

*FIREBERD® 500*

# *Internetwork Analyzer*



# *Comprehensive, Expert LAN/WAN Analysis in One Instrument*

Service providers and end users around the world rely on the TTC® FIREBERD® 500 Internetwork Analyzer as the premier tool for fast packet analysis and troubleshooting. Powerful and endlessly adaptable, the FIREBERD 500 is an all-in-one expert LAN/WAN analyzer that evolves with your network.

The FIREBERD 500 is designed for field service, with a versatile feature set and rugged packaging — you can carry one instrument into the field to test your entire internetwork. Now with advanced ATM, ISDN, expert frame relay, network signaling, and Sniffer® Network Analyzer capabilities, the FIREBERD 500 offers the most extensive provisioning and troubleshooting analysis capabilities of any portable LAN/WAN analyzer in the market today.

## Highlights

- Simultaneous LAN/WAN multi-port analysis
- Gather statistics on all supported interfaces, media, and LAN and WAN protocols, including ATM
- WAN protocol decodes: frame relay, SMDS, ATM, ISDN, PPP, ML-PPP, Cisco, X.25, SNA, and async/bisync
- LAN and encapsulated LAN protocol decodes: TCP/IP, Novell, Xerox, DEC, IBM, ISO, and more
- Frame relay DLCI discovery and statistics with expert analysis and real-time fault resolution
- Capture, filter, and decode ATM cells in real time, at full-bandwidth in full-duplex at speeds up to 155 Mbit/s
- Expert LAN analysis with Network General's Sniffer Network Analyzer option
- ISDN BRI and PRI decode and emulation
- Analyze TR-303, SS7, CDPD, and V5.x signaling protocols
- Cost-effective 4 Mbit/s dual-port WAN analysis
- Generate traffic on the WAN or on a specific LAN segment to simulate live traffic conditions
- Gather statistics on Ethernet, Token Ring, and FDDI LANs
- Remote LAN and ATM analysis via SNMP and RMON
- BERT capabilities: G.821 results, switched 56K emulation and monitoring, loop codes, DDS stress patterns, DCE or DTE emulation, full-duplex drop & insert, and more
- The FIREBERD 500 is a Windows®-based PC — programmable, customizable, and modular



*The FIREBERD 500 offers simultaneous LAN/WAN, frame relay, and expert LAN analysis in one instrument.*

## Monitoring and Emulation from Async to SONET/SDH Speeds

The FIREBERD 500 is an all-in-one, integrated internetwork analyzer that performs monitoring and emulation for a wide range of technologies and interfaces — from async to SONET/SDH speeds. The instrument easily handles full-bandwidth T1 and FT1 testing, 2M and Nx64 testing, high-speed WAN analysis, and simultaneous LAN/WAN, encapsulated LAN, and BERT analysis.

- **Simultaneous LAN/WAN Analysis**

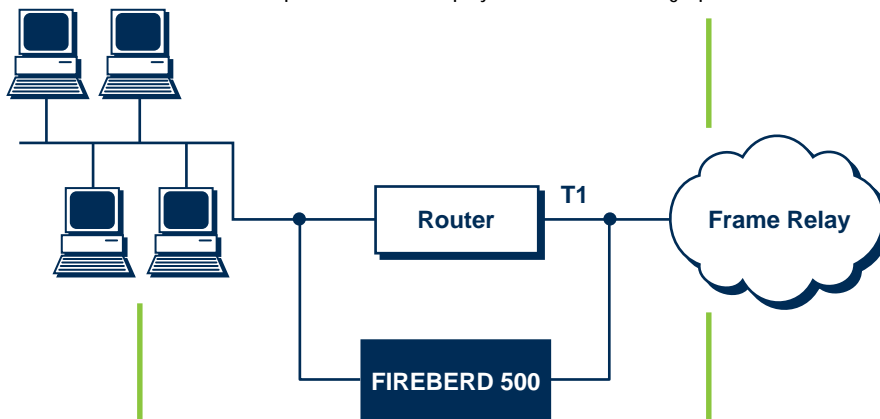
The dual-port capabilities of the FIREBERD 500 allow you to quickly obtain an overall view of internetwork conditions. Sectionalize faults by “wrapping” a router or bridge, and verify connectivity between LAN and WAN environments, concurrently with access to LAN, data, and telecom interfaces.

