

ParaScope 2000 ISDN

The complete solution for telecom and datacom professionals who needs to turn up, troubleshoot, and maintain ISDN networks.

The ParaScope 2000 ISDN is a portable telecom and datacom analyzer, which can capture and transmit up to 2.048 Mbps. It has been especially designed for the technical engineer who has the responsibility of analyzing network problems on T1/E1, and ISDN PRI/BRI circuits.

Use it to resolve physical layer problems through it's ability to monitor, emulate and log vital signal parameters, alarms and error conditions. Pass/fail indicators, along with Expert assistance software, guarantee you will be the telecom expert.



Product Features Include:

Standard Interfaces

T1/ISDN PRI & E1/ISDN PRI

Optional Interfaces

ISDN BRI ST, ISDN BRI U, DDS, RS-232, X-21, V.35/36, RS-449, RS-530, RS-422/423

Telecom Analysis

- ISDN PRI/BRI monitoring & protocol analysis
- ISDN PRI/BRI call placement/answer with Call Expert and call detail recall
- Signal analysis
- Pass/Fail Indicators
- Measure frequency, amplitude, and power
- Detect alarm conditions
- Detect & count errors and violations
- Bit error testing
- DTMF call placement/answer with Call Expert
- 24x7 Alarm Logging
- Simulation

Datacom Analysis

- 7 layer encapsulated decodes
- Frame simulator
- Comprehensive statistics
- Async, Sync, Bisync and BOP

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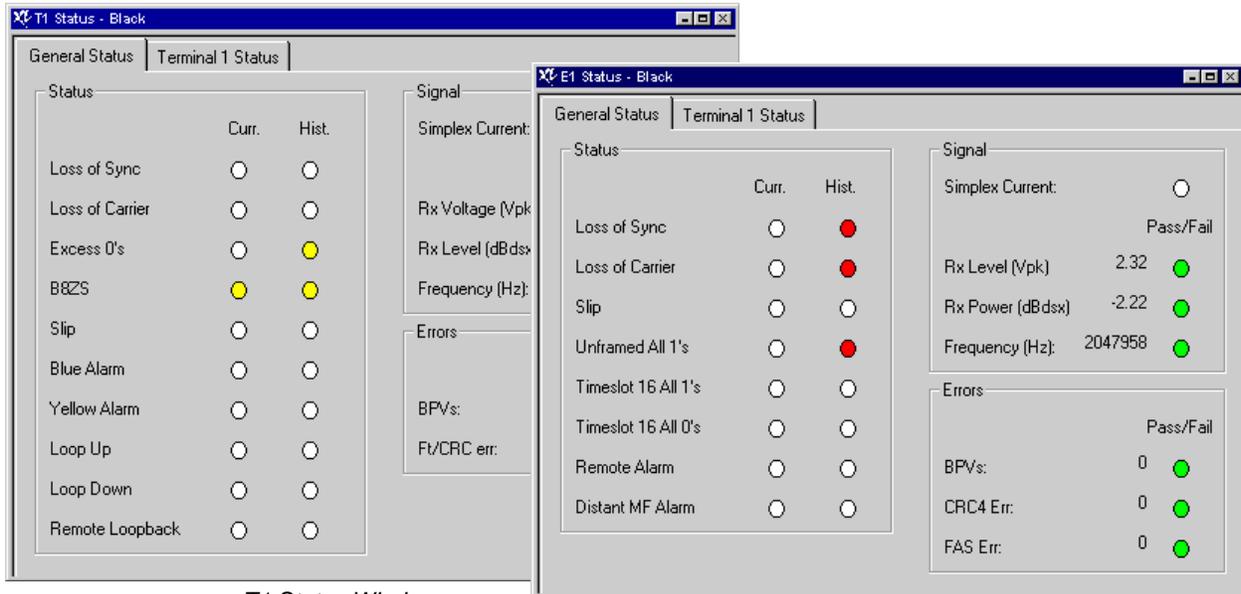


ISDN PRI Analysis and T1/E1 Monitoring

Quickly turn-up, troubleshoot, and maintain ISDN PRI networks.

End Finger Pointing

Start by non-intrusively checking the physical line status of the link in both directions. Use this information to easily pinpoint layer 1 problems that will adversely affect ISDN PRI operation. Problems like impedance mismatch, bad repeaters, etc., are readily detected and resolved.



