

# *innovx*<sup>TM</sup>

## Frame Relay Access Products

### Highlights:

- *Frame relay SLA monitoring plus probe functions with built-in Web-based performance reports*
- *A powerful yet affordable window to the power of frame relay networks*
- *Carrier class, rate flexible, frame relay access at 56/64 Kbps software upgradeable to T1 speeds*
- *Comprehensive tools for verifying SLAs, assessing quality of service, and managing bandwidth usage*
- *Internet-ready management via an embedded Web server agent*
- *Optional Innovx Frame Manager enterprise network management software for WindowsNT-based analysis and reporting*
- *Automatically responds to LMI polls ensuring frame relay service availability during router or LAN outages*



**Overview** GDC's *innovx*<sup>TM</sup> is a family of next generation access products designed specifically for packet networks. Current solutions include innovative, highly intelligent, software based frame relay access devices, with built-in CSU/DSUs, that perform frame relay monitoring and extensive frame relay network probing functions. The *innovx* platform has the computing power of a PC, for lower latency than most other products in its class, and makes full use of the power of the Internet through a built in HTTP web server supporting Java. *Innovx*<sup>TM</sup> core architecture is ready for the swing away from circuit-based to packet-based networking — from frame relay support now to ATM transport in the future.

**Open A Window to the Network** An *innovx* located between a LAN segment and the frame relay network not only provides access to frame relay at 56/64 Kbps, FT1, or T1 rates but also opens a window to the network for complete awareness of frame relay performance, line impairment conditions, and alarms.

*Innovx* provides network managers with all the tools necessary to monitor and troubleshoot frame relay transport systems through Telnet and SNMP — or your Internet browser. In addition, the family

delivers valuable tools for long-range proactive and predictive management of network resources — such as network baselining and performance trend analysis. For enterprise users, the *innovx* family quickly pays for itself by allowing users to fully utilize bandwidth, which ultimately controls recurring frame relay costs. For service providers in today's highly competitive frame relay market, *innovx* provides a means for introducing new value-added services.

**The Innovx Difference** Frame relay is currently the access method of choice to interconnect multiple enterprise locations together for LAN-based networking. Frame relay is a connectionless service whose protocol transparency and dynamic nature leaves much to the customer in terms of monitoring, assessing quality of service, and troubleshooting. *Innovx* not only analyzes the physical and logical aspects of a users frame relay network, but helps characterize the level of service users are receiving.

### Key Features

**Data Collection** Information about network operation is collected by high speed dedicated processors. Built-in 24 hour reports are sampled



## *innovx*<sup>™</sup>

every second and accumulated in 15 minute intervals. The reports are available directly from the *innovx* via a PC with an ordinary web browser. Since virtually all the collection and processing of data occurs within the *innovx*, WAN overhead created by management traffic is minimized.

**Real-Time Performance Monitoring** *Innovx* probes provide real-time monitoring and analysis of frame relay networks. This enables users to proactively maintain and troubleshoot frame relay performance issues.

**Versatile Frame Relay Access** *Innovx* products are carrier class, highly intelligent frame relay service access devices, so external DSU/CSU hardware is not needed. Users have a choice of access to digital services at 56/64 Kbps or at T1/FT1 rates. *Innovx* 553s support both DS-1 and DSX-1 network interfaces while *innovx* MSPs support both DDS and DDS with Secondary Channel network interfaces and are software upgradable to DS-1/DSX-1 (T1/FT1) services. DTE interfaces can be standard EIA-530 or V.35. An Ethernet interface enables LAN attachment.

### **Innovx Benefits**

**Quality of Service Assurance** *Innovx* acts as an expert frame relay Service Level Advisor giving service providers and enterprise users a means of verifying that service commitments are met. Frame relay tariff rates are based in part on a Committed Information Rate (CIR) — the sustainable data rate, which is guaranteed by the carrier. Statistics gathered by *innovx* give IT managers the information needed to analyze the CIR track record and measure such critical performance parameters as PVC delay, PVC frame loss, throughput, utilization, and congestion.