- **Encapsulated LAN Analysis**

Decode LAN traffic on the WAN portion of your network to reduce fingerprinting at demarcation points between service providers and end users, including TCP/IP, Novell NetWare, ISO, Banyan VINES, IBM, DECnet, AppleTalk, and more.

- **WAN and LAN Statistics**

The FIREBERD 500 goes beyond decodes to bring you a statistical overview of WAN link conditions, LAN traffic, and error profiles — providing insight into the real causes of LAN-to-LAN and LAN-to-WAN interconnection problems. Statistics such as packets and frames transmitted and errored frames and packets can be displayed in table and bar graph formats.



*Simultaneous LAN/WAN analysis allows you to quickly identify LAN-to-WAN interconnection problems.*

## Carry One Instrument to Test Your Entire Internetwork

Multi-functional and user-friendly, the FIREBERD 500 is designed for field service, with expert LAN analysis options and a range of fast packet capabilities. Protocol decodes are presented in plain English. Results can be viewed as histograms or tables, and logged to the high capacity hard drive or a floppy disk. Context-sensitive on-line help and preset sample test configurations guide you through all areas of the instrument.

- **Troubleshooting the ATM Network**

The FIREBERD ATM Analyzer's real-time statistics combine with physical, SONET, and ATM errors and alarms and sophisticated filters to quickly isolate the source of trouble and enable you to get your revenue-earning networks back up to full speed. Ideally suited for escalated troubleshooting applications, the ATM Analyzer operates as a stand-alone test set or as an option to the FIREBERD 500, adding to the 500's built-in T1 ATM analysis capabilities.

- **Expert Frame Relay Analysis**

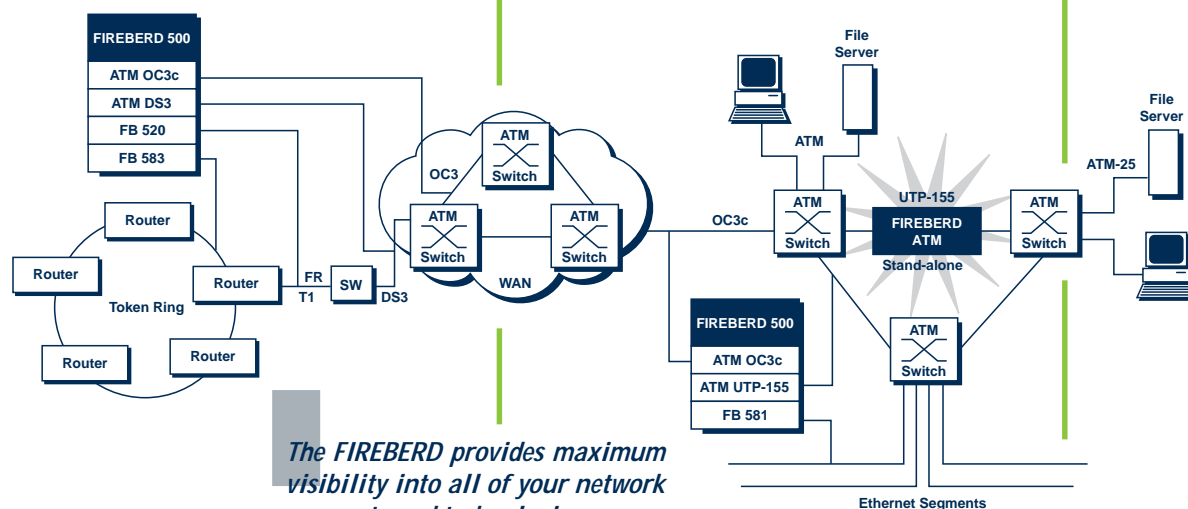
Save time and money with Frame Relay Expert software for the FIREBERD 500. Frame Relay Expert analyzes data from your network and then suggests the probable cause of a problem and recommends the most efficient test to troubleshoot it.