T1 Status Window

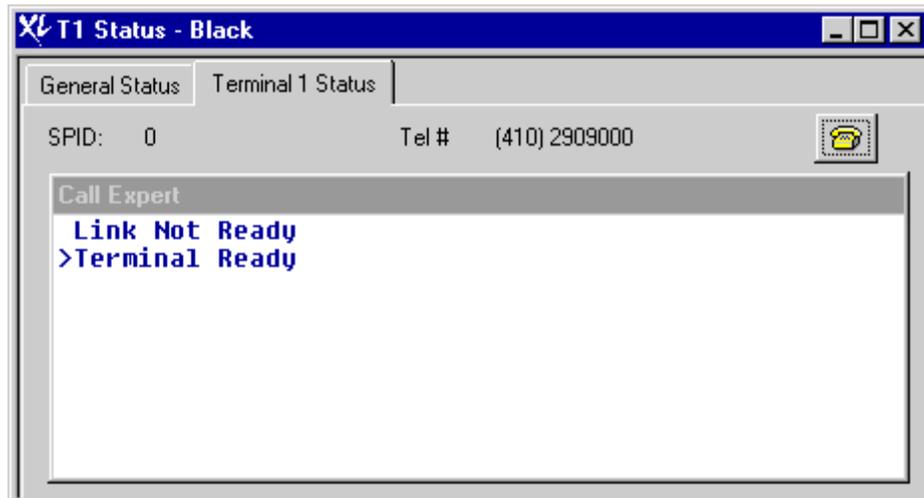
E1 Status Window

Place and Answer Voice/Data Calls

Place or answer calls on D channel and automatically cut-through to the correct B channels for voice or data. Simply plug in a handset and your test set becomes an ISDN PRI phone set with unmatched simultaneous analysis capabilities.

ISDN PRI Call Expert

Call Expert analyzes and decodes cause codes and diagnostics and, where possible, recommends an action. Also, Call Expert summarizes the progress and status of calls. In essence, the Call Expert saves you having to master 500 pages of protocol specifications.

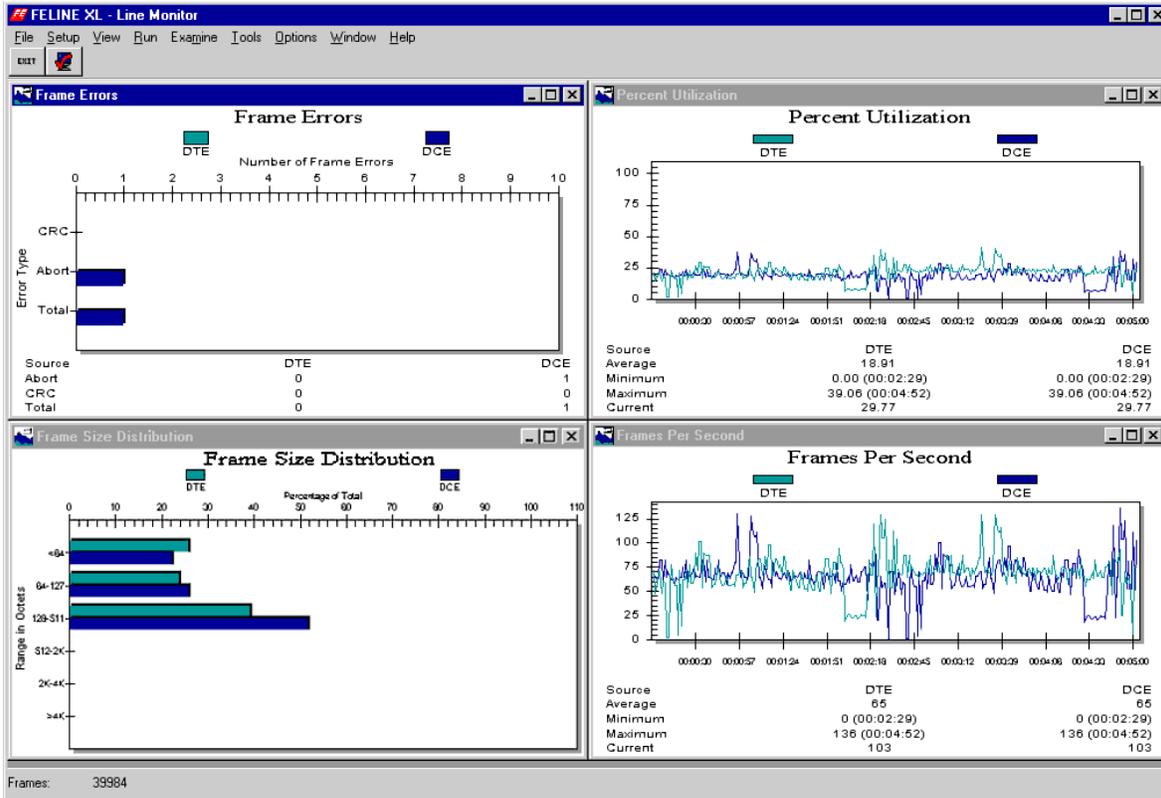


ISDN Call Expert

ISDN PRI Analysis and T1/E1 Monitoring

Comprehensive Statistics

Armed with a bevy of graphical statistics you can completely baseline a network and detect degrading problems well in advance. Graphic displays are available for % utilization, packets/second, throughput, errors, number of frames, frame size, and more. Drag and zoom into more detail.