**Reduced Recurring Frame Relay Access Costs** *Innovx* provides a means of collecting bandwidth usage data and allows the user to maximize bandwidth efficiency. An investment in *innovx* is easily cost-justified because, ultimately, wise bandwidth management pays off in terms of reduced access charges.

**Lower Facility Costs** *Innovx* products are easily introduced without major disruption of the existing network. They are easy to install and maintain. Plug-and-play and Ethernet LAN attachable, they feature a modular scalable architecture with room for growth and easy upgrades. Whether you are installing one unit or thousands, *innovx* scales to exactly your need.

**Easy Provisioning of Leading-edge, Value-added Offerings** The *innovx* family's versatile interfaces and advanced management tools — which provide added monitoring, reporting, and control features — make *innovx* an ideal vehicle for carriers seeking to provision value-added offerings, based on frame relay services.

### **INNOVX Family Members**

***Innovx* 553 and *Innovx* 553 Plus** The *innovx* 553 and *innovx* 553 Plus are highly intelligent, frame relay monitoring probes that provide network managers with all the tools necessary to monitor and troubleshoot frame relay transport systems. Both models contain a built-in T1/FT1 CSU/DSU for frame relay service access providing all N x 56/64 Kbps rates from 56 Kbps to 1.536 Mbps (where N=1 to 24). They also support standard EIA-530 and V.35 DTE interfaces, an Ethernet interface, plus a PPP dial-up/local management port. The *innovx* 553 Plus provides a drop-and-insert port that supports a DS1/DSX-1 interface. Key features include:

- Carrier class probe capability for high-profile frame relay monitoring and troubleshooting
- Supports up to 127 PVCs
- Comprehensive tools for assessing quality of service and managing bandwidth usage
- Advanced web-based management including GUI and embedded web server
- Trendline performance, utilization and statistics for better resource management
- Integral T1/FT1 CSU/DSU for versatile service access

***Innovx* MSP** The *innovx* MSP (Multiple Service Platform) serves as a highly intelligent, frame relay monitoring probe. The *innovx* MSP provides access to frame relay at 56/64 Kbps rates for applications that do not require full T1 bandwidth. However, as bandwidth requirements grow, the *innovx* MSP is easily upgradable to fractional or full T1 service simply and inexpensively by downloading new software.

All of the powerful *innovx* 553 monitor and probe features are present in the *innovx* MSP, including drill down fault isolation and performance monitoring, advanced tools for assessing Quality of Service (QoS) and managing bandwidth usage.

*Innovx* MSP, like the *innovx* 553, delivers a powerful yet affordable window on the network. It is plug-and-play and Ethernet LAN attachable, scalable for use on the customer desktop or in the wiring closet. Key features include:

- Multiple Service Platform supports 56/64 Kbps
- Software upgrade to FT1/T1
- Supports 8 PVCs for 56/64 Kbps
- Software upgradable to 127 PVCs
- Extended dynamic range

**Innovx Architecture** Based on PowerPC architecture, innovx design (Figure 1) leverages all the computing power and ample memory of today's latest technology in one compact desktop unit that can operate independently within the enterprise network. The *innovx* computing platform supports:

- A CPU capable of processing up to 50 MIPS (Million Instructions per Second)
- An abundant FLASH ROM memory with ample room for storing both the factory default system and the currently running system, as well as for downloading a new or alternative system.

**Power and Packaging** Units are LAN attachable with connectors that support multiple digital network interfaces plus a PPP dial-up local management port. Standard EIA-530 and V.35 DTE interfaces are supported. The 100-240 VAC power supply is internal to the unit. Figure 2 shows *innovx* family front and rear panels.