- **Expert Analysis with the Sniffer Network Analyzer Option**

The Sniffer Network Analyzer provides seven-layer analysis of Ethernet and Token Ring LANs, with support for more than 250 protocol decodes. If there is a problem on the network, the Sniffer Network Analyzer will tell you what it is and why it happened and then provide experience-based suggestions for correcting it — automatically and in real time.

- **Real-Time FDDI Monitoring**

Keep a watchful eye on your FDDI network with the FDDI Analyzer. This module instantly provides the status of your FDDI ring, as well as every station, and logs a complete history of station and ring activity. You don't miss a thing, because the FDDI Analyzer monitors the entire 100 Mbit/s FDDI bandwidth in real time. Options are available for multimode and single mode FDDI LANs.



## The Right Tool for Network Provisioning and Management

A powerful set of features and options makes the FIREBERD 500 a complete tool for network turn-up and management, including full-duplex monitoring of voice channels with the ISDN BRI module. Extensive WAN, LAN, and BERT statistics give you the right data for managing your internetwork.

- ISDN Provisioning

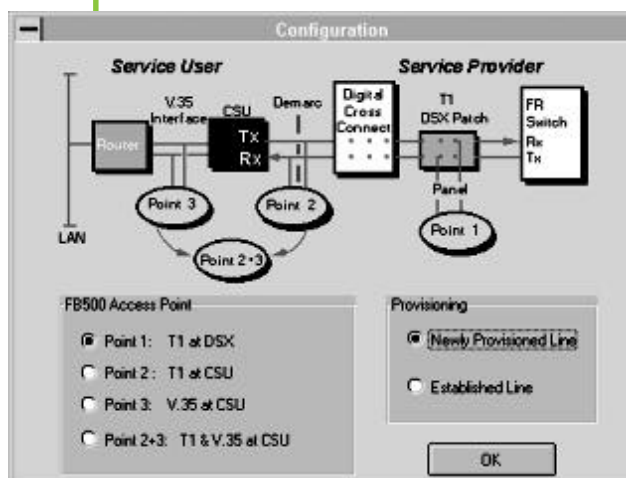
The ISDN BRI module enables you to verify line provisioning and local loop qualification. Emulate customer premises equipment on the S/T or U interface to verify switch provisioning and service turn-up. Place and receive full-duplex voice or data calls, or place a self call from one B channel to the other. BERT a B channel or generate traffic after call setup to verify quality of service. Added to the FIREBERD's standard ISDN PRI decode capability, the BRI module makes the FIREBERD 500 your total solution for ISDN provisioning.

- Frame Relay Installation

With the DDS Local Loop interface, you can verify frame relay installation without the use of a separate DSU/CSU — the FIREBERD 500 will emulate a DSU/CSU and generate test traffic while maintaining the frame relay signaling. Verify the physical layer with BERT, emulate the local management interface (LMI) to ensure that the heartbeat/polling process is set up correctly, and run frame relay decodes and statistics to be sure data is moving properly through your network.

- Dual-Port Frame Relay Analysis

Monitor the T1 line and the V.35 data interface on both sides of a CSU to verify physical layer status. The combination of Frame Relay Expert software and the FIREBERD 500's dual-port capabilities ensures efficient, reliable trouble isolation on every part of the frame relay network.



*Frame Relay Expert allows you to correlate physical, CPE, and frame relay elements.*

## The FIREBERD 500 Evolves with Your Network

The FIREBERD 500 offers flexibility and function in one powerful, modular Windows-based package. Easy field upgrades keep you up to date with the latest signaling options and network protocols. TTC can even customize the instrument to conform to your network configuration and meet your precise testing needs.