Tiled Statistics Windows

Protocol Analysis

Fully decode ISDN PRI frames. Several views are available to ensure that you pinpoint the problem quickly and accurately.

Summary 1 View: Provides a summary decode of each LAPD frame including Layer 3 message types and call reference values. Use this view to easily see the setup and release of calls.

The screenshot displays the FELINE WinXL - Examine Buffer window showing the Summary 1 View of ISDN PRI frames. The table below is a representation of the data shown in the window:

Number	Err	Lqth	LAPD:	SAPI	TEI	C/R	FrnType	N(S)	N(R)	P/F	NISDN:	CRF	CRU	Message Type
1		5	LAPD:	0	0	0	SABME			1				
2		5	LAPD:	0	0	0	UA			1				
3		31	LAPD:	0	0	1	INFO	0	0	0	NISDN:	Oriq	1	SETUP
4		6	LAPD:	0	0	0	RR			1				
5		16	LAPD:	0	0	0	INFO	0	1	0	NISDN:	Dest	1	ALERTing
6		6	LAPD:	0	0	0	RR			1				
7		11	LAPD:	0	0	0	INFO	1	1	0	NISDN:	Dest	1	CONNect
8		6	LAPD:	0	0	0	RR			2				
9		11	LAPD:	0	0	1	INFO	1	2	0	NISDN:	Oriq	1	CONNect ACKnowledge
10		6	LAPD:	0	0	0	RR			2				
11		15	LAPD:	0	0	1	INFO	2	2	0	NISDN:	Oriq	1	DISConnect
12		6	LAPD:	0	0	0	RR			3				
13		11	LAPD:	0	0	0	INFO	2	3	0	NISDN:	Dest	1	RELEase COMplete
14		6	LAPD:	0	0	0	RR			3				
15		31	LAPD:	0	0	1	INFO	3	3	0	NISDN:	Oriq	2	SETUP
16		6	LAPD:	0	0	0	RR			4				
17		16	LAPD:	0	0	0	INFO	3	4	0	NISDN:	Dest	2	ALERTing
18		6	LAPD:	0	0	0	RR			4				
19		11	LAPD:	0	0	0	INFO	4	4	0	NISDN:	Dest	2	CONNect
20		6	LAPD:	0	0	0	RR			5				
21		11	LAPD:	0	0	1	INFO	4	5	0	NISDN:	Oriq	2	CONNect ACKnowledge
22		6	LAPD:	0	0	0	RR			5				
23		15	LAPD:	0	0	0	INFO	5	5	0	NISDN:	Dest	2	DISConnect
24		6	LAPD:	0	0	0	RR			6				
25		11	LAPD:	0	0	1	INFO	5	6	0	NISDN:	Oriq	2	RELEase
26		6	LAPD:	0	0	0	RR			6				
27		11	LAPD:	0	0	0	INFO	6	6	0	NISDN:	Dest	2	RELEase COMplete

Pg: 1/ 1

Summary 1 View

ISDN PRI Analysis and T1/E1 Monitoring

Protocol Analysis (continued)

Summary 2 View: Provides a summary of each frame including information element (IE) names.

Detail View: Provides a complete decode of each frame including information elements (IEs) and DNIS digits

Armed with a bevy of graphical statistics you can completely baseline a network and detect degrading problems well in advance. Graphic displays are available for % utilization, packets/second, throughput, errors, number of frames, frame size, and more. Drag and zoom into more detail.

Summary 2 View

FELINE WinXL - Examine Buffer (national pri incoming call.buf)

File Setup View Run Examine Tools Options Window Help

EXIT CHM NYZ TEXT

1-National ISDN-1 PRI Summary II

Frame 29 (31 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 1
Frame Type = INFO
N(S) = 6, N(R) = 7, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 2, Flag = Origination, Value = 3
Message Type = SETUP
Info Element = Bearer Capability
Info Element = Channel Identification
Info Element = Called Party Number

Frame 30 (6 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = RR
N(R) = 7, P/F = 0

Frame 31 (16 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = INFO
N(S) = 7, N(R) = 7, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 2, Flag = Destination, Value = 3
Message Type = ALERTing
Info Element = Channel Identification

Frame 32 (6 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = RR
N(R) = 8, P/F = 0