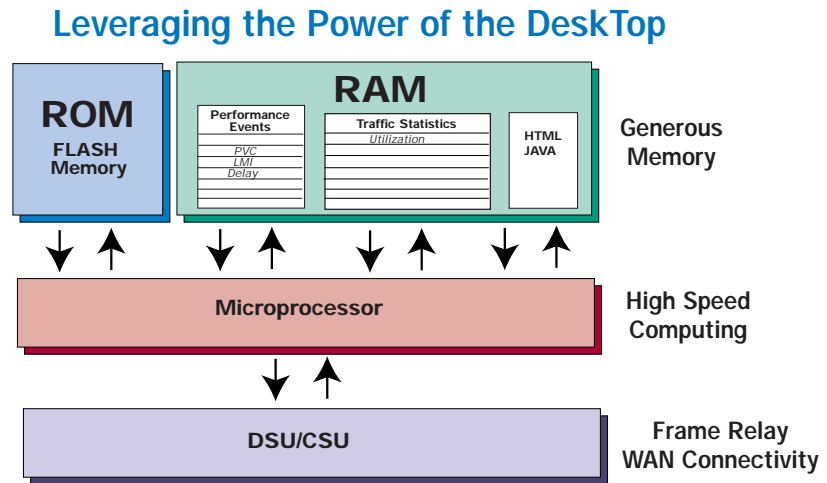


Figure 1 – *Innovx* Architecture

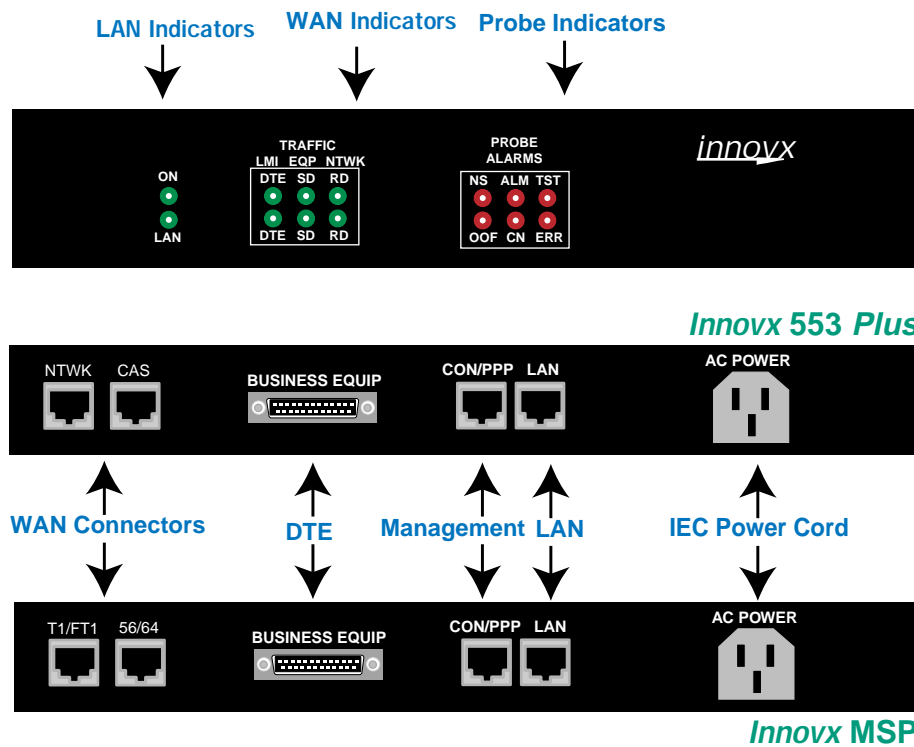


Figure 2 – *Innovx* Front and Rear Panels

**innovx™ Network Management**

- "Under the Hood" - No Dedicated Workstation
- Direct Web Server for Graphical Retrieval
- Stores Up to 24 Hours of Data
- Access via Local LAN, Remote shared or dedicated PVC Connection, PPP, Dial-up or VT100 Dial-up
- Works with Popular Browsers Supporting Java 1.1
- Supports in-band and out-of-band SNMP, Telnet, VT-100, and HTML management