- Remote LAN Analysis

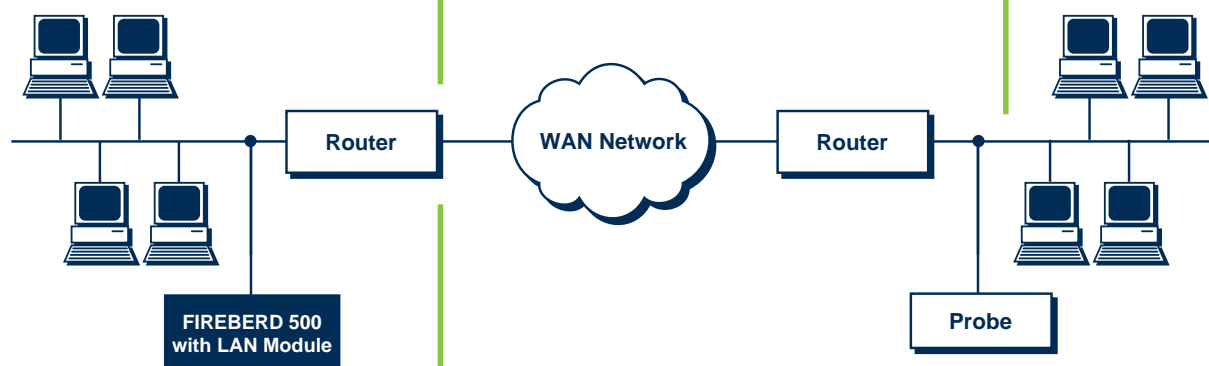
Use Ethernet and Token Ring LAN Analyzer modules to verify connectivity to both ends of your WAN. These modules ping across the network to the far-end router (or host), monitoring both the outgoing ping packet and the returning response to check the connections through the WAN. In addition, Distributed Monitoring Probes enable the FIREBERD 500 to generate traffic, decode protocols and measure protocol utilization, and monitor RMON-compatible statistics.

- Testing the Wireless Infrastructure

CDPD and QUALCOMM® BCN options add real-time wireless protocol analysis and decodes to the FIREBERD 500's extensive ISDN, frame relay, and internetwork analysis capabilities. Use the FIREBERD 500 to verify circuit integrity and isolate physical layer problems during commissioning of the wireless network infrastructure.

- Network Service and Signaling Analysis

Options including SS7 analysis and ISDN decodes add to the FIREBERD 500's power as a network service and signaling testing solution. Use the FIREBERD 500 with SS7, TR-303, BRI, PRI, or V5.x options to monitor statistics or take a quick snapshot of the health of your network whenever you need it.



*LAN-to-LAN interconnection testing verifies LAN and WAN elements for single-person fault isolation.*



## Fast Packet and ISDN Analysis

### FIREBERD ATM Analyzer

Now you can capture, filter, and decode ATM cells in real time at speeds up to 155 Mbit/s. Capture up to one million matched cells, timestamped with 33 nanosecond resolution, and regenerate captured cell streams with exact inter-cell delays, or change parameters to exploit a problem for quick resolution. Automatic ATM-layer cell decodes enable analysis of UNI 3.0/3.1 signaling, LAN emulation, and higher layer protocol decodes, such as IP and IPX. The ATM Analyzer operates as an option to the FIREBERD 500 or as a stand-alone unit and supports OC-3c/STM-1 over single and multimode fiber and UTP-155, as well as ATM-25, DS3, DS1, E3, and E1.

### DDS Local Loop

Service technicians can use this interface to perform bidirectional monitoring of link statistics, DLCI statistics, frame relay signaling messages, and encapsulated LAN traffic decodes to determine the most likely cause of errors, service degradation, or lost connectivity. Verify frame relay installation by emulating a DTE, generate test traffic while maintaining the frame relay signaling, and conduct ping tests to remote router ports or destination nodes as a connectivity check.



*FIREBERD 500 ATM Analyzer provides ISO 0.191 QoS data.*

### ISDN BRI and PRI

For applications such as DDS CSU/DSU integrated within a router, the ISDN BRI module provides the test solution. You can analyze full-duplex traffic on the S/T or U interface and perform simultaneous B and D channel analysis using the FIREBERD 500's dual-port WAN capability. You can also emulate voice and data calls on the D channel, decode encapsulated LAN data on the B channel, and examine the frame relay or leased line traffic ISDN backs up. All capabilities are seamlessly integrated into the standard FIREBERD 500 hardware module. Add ISDN PRI emulation capabilities for a complete ISDN provisioning and maintenance solution.