Frame 33 (11 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = INFO
N(S) = 8, N(R) = 7, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 2, Flag = Destination, Value = 3
Message Type = CONNect

Detail View

FELINE WinXL - Examine Buffer (national pri incoming call.buf)

File Setup View Run Examine Tools Options Window Help

EXIT CHM NYZ TEXT

1-National ISDN-1 PRI Detail

Frame 29 (31 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 1
Frame Type = INFO
N(S) = 6, N(R) = 7, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 2, Flag = Origination, Value = 3
Message Type = SETUP
Info Element = Bearer Capability
IE Length = 3
Transfer Capability = Speech
Transfer Mode/Rate = 64 kbps, Circuit mode
Layer 1 Protocol = mu-law (Rec G.711)
Info Element = Channel Identification
IE Length = 3
Interface Id Present = Interface implicitly defined
Interface Type = Primary Rate Interface
Preferred/Exclusive = Indicated channel preferred
D-Channel Indicator = No
Channel Select = As indicated
Number/Slot Map = Channel Number
Channel Number = 1
Info Element = Called Party Number
IE Length = 8
Number Type/Plan = Unknown number in unknown plan
Called Number = 5551000

Frame 30 (6 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = RR
N(R) = 7, P/F = 0

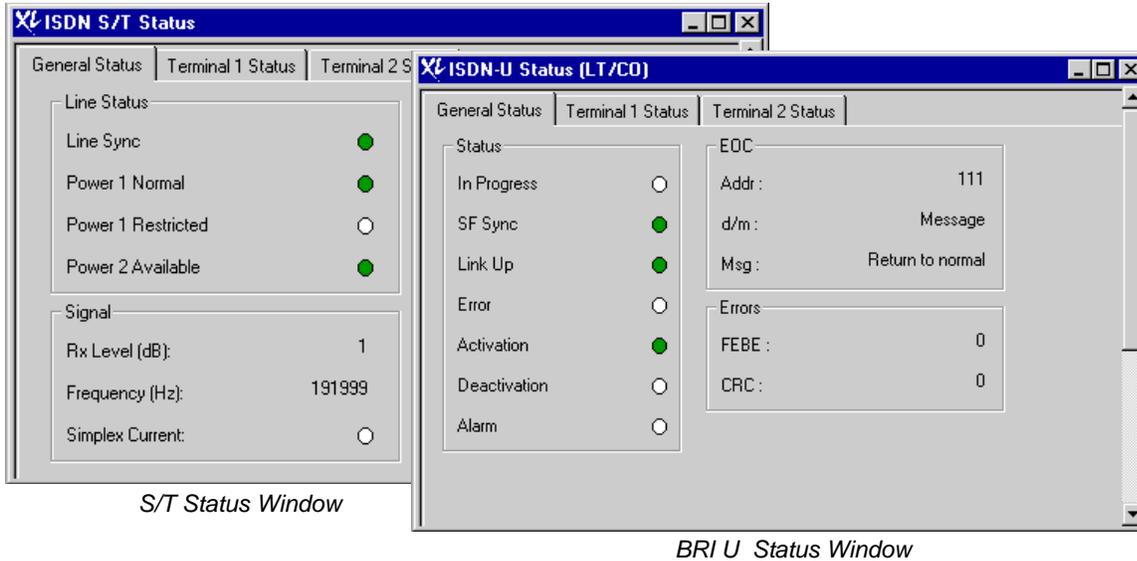
Frame 31 (16 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 0, C/R = 0
Frame Type = INFO
N(S) = 7, N(R) = 7, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 2, Flag = Destination, Value = 3
Message Type = ALERTing
Info Element = Channel Identification
IE Length = 3
Interface Id Present = Interface implicitly defined
Interface Type = Primary Rate Interface
Preferred/Exclusive = Exclusive, only indicated channel acceptable
D-Channel Indicator = No
Channel Select = As indicated
Number/Slot Map = Channel Number
Channel Number = 1

ISDN BRI Analysis and U/ST Interface Monitoring

Quickly turn-up, troubleshoot, and maintain ISDN BRI U and S/T networks.

End Finger Pointing

Start by non-intrusively checking the physical line status of the link in both directions. Use this information to easily pinpoint layer 1 problems that will adversely affect ISDN operation. Activation and power problems are readily detected and resolved.