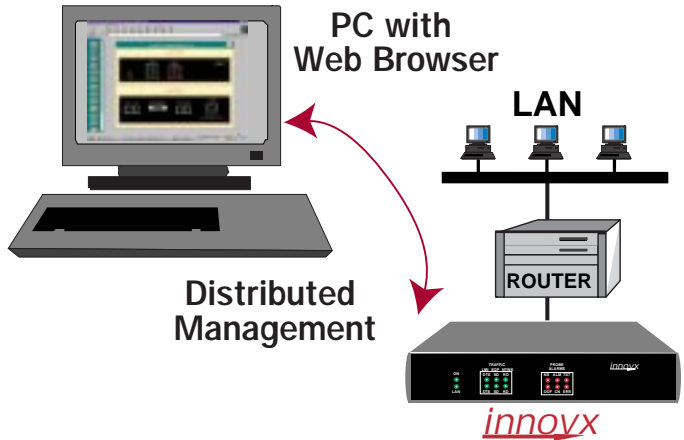


Figure 3 – Out of Band, Distributed Management

**Innovx Network Management**

**A New Point of View** Most existing support tools such as portable analyzers, RMON probes, and carrier reports do not provide the sophisticated, robust system needed for the management of today's frame relay networks. Most current network element management systems are designed for the circuit switched not the packet switched world. *innovx* is one of the first systems to supply a complete network management toolset including performance monitoring, troubleshooting, network baselining and long term planning especially for frame relay environments.

**Management via the Internet** Today's Internet-literate users will be comfortable with the *innovx* management approach. *Innovx* network management follows the trend towards client/server, web-based network management that relies on image and information retrieval via the Internet.

With *innovx*, responsibility for collecting and processing management data lies not in one central console, but is distributed among the "client" *innovx* units in the network. You no longer need a dedicated network management station with a custom software package. Instead network management is "under the hood" of each unit delivering out-of-band distributed management via an



Figure 4 – *Innovx* Home Page

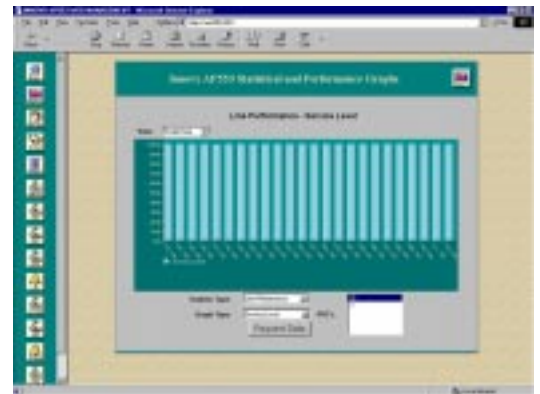


Figure 5 – Line Availability Report

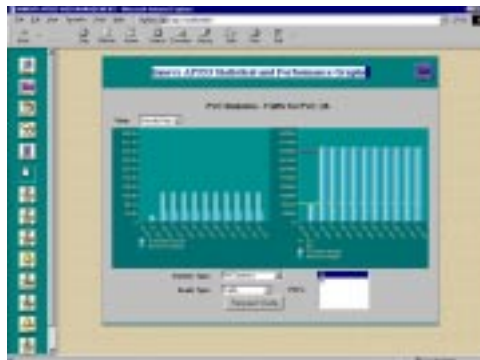


Figure 6 – PVC CIR/EIR Verification

# Innovx Frame Manager

- ⊕ *Statistics Collection and Reporting*
- ⊕ *Windows NT*
- ⊕ *Probe Auto-Discovery*
- ⊕ *Comprehensive Frame Relay Reports*
- ⊕ *Powerful Console with Integrated Browser*
- ⊕ *Installation Wizard for easy setup*
- ⊕ *Built in Web Server*
- ⊕ *Auto Report generation with e-mail notification and delivery*
- ⊕ *ODBC Compliant*

embedded web server agent that allows ordinary web browsers to view configurations and reports via a web-browser-based standard PC (Figure 3). All you need is web connectivity.