### X.25 Emulation

The X.25 Emulation utility provides the FIREBERD 500 with X.25 call placement emulation capability essential for testing X.25 service, used throughout the world for applications such as host computer access and internetworking. The utility performs X.25 call placement, call answer, and data transfer and enables display of current X.25 Layer 2 and Layer 3 states. You can also obtain X.25 call statistics, including calling and called address and data packets sent/received, and emulate an X.25 network or subscriber.

### HSSI Analysis

The HSSI option provides non-intrusive test access to fast frame relay, plain HDLC, SMDS DXI, PPP, and Cisco services running at speeds up to 52 Mbit/s on a HSSI interface. You can automatically discover over 1000 DLCIs, monitor per DLCI statistics, and calculate and display full line rate statistics. You can also capture and filter traffic at full line rates, emulate a high speed router or switch, and generate traffic on one or more DLCIs to prove the CIR and frame relay network throughput.

## Expert Analysis Everywhere in Your Network

### Network General's Sniffer Network Analyzer Option

The combination of the Sniffer Network Analyzer and the FIREBERD 500 is unbeatable for fast, reliable, *expert* trouble isolation anywhere on your network — from bit errors on the physical layer to individual frames of encapsulated data on the LAN. Use the FIREBERD 500 to ease deployment of a new LAN or LAN segment in the enterprise, maintain quality of service, smoothly integrate multi-protocol networks, monitor your network, and quickly isolate internetworking faults.

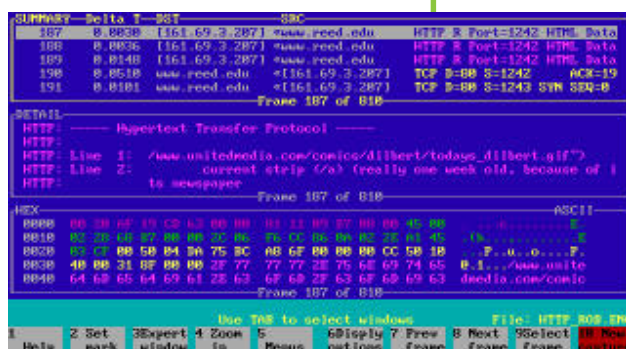
The Sniffer Network Analyzer provides seven-layer analysis of Ethernet and Token Ring LANs. If there is a problem on your network, such as bottlenecks, protocol violations, or duplicate addresses, the Sniffer Network Analyzer will tell you what it is and why it happened and offer experience-based suggestions for correcting the problem — automatically and in real time. The Sniffer Network Analyzer interprets more than 250 protocols, including the proprietary protocols used by bridges and routers. Sophisticated filters allow you to focus on trouble spots. With such precise information at your fingertips, you can correct problems quickly and maximize efficiency. By learning network configuration automatically and continuously, you can reduce the time you spend on routine maintenance, forecast future needs, and spot problems before they begin to degrade quality of service.

### Frame Relay Expert

Troubleshoot more with less with Frame Relay Expert software for the FIREBERD 500. Frame Relay Expert analyzes physical layer measurements, protocol decodes, WAN analysis data, and link management information, taking into account all aspects of frame relay provisioning. The software then provides weighted probabilities as to the cause of a network problem and performs a cost/benefit analysis to recommend the best frame relay test for troubleshooting the problem. The interactive interface allows you to follow the recommended test sequence or select your own. Both T1/V.35 and 2M/X.21 options are available.

### FDDI Analyzer

The FDDI Analyzer instantly provides the status of your FDDI ring, as well as every station, and logs a complete history of station and ring activity. This module captures the data for you, analyzes it, and gives you the results you need. Two options are available for single mode or multimode LANs. You can perform expert SMT analysis and store, retrieve, and maintain SMT MIB data for every node on your FDDI ring. You can analyze the entire claim and beaconing process, receive statistics and threshold alarms, and export information into any spreadsheet or word processing program. You don't miss a thing, because the FDDI Analyzer monitors the full 100 Mbit/s FDDI bandwidth and every SMT transaction in real-time.