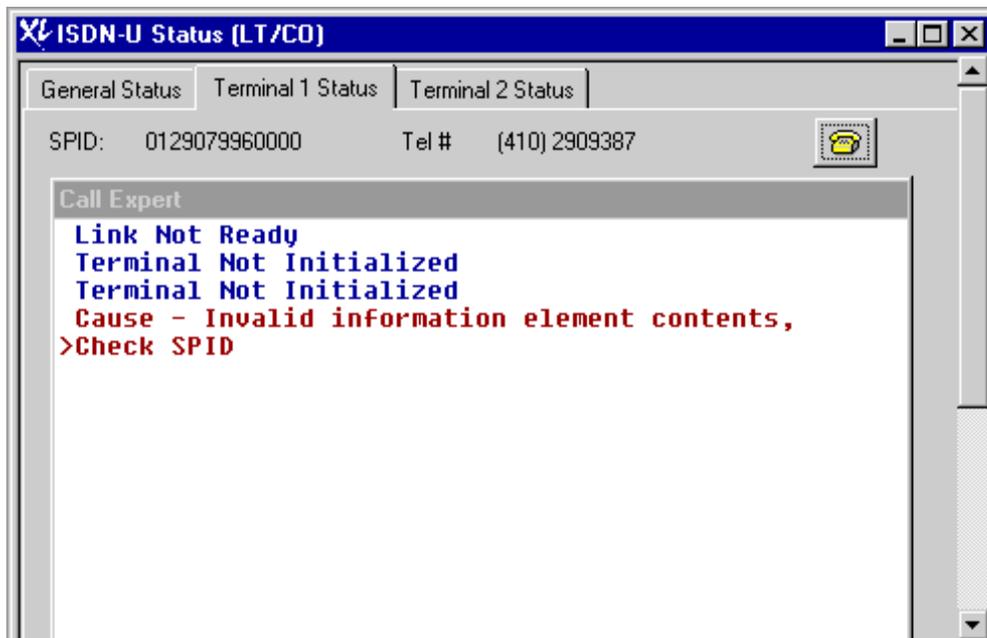


Place and Answer Voice/Data Calls

Place or answer calls on D channel and automatically cut-through to the correct B channels for voice or data. Simply plug in a handset and your test set becomes an ISDN BRI phone set with unmatched simultaneous analysis capabilities.

ISDN BRI Call Expert

Call Expert analyzes and decodes cause codes and diagnostics and, where possible, recommends an action. Also, Call Expert summarizes the progress and status of calls. In essence, the Call Expert saves you having to master 500 pages of protocol specifications.



ISDN Call Expert

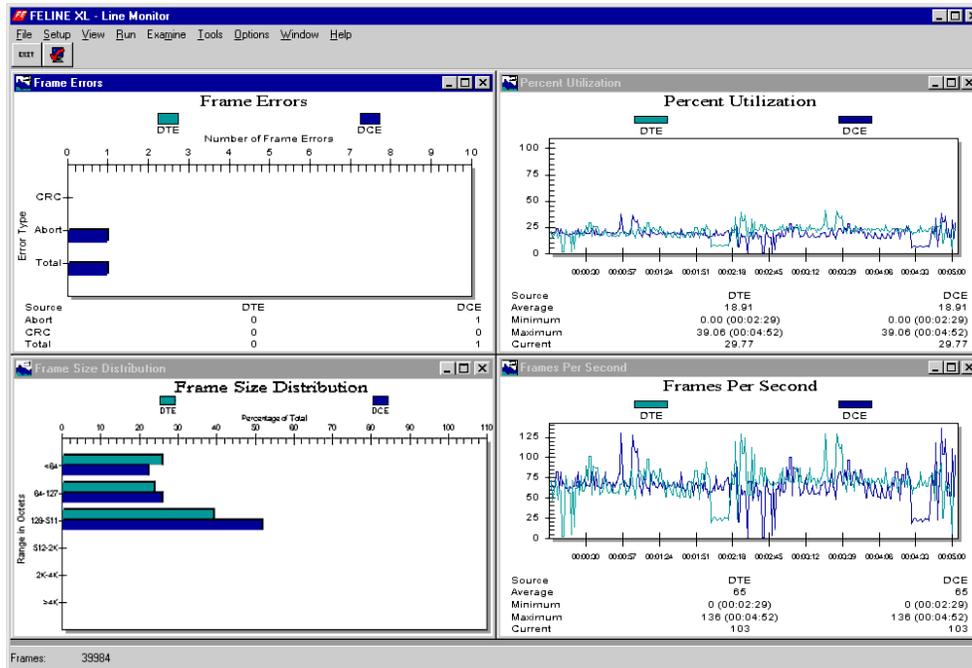
ISDN BRI Analysis and U/ST Interface Monitoring

ISDN Bit Error Testing

The easiest way to check line integrity is to run a BERT test. With this simple test, you will know if the B1, B2, or D channel has a problem.