Internet ready network management features include HTML and Java 1.1 support. This means you can use any ordinary web browser supporting Java, such as Microsoft's Internet Explorer or Netscape's Navigator.

**High Visibility** *Innovx* offers an entire day's information on every device. Information gathered ranges from line and channel statistics all the way to individual PVC statistics. Throughput, utilization, congestion, bursting, and errors are just a few of the items that can be monitored both in real-time and historically. Drill down screen design not only helps the user to quickly gain information on the global network environment, but allows precision analysis whenever needed. Access can be via the local LAN or through a remote TCP/IP connection. Figures 4 through 6 show front and rear panel views, alarm configuration, and a performance graph as they appear on the web browser screen.

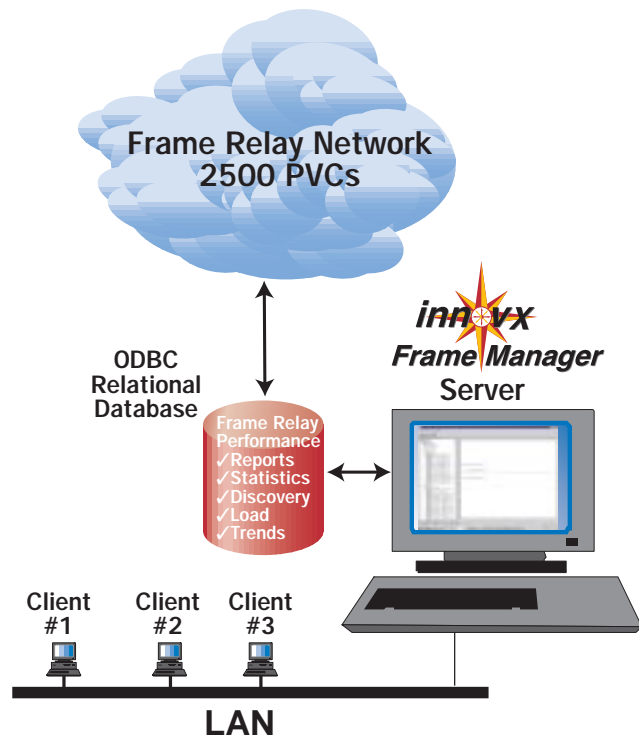


Figure 7 – Innovx Frame Manager System Components

**Steering in the Right Direction** For added insight into network performance and resources, users have the option of adding the Innovx Frame Manager, GDC's WindowsNT-based enterprise network management software application. Residing on a management PC, usually located at the central site, the application pulls data from each remote *innovx* at pre-defined intervals for up to 2,500 PVCs, processes it, and stores it in a relational database.

Innovx Frame Manager supports up to 2,500 PVCs per management application license. The centralized database provides

a single point of access to valuable, long-term archives about network performance that are especially useful in large enterprise networks. Figure 7 shows Innovx Frame Manager's system components.

**Graphical Reports** The application uses the statistics collected by each *innovx* to generate detailed graphical reports either on-demand or in an automated fashion.

These reports contain powerful information demonstrating network performance, errors, and quality of service in a variety of line, bar and other graph formats. Network managers can use these reports to:

- Verify that frame relay Service Level Agreements (SLAs) are being met
- Audit network performance and establish normal performance ranges
- Assess efficiency of bandwidth usage
- Spot network trouble spots before they threaten performance and QoS
- Plan for and cost-justify network upgrades and enhancements

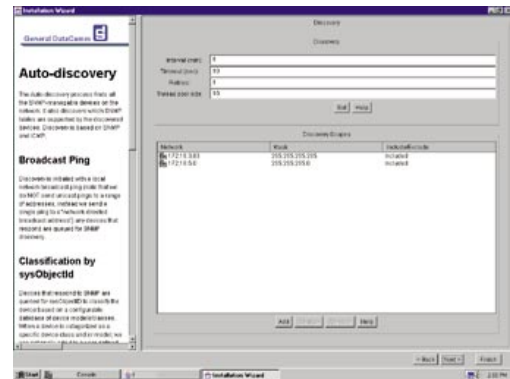
**Auto Discovery and Inventory Tools** The Innovx Frame Manager also features an auto-discovery capability that finds and lists a hierarchy of all the *innovx* devices in the network (Figure 8). Clicking on a device icon within the hierarchy displays information about the device including device IP address and SNMP settings (Figure 9).