*Network General's Sniffer Network Analyzer Option displays LAN decode data in summary, English, and Hex/ASCII formats.*



## Interfaces and Options for LAN and WAN Analysis

### Data Interface, T1/Data Interface, and 2M/Data Interface

The *Data Interface* provides physical layer access and BERT capability for full-duplex V.35 (306), RS-449, RS-422 and 423 (terminated and unterminated), and RS-232 circuits for WAN monitoring and analysis and provides traffic generation up to full T1 line speeds. The *T1/Data Interface* provides additional physical layer access and BERT capability for T1, FT1, and data communications circuits.

The *2M/Data Interface* provides physical layer access and Nx64 BERT capability for 2M and data communications circuits cable-ready for X.21 or V.35. You can perform protocol analysis on monitored 2M and data circuit signals and generate traffic for most common WAN protocols, including frame relay, X.25, SMDS, and ISDN.

The FIREBERD 500 offers combined 2M and T1 qualification testing of international communications links. Simultaneously monitor G.703 2M and V.35, RS-449, X.21, RS-530, and RS-232 data circuits. Traffic generation up to 2.048 Mbit/s line speed is possible when used with the Single Port or Dual Port WAN Analyzer modules. Timing slips measurement detects network synchronization errors.

### Single Port WAN Analyzer and Dual Port WAN Analyzer

The Single Port and Dual Port WAN Analyzer modules provide capture, decodes, and statistics for all major WAN protocols up to 4 Mbit/s on a full-duplex port. Software options enable the FIREBERD 500 to support additional protocol analysis capabilities, including traffic generation and emulation (ISDN BRI and PRI, SMDS-DXI, T1 ATM, and frame relay) and decodes (CDPD, TR-303, ML-PPP, SS7, and QUALCOMM BCN).

### Ethernet and Token Ring LAN Analysis

The FIREBERD 500 can be equipped with economical Ethernet and Token Ring LAN Analyzer modules, which provide protocol decodes and statistics monitoring of IEEE 802.3/ISO 8802-3-compliant 10 Mbit/s Ethernet LANs or 4/16 Mbit/s Token Ring LANs. The dual-port capabilities of the FIREBERD 500 allow you to perform simultaneous LAN/WAN analysis. Test from remote locations with the FIREBERD 500 with Ethernet and Token Ring Distributed Monitoring Probes, which provide protocol decodes and RMON-compatible statistics monitoring. All of these options include traffic generation and protocol utilization measurement capabilities.

### Async Analysis and Async/Bisync Analysis

Async Analysis and Async/Bisync Analysis options turn your FIREBERD 500 into a full-featured async/bisync serial data protocol analyzer. With these options you can monitor traffic flowing between any two serial devices — both data bytes and control signals — and emulate the DTE or DCE side of the communications link. The Async/Bisync option supports a wide range of protocol decodes, including PPP, SLIP, TCP/IP, HDLC, SDLC, X.25, SNA, frame relay, and more, at synchronous rates up to 64 kbit/s and asynchronous rates up to 38.4 kbit/s. The Async Analysis option enables you to analyze PPP, SLIP, and TCP/IP protocols and supports asynchronous rates up to 115.2 kbit/s.