Comprehensive Statistics

Armed with a bevy of graphical statistics you can completely baseline a network and detect degrading lines well in advance. Graphic displays are available for % utilization, packets/second, throughput, errors, number of frames, frame size, and more. Drag and zoom into more detail.



Tiled Statistics Windows

Protocol Analysis

Fully decode BRI frames. Several views are available to ensure that you pinpoint the problem quickly and accurately.

Summary 1 View: Provides a summary decode of each LAPD frame including Layer 3 message types and call reference values. Use this view to easily see the setup and release of calls.

The screenshot shows the Summary 1 View of LAPD frames. The table below represents the data shown in the window:

Err	Lqth	LAPD:	SAPI	TEI	C/R	FrnType	N(S)	N(R)	P/E	National ISDN-1 BRI:	CRF	CRU	Message Type	User In
	10	LAPD:	63	127	0	UI			0					
	10	LAPD:	63	127	0	UI			0					
	10	LAPD:	63	127	0	UI			0					
	10	LAPD:	63	127	0	UI			0					
	10	LAPD:	63	127	1	UI			0					
	5	LAPD:	0	96	0	SABME			1					
	10	LAPD:	63	127	1	UI			0					
	5	LAPD:	0	105	0	SABME			1					
	5	LAPD:	0	96	0	UA			1					
	23	LAPD:	0	96	0	INFO	0	0	0	National ISDN-1 BRI:			INFORMATION	
	5	LAPD:	0	105	0	UA			1					
	23	LAPD:	0	105	0	INFO	0	0	0	National ISDN-1 BRI:			INFORMATION	
	6	LAPD:	0	96	0	RR			1					
	6	LAPD:	0	105	0	RR			1					
	13	LAPD:	0	96	1	INFO	0	1	0	National ISDN-1 BRI:			INFORMATION	
	6	LAPD:	0	96	0	RR			1					
	13	LAPD:	0	105	1	INFO	0	1	0	National ISDN-1 BRI:			INFORMATION	
	6	LAPD:	0	105	0	RR			1					
	31	LAPD:	0	96	0	INFO	1	1	0	National ISDN-1 BRI:	Oriq	64	SETUP	
	6	LAPD:	0	96	0	RR			2					
	13	LAPD:	0	96	1	INFO	1	2	0	National ISDN-1 BRI:	Dest	64	CALL PROCEEDING	
	6	LAPD:	0	96	0	RR			2					
	30	LAPD:	0	127	1	UI			0	National ISDN-1 BRI:	Oriq	86	SETUP	
	13	LAPD:	0	105	0	INFO	1	1	0	National ISDN-1 BRI:	Dest	86	ALERTING	
	6	LAPD:	0	105	0	RR			2					
	17	LAPD:	0	96	1	INFO	2	2	0	National ISDN-1 BRI:	Dest	64	ALERTING	
	6	LAPD:	0	96	0	RR			3					
	14	LAPD:	0	96	0	INFO	2	3	0	National ISDN-1 BRI:	Oriq	64	DISCONNECT	
	6	LAPD:	0	96	0	RR			3					
	10	LAPD:	0	96	1	INFO	3	3	0	National ISDN-1 BRI:	Dest	64	RELEASE	
	6	LAPD:	0	96	0	RR			4					
	10	LAPD:	0	96	0	INFO	3	4	0	National ISDN-1 BRI:	Oriq	64	RELEASE COMPLETE	
	6	LAPD:	0	96	0	RR			4					
	14	LAPD:	0	105	1	INFO	1	2	0	National ISDN-1 BRI:	Oriq	86	RELEASE	
	6	LAPD:	0	105	0	RR			2					
	10	LAPD:	0	105	0	INFO	2	2	0	National ISDN-1 BRI:	Dest	86	RELEASE COMPLETE	
	6	LAPD:	0	105	0	RR			3					

At the bottom of the window, it indicates "Frames: 37".

Summary 1 View

ISDN BRI Analysis and U/ST Interface Monitoring

Protocol Analysis (continued)

Summary 2 View: Provides a summary of each frame including information element (IE) names.

Detail View:

Provides a complete decode of each frame including information elements (IEs) and DNIS digits.

The screenshot shows two windows from the FELINE WinXL software. The left window, titled '1-National ISDN-1 BRI Summary II', displays a list of frames with their respective parameters. The right window, titled 'FELINE XL - Line Monitor - [1-National ISDN-1 BRI Detail]', provides a detailed breakdown of frame 565, including LAPD and National ISDN-1 BRI parameters.