Because the Innovx Frame Manager is integrated with Windows NT and has a built-in installation Wizard utility, network managers who are familiar with PCs will find *innovx* very easy to install, configure, and operate. The application is Internet ready, with an integrated Web browser, which means that it can be accessed via an Internet connection.

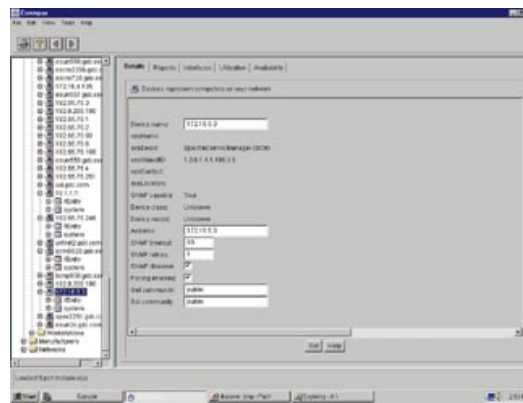
**Innovx Applications**

**Enterprise Network** *innovx* gives network administrators all the tools for complete day-to-day and long-range insight into the operations of their frame relay network, at an affordable price and without radical changes to their existing network architecture.

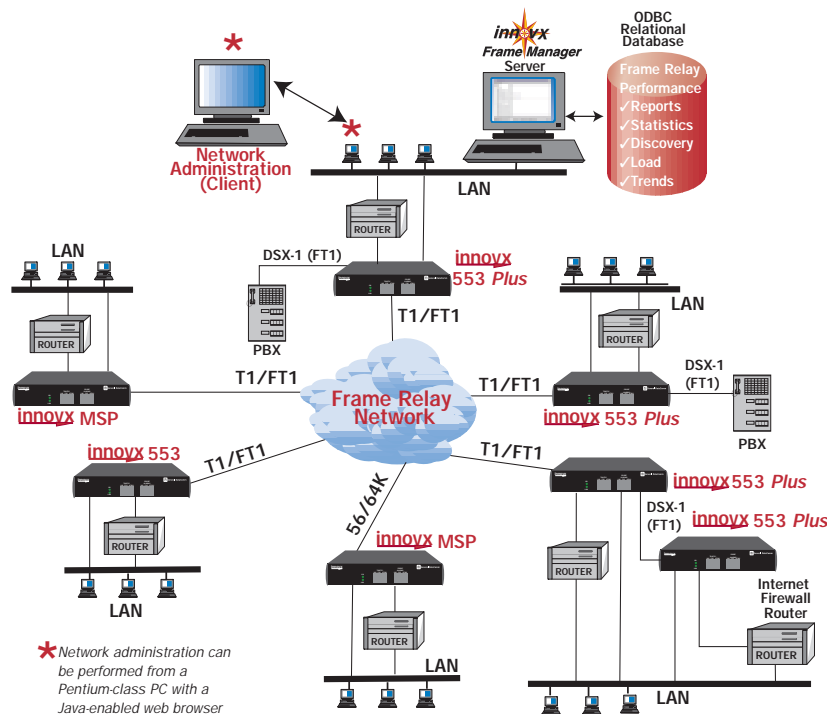
Figure 10 shows a typical *innovx* Enterprise Network application. In place of CSU/DSUs, *innovx* 553s and MSPs are located at the central and remote sites of this corporation. Here they connect LAN routers to the frame relay network at 56/64 Kbps, FT1, or T1 rates up to 1.536 Mbps. Frame relay performance statistics are accumulated locally on each *innovx*. Each remote site is managed inband via SNMP or out-of-band via Ethernet or