## Advanced Network Signaling Capabilities

### ISDN TR-303 Decodes

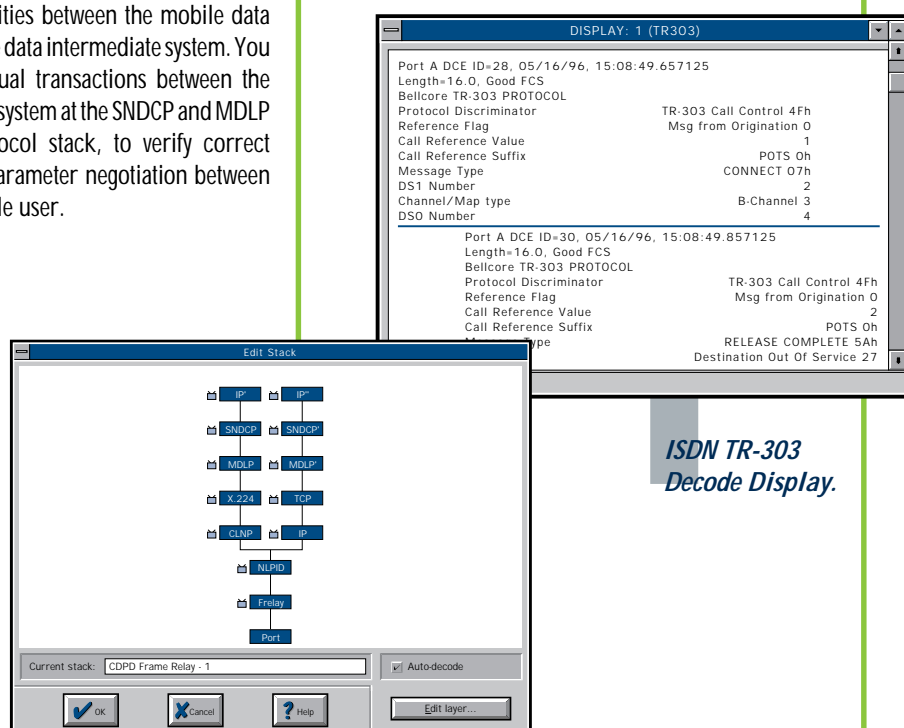
The ISDN TR-303 decode option adds real-time TR-303 protocol analysis and decodes to the FIREBERD 500. This option includes call tracing, call duration measurement, and call setup timing analysis. You can perform real-time analysis of the TR-303 time-slot management channel (TMC) and common signaling channel (CSC) and check management communications between the switch and remote terminal. Use the FIREBERD 500's dual-port decode capability to monitor the primary and protection T1s simultaneously.

### CDPD Decodes

The CDPD protocol decode option allows you to troubleshoot the wireless network infrastructure by tracking protocol incompatibilities between the mobile data base station and the mobile data intermediate system. You can also filter on individual transactions between the mobile user and the CDPD system at the SMDCP and MDLP layers of the CDPD protocol stack, to verify correct registration and service parameter negotiation between the network and the mobile user.

### SS7 Analysis

Identify potential problems in the SS7 network from the central office with real-time expert analysis — without sifting through large trace files. An easy-to-use testing tool, the SS7 Analysis option offers fast statistical analysis of switch translations between access loop signaling protocols (ISDN BRI and PRI, TR-303, and V5.x) and network signaling protocols (SS7). The SS7 Analysis option complements the FIREBERD 500's ISDN, TR-303, and V5.x testing applications and adds to this versatile LAN/WAN analyzer's power as a network service and signaling testing instrument.



*ISDN TR-303  
Decode Display.*

*CDPD Decode Stack.*

## Mainframes

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB500A	FIREBERD 500 Internetwork Analyzer with color display
FB500RA	FIREBERD 500 Internetwork Analyzer without display/keyboard

## Mainframe Options

<i><b>Model No.</b></i>	<i><b>Description</b></i>
10020	16 MB RAM Upgrade
10030	Second Serial (COM) Port
10043	Hard Disk Drive Upgrade
10044	486 100 MHz Processor Upgrade
10045	10" Color Display Upgrade
10046	PCMCIA Interface Module
10047	HSSI Monitor Tap
FB500-NRSW	Current System Software

## Interface Modules

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB520	T1/Data Interface
FB523	Data Interface
FB525	2M/Data Interface (V.35 cable ready)
FB526	2M/Data Interface (X.21 cable ready)
FB527	DDS Local Loop Interface
FB528	ISDN BRI Interface
FB529	HSSI Interface

## WAN Analyzer Modules

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB530	Single Port WAN Analyzer
FB531	Dual Port WAN Analyzer

## LAN Analyzer Modules

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB581	Ethernet Analyzer (Ethernet/IEEE-802.3 10 Mbit/s)
FB583	Token Ring Analyzer (IEEE-802.5 4/16 Mbit/s)
FB590	FDDI Analyzer (multimode)
FB591	FDDI Analyzer (single mode)
FB823	Ethernet Sniffer Network Analyzer
FB825	Token Ring Sniffer Network Analyzer