Summary 2 View (Left Pane):

- Frame 563 (37 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 64, C/R = 1
Frame Type = INFO
N(S) = 28, N(R) = 28, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Destination, Value = 4
Message Type = SETUP ACKnowledge
Info Element = Channel Identification
Info Element = Progress Indicator
Info Element = Signal
Info Element = Shift
Info Element = Display Text
- Frame 564 (6 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 64, C/R = 0
Frame Type = RR
N(R) = 29, P/F = 0
- Frame 565 (13 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 64, C/R = 1
Frame Type = INFO
N(S) = 29, N(R) = 29, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Destination, Value = 4
Message Type = INFORMATION
Info Element = Signal
- Frame 566 (21 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 64, C/R = 1
Frame Type = INFO
N(S) = 30, N(R) = 29, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Destination, Value = 4
Message Type = PROGRESS
Info Element = Cause
Info Element = Progress Indicator
Info Element = Signal
- Frame 567 (17 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 64, C/R = 1
Frame Type = INFO
N(S) = 31, N(R) = 31, P/F = 0
NISDN:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Destination, Value = 4
Message Type = RELEASE
Info Element = Shift
Info Element = Display Text

Detail View (Right Pane):

- Interface Id Present = Interface implicitly defined
Interface Type = Basic Access Interface
Preferred/Exclusive = Indicated channel preferred
D-Channel Indicator = No
Channel Select = Any channel
Info Element = Called Party Number
IE Length = 11
Number Type/Plan = Unknown number in unknown plan
Called Number = 4102909387
- Frame (13 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 88, C/R = 1
Frame Type = INFO
N(S) = 1, N(R) = 2, P/F = 0
National ISDN-1 BRI:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Destination, Value = 68
Message Type = CALL PROCEEDING
Info Element = Channel Identification
IE Length = 1
Interface Id Present = Interface implicitly defined
Interface Type = Basic Access Interface
Preferred/Exclusive = Exclusive, only indicated channel acceptable
D-Channel Indicator = No
Channel Select = B1 on Basic Access interface
- Frame (14 bytes) was captured with no errors.
LAPD:
SAPI = 0, TEI = 88, C/R = 0
Frame Type = INFO
N(S) = 2, N(R) = 3, P/F = 0
National ISDN-1 BRI:
Protocol Discriminator = 8 (Q.931)
Call Reference: Length = 1, Flag = Origination, Value = 68
Message Type = DISCONNECT
Info Element = Cause
IE Length = 2
Coding Standard = ITU-TS Standard
General Location = User
Cause Class = Normal event
Cause Value = Normal clearing

Frames: 49

Summary 2 View

Detail View

ParaScope 2000 ISDN Technical Specifications

Hardware Specifications

PC Requirements - Pentium with minimum 16 MB Ram and VGA or SVGA monitor. Connects via PCMCIA. Operates with WanXL Software using Windows XP/2000 ISDN/95/98 and NT.

Line Interfaces - Standard product supports T1/FT1, E1/FE1, and ISDN PRI interfaces. Optional interfaces for ISDN BRI S/T, ISDN BRI U, DDS, RS-232, RS-530, V.35/V.36, X.21, RS-449, RS-422 and RS-423 are available. See interface specification for more details.

Expert Analysis - ISDN connection problems are detected and identified. Where possible, an action is recommended.

Capture Buffer - Data is stored in integrated 8 MB Ram capture buffer.

Data Rate (max.) - Up to 2048 Kbps.

Data Clock - Selectable for internal and external.

Receiver - High input impedance receivers on all monitored lines.

Testpoints - Four testpoints each for Ground, +12 Volts, and -12 Volts.

Output Points - Four programmable unbalanced and 2 programmable balanced output points

Input Points - Four unbalanced and 2 balanced monitor points

Power - AC adapter provides AC powered operation

Dimensions - 10.25" long, 6.25" wide, and 2.5" tall

Packaging - Conveniently packaged in a custom carrying case, the ParaScope 2000 ISDN consolidates industry standard test and protocol analyzers for multiple interfaces into one single, easy-to-use unit. It includes the ParaScope hardware unit, WanXL Software, and the slim-line power supply. Even with all hardware options installed, the basic hardware unit weighs a mere 5 lbs.

Warranty

All FE ParaScope products include a 90-day hardware parts and labor warranty and WanXL Software maintenance. Ask about our optional 3-year Extended Warranty Plan.

Maintenance Plans

One or two year WanXL Software Suite & Maintenance packages are available and include:

- One or two year hardware warranty
- One or two year software subscription updates
- Unlimited technical support
- Additional software features, such as Remote and Reporter

T1 Interface Specifications

Physical Interfaces - Bantam, RJ-48C, WECO 310, DB-15

Termination - Monitor, simulate, drop and insert

Framing - D4, ESF, SLC-96, unframed

Clock Type - n x 64 Kbps, n x 56 Kbps

Clock Source - internal, recovered

Line Code - AMI, B8ZS, jammed bit seven

Auto Config - Framing and Line Code

Monitoring - Single DSO, contiguous DSO's, non contiguous DSO's, AB/CD signaling.

