered clock (most applications use this selection). Internal uses the unit's internal frequency as the standard for all timing.

### **RAI Alarm**

Enables or disables the unit's ability to transmit a remote alarm.

### **Timeslot 01 to Timeslot 31**

Selects the timeslot as either ACTIVE or IDLE. Timeslots selected as ACTIVE are routed to the DTE port. timeslot 16 can only be selected if the framing mode has been set to CCS. In FULL 2M operation, this selection is not available.

## E1 DTE Configuration

This menu establishes the necessary parameters for connection with the DTE.

### DTE Clock

The polarity of the clock is either normal or inverted.

### TXCC Clock

This is used to enable or disable generation of the TXCC clock from the unit to the DTE.

### DTE Data

In the invert mode, transmit and receive data are inverted at the port interface. This function can be used as a means of guaranteeing ones density when the data is composed of SDLC- type protocols. The default setting is normal.

### CTS

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation where CTS follows the transition of RTS.

### DCD

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

### DSR

Setting this field to Forced On allows the forcing of the port control lead output state. Normal allows for normal operation.

### DTR

Setting this field to Forced On allows the forcing of the port control lead output state. Ignored allows for normal operation.

## Frame Relay Configuration

The frame relay configuration screen allows performing the configuration and control of the frame relay parameters.

### LMI Mode

Sets the operating mode for FrameStart. The choices are as follows. ON discovers the LMI Type and sources LMI to the network. MON (Monitor

option only) monitors the DTE and network frame relay packets and sources LMI when errors are detected. OFF is selected when there is no frame relay activity.

## Unit ID

The local unit ID number. This number is entered by the user and ranges from 000 to 999. It is displayed at the remote end by PVC discovery frames.

## N391

Sets the number of polling cycles for full status messages. This value ranges from 1 to 255. Consult the network provider for this value. The default setting is 006.

## N392

Sets the number of allowable errors occurring during N393- monitored events. This value ranges from 1 to 10. Consult the network provider for this value. The default setting is 03.

## N393

Sets the number of events in which N392 is monitored. This value ranges from 1 to 10. Consult the network provider for this value. The default setting is 04.

## T391

This sets the link integrity verification polling timer. This value ranges from 5 to 30 seconds. Consult the network provider for this value. The default setting is 010.

## PVC Mode

This option enables or disables PVC discovery and delay evaluation by the local unit. For this to be effective, the local and remote units must have this mode enabled. When enabled, the local unit queries each of the remote units based on its local DLCI table. Once a remote unit has been identified, the unit performs a PVC delay calculation. The unit must be set to LMI Mode On.

## SOS TX (Monitor Mode)

This field enables SOS frames to be sent in SM mode every 5 to 25 milliseconds on all active DLCIs. This occurs after SM has finished and LMI sourcing has started and the unit can communicate with the frame relay switch. The default is Disable.

## **SOS RX (Monitor Mode)**

This field enables SOS frames to be detected at a host site in LM monitor mode. Each DLCI is tested every 1 to 10 seconds in a mask scenario for SOS frames received. It can take five to ten minutes to detect these frames depending on the amount of traffic. The default is Disable.



# Affidavit for the Connection of Customer Premises Equipment to 1.544 Mbps and/or Subrate Digital Services

For work to be performed in the certified territory of

Telco's Name: \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

I, \_\_\_\_\_ (Authorized Representative Name), of \_\_\_\_\_ (Customer Name),  
\_\_\_\_\_ (Customer Address), \_\_\_\_\_ (Telephone Number),

being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to \_\_\_\_\_ 1.544 Mbps and/or \_\_\_\_\_ subrate digital services. The terminal equipment to be connected complies with Part 68 of the Commission's rules except for the encoded analog content, and billing protection specifications. With respect to encoded analog content and billing protection:

- I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and encoded billing information continuously complies with Part 68 of the FCC's Rules and Regulations.
- The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.
- The encoded analog and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully completing one of the following (Check the appropriate box(es) below):

- A. Training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or
- B. Training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or
- C. Independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or
- D. In lieu of the preceding training requirements, the operator(s) maintainer(s) is (are) under the control of a supervisor trained in accordance with \_\_\_\_\_ (choose A, B, or C) above.

I agree to provide \_\_\_\_\_ (Telco's Name) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.

\_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

\_\_\_\_\_ (Date)

Subscribed and Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission expires \_\_\_\_\_.





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- VII. **RETURN OF GOODS.** If for any reason the Buyer must return a Verilink product, it must be returned to the factory, shipping prepaid, and packaged to the best commercial standard for electronic equipment. Verilink will pay shipping charges for delivery on return. The Buyer is responsible for mode and cost of shipment to Verilink. The Buyer must have a Return Material Authorization (RMA) number marked on the shipping package. Products sent to Verilink without RMA numbers will be returned to the sender, unopened, at the sender's expense. A product sent directly to Verilink for repair must first be assigned an RMA number. The Buyer may obtain an RMA number by calling the Verilink Customer Service Center at 1.800.926.0085, extension 2282 or 2322. When calling Verilink for an RMA, the Buyer should have the following information available:
- Model number and serial number for each unit
  - Reason for return and symptoms of problem
  - Purchase order number to cover charges for out-of-warranty items
  - Name and phone number of person to contact if Verilink has questions about the unit(s).
- A return address will be provided at the time the RMA number is issued. The standard delivery method for return shipments is Standard Ground for domestic returns and International Economy for international returns (unless otherwise specified).
- VIII. **GOVERNING LAW.** This Agreement is governed by the laws of the State of Alabama, U.S.A., without reference to its conflicts of law provisions. The provisions of the UN Convention on Contracts for the International Sale of Goods shall not apply.