## LAN Distributed Probes

<i><b>Model No.</b></i>	<i><b>Description</b></i>
NL7710	Ethernet Distributed Monitoring Probe
NL7730	Token Ring Distributed Monitoring Probe

## Applications Software

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB500-1	Bit Error Rate Testing (BERT)
FB50400	Remote Control Software for FIREBERD 500 (host)
FB50406	Remote Control Software for PC (viewer)
FB50420	T1/V.35 Frame Relay Expert Software
FB50421	2M/X.21 Frame Relay Expert Software
FB50430	ISDN TR-303 EOC ASN.1 Decoder
FB50431	ISDN TR-303 TMC Statistics
FB50432	V5.1/V5.2 Analysis
FB50440	SS7 Analysis
FB50441	X.25 Emulation Utility
FB50500	Trace Tool™
FB50600	Async Analysis
FB50610	Async/Bisync Analysis
FB50800	Frame Relay Traffic Generation
FB50801	Frame Relay Traffic Generation and Emulation
FB50810	SMDS PLCP/L2/L3-PDU Decode
FB50811	SMDS PLCP/L2/L3-PDU Decode and L3-PDU Traffic Generation
FB50822	ISDN PRI Traffic Generation and Emulation
FB50825	ISDN TR-303 Decode
FB50831	CDPD Decode
FB50840	TAD/FAD Access
FB50851	T1 ATM Traffic Generation
FB50860	ISDN BRI Traffic Generation and Emulation

## FIREBERD ATM Analyzer

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB-ATM-155-M	FIREBERD ATM Analyzer with OC-3c/STM-1 MMF Module
FB-ATM-155-S	FIREBERD ATM Analyzer with OC-3c/STM-1 SMF Module
FB-ATM-155-U	FIREBERD ATM Analyzer with STS-3c/STM-1 UTP Module
FB-ATM-25	FIREBERD ATM Analyzer with ATM-25 Module
FB-ATM-DS3	FIREBERD ATM Analyzer with DS3 Module
FB-ATM-DS1	FIREBERD ATM Analyzer with DS1 Module
FB-ATM-E3	FIREBERD ATM Analyzer with E3 Module
FB-ATM-E1	FIREBERD ATM Analyzer with E1 Module

## ATM Analyzer Options

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB-ATM-CAP	High Capacity Capture Buffer Substitution (initial order)
FB-ATM-CAP-UPG1	High Capacity Capture Buffer Upgrade
FB500-ATM-KIT	FIREBERD 500 ATM Analyzer Package (initial order)
FB500-ATM-UPG2	FIREBERD 500 ATM Analyzer Package Upgrade
FB500-NIM1	Ethernet Pocket Adapter

## Software Enhancement Agreements

<i><b>Model No.</b></i>	<i><b>Description</b></i>
FB500-SWS-1	FIREBERD 500 (1 year)
FB500-SWS-3	FIREBERD 500 (3 years)
FB500-SWS-SNIFFER	FIREBERD 500 and Sniffer Network Analyzer (1 year)
FB-ATM-SWS-1	FIREBERD ATM Analyzer (1 year)

## TTC Worldwide Customer Services and Support

When you buy a TTC product, you are getting not just a world-class test instrument, but also unsurpassed TTC services:

- Industry-leading three-year warranty, supported by repair and calibration capabilities worldwide
- Customer Care: free product information and assistance with returns
- Technical Assistance: free, expert consultation on any technical problem
- Advanced Applications Engineering: network consulting, on-site applications assistance, software customization, test procedure development, and network management integration services
- Instrument Service: extended warranty options, service and calibration agreements, expedited service, and flat-rate pricing
- Software Enhancement Agreements: automatic software enhancements to operating systems and application platforms
- Technical Training: hands-on training at our facilities in the USA, Canada, UK, and Germany or any other location you designate
- Computer-Based Training: train anytime, anywhere, at your own pace and on your own PC

## How to Contact Customer Services

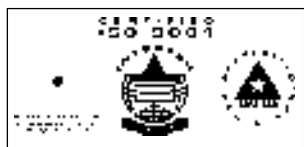
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