Simulation - Single DSO, contiguous DSO's, non contiguous DSO's, AB/CD signaling. User defined idle code or drop and insert mode. Transmit yellow alarm, blue alarm, and loop-up/loop-down pattern.

Line Build Out - 0 dB, -7.5 dB, -15 dB

Measurements - Real-time display of received level (Vp), power/amplitude (dBsx), frequency and loop current

Status Indicators - Real-time and historical indicators of loss of sync, loss of carrier, yellow alarm, blue alarm, B8ZS detect, excessive zeros, bipolar violations (BPV), frame/CRC errors and slips, Loop Up/Loop Down. Log to disk. Pass/Fail indicators with user definable thresholds.

Statistics - Bipolar Violations (BPV), BPV error rate, frame/CRC errors, frame/CRC error rates, conveniently log them to disk.

VF/DTMF over T1 - Emulate ground start, loop start and e&m trunks. Send wink, ring and dial signals. Measure wink time. Detect and display DTMF digits. Measure digit and interdigit time. Decode signaling bits to show line status, call status and timestamp. Log call status, call states and signaling to comma-delimited file (vf.csv). Supervised and unsupervised call placement and answering. User-defined digit, interdigit and call state timing.

Voice Testing - Monitor and simulate via an external telephone handset. Select A-Law or μ -Law. Supports ISDN PRI.

Clear Channel - Monitor and capture synchronous data streams like PCM voice.

Tone Generator - Generate user defined tones from 1 to 3000 Hz

Scan for Active Channel - Scan manually or at user defined timed intervals for active channels. Active channels are highlighted in GREEN.

ParaScope 2000 ISDN Technical Specifications

E1 Interface Specifications

Physical Interfaces - RJ-45, Coax, 120W, 75W

Termination - Monitor, simulate, drop and insert

Framing - Multiframe CAS, Multiframe CRC-4, CCS, Unframed

Clock Type - n x 64 Kbps, n x 56 Kbps

Clock Source - internal, recovered

Line Code - AMI, HDB3

Monitoring - Single timeslot, contiguous timeslots, non-contiguous timeslots, protected mode, and CAS/CCS signaling.

Simulation - Single timeslot, contiguous timeslots, non-contiguous timeslots and CAS/CCS signaling. User defined idle code or drop and insert mode. Transmit (AIS), AIS timeslot 16, Remote and Multiframe alarms.

Measurements - Real-time display of received level (Vp), power and amplitude (dBsx), frequency and loop current.

Status Indicators - Real-time and historical indicators of Loss of Sync, Loss of Carrier, AIS alarm, AIS timeslot 16 alarm, Remote alarm, Multiframe alarm, Excessive Zeros, Code Violations (CV)s, Frame/CRC errors and Slips. Log to disk. Pass/Fail indicators with user definable thresholds.

Statistics - Code Violations (CV), CV error rate, frame/CRC errors, frame/CRC error rates, conveniently log them to disk.

Voice Testing - Monitor and simulate via an external telephone handset. Select A-Law or μ -Law. Supports ISDN PRI.

Scan for Active Timeslots - Scan manually or at user defined timed intervals for active timeslots. Active timeslots are highlighted in GREEN.

(Optional) ISDN BRI ST Interface Specifications

Physical Interfaces - RJ-45.

Monitoring - Monitor D, B1, B2, and B1+B2 channels from TE and NT devices.

Simulation - Simulate a TE or NT device. Place data or voice call on B1 or B2 channels. Receive calls on B1 or B2 channel. Call placement as user or CPE only

Bit Error Rate Tests - Perform BERT tests on B1, B2, or B1+B2 channels. Test B channels to and from the network by calling self and send pattern on one B channel and receive on other B channel.

Call Placement - Place a one-click call on D channel to set up voice, data or BERT on B channels.

Call Answering - Auto-answer incoming calls on D channel and automatically cut-through to the correct B channels for voice, data or BERT.

ISDN BRI ST Interface Specs - *continued*

Call Expert - Step-by-step analysis of calls. Analyze and interpret cause codes Recommend corrective actions. Check timing between user and network .

Physical Line Analysis - Simultaneously monitor physical line status of link in both directions. Real-time indicators of Loss of Sync and Power source. Pass/Fail indicators with user definable thresholds.

Measurements - Real-time display of received level (Vp), power and amplitude (dBsx), frequency and loop current.

Protocol