**Figure 8 – Auto-discovery**



**Figure 9 – Device Information**



**Figure 10 – Enterprise Network Application**

PPP. T1 performance statistics per ANSI T1.403 and TR 54016 recommendations can be gathered by the the far end SNMP management station. SNMP traps can be used to generate alarms if performance degradation occurs. Each device terminates the frame relay network and responds to LMI polls automatically. This feature ensures that frame relay services remain available during router outages, making troubleshooting a snap.

Since each *innovx* has an internal Web server agent, it can be accessed via a PC equipped with any standard Web browser. In addition, at the central site,

this customer has chosen to add the Innovx Frame Manager application.

**Frame Relay Service Provisioning** *Innovx* gives service providers the edge in provisioning frame relay services that are clearly differentiated from the competition. *Innovx* 553s and MSPs are easily deployed at the customer premises for frame relay service termination. Inserting an *innovx* between the router and the network not only provides network performance statistics, but also gives a clear vision of the QoS the customer is receiving. For example, Service Level Agreement parameters like

network latency or throughput can be set to trigger an alarm before a particular location is about to exceed its SLA.

*Innovx* 553s and MSPs are off-the-shelf, plug-and play devices that are easy to install and software upgradable. An MSP at a customer site can be upgraded from 56/64 Kbps to FT1 through a simple download. *Innovx* management is built into each device, all physical and network layer data is easily accessible via Telnet and SNMP or using an Internet connected d a Web browser. A craft port on the *innovx* unit allows local access using a VT-100 style terminal.

## Specifications

Functional	Innovx 553/Innovx 553 Plus	Innovx MSP*
Data Rates:	N x 56/64 Kbps to 1.536 Mbps, where N = 1 to 24 DS0s	56/64 Kbps, synchronous Software upgradeable to FT1/T1
Data Encoding:	AMI or B8ZS	Bipolar Return to Zero
Framing/Format:	D4, AT&T 54016 ESF, ANSI T1.403 ESF	Serial, synchronous, binary
Network Interface:	DS1 or DSX-1	Conventional DDS; DDS/SC
Cascade Interface:	<i>Innovx</i> 553 Plus Only; DS1 or DSX-1	N/A
DTE Interfaces:	ITU-T V.35, EIA-530	ITU-T V.35, EIA-530
Dial-up Diagnostic Port:	EIA/TIA-232-E (DTE PPP Port)	EIA/TIA-232-E (DTE PPP Port)
Diagnostic Tests:	Line Loop, Payload Loop, Channel Loop	Conventional DDS Loops, Line Loop, Channel Loop
Number of PVCs Supported:	127	8
Frame Relay Management:	Locally via Ethernet; remotely via in-band PVC or dial-up PPP encapsulated in Frame Relay; from any SNMP compliant manager	
Logical Link Management:	Annex A, Annex D	
Monitoring:	Built-in 24 hour reports, sampled every second and accumulated in 15 minute increments	
LMI:	Spoofs LMI polls by acting as a frame relay DCE device on the customer side and as a DTE device on the network interface side	
Statistics		
Line :	Errored Seconds, Error Counts, Error Free % Percentage	
Channel:	Channel Traffic, LMI, BECN and FECN, IP Packets, Keep Alive Polls	
PVC:	PVC Traffic, DE Frames, BECN and FECN, Keep Alive Polls	
Performance		
Line:	Availability, Throughput/Utilization	
Channel:	Local and Remote Availability, Load	
PVC:	Average Round Trip Time, Local and Remote DTE Availability, Load, Excess CIR and EIR, Frame Loss, Real-time Round Trip Delay	

\* *Innovx* MSP can be upgraded to *innovx* 553 via software download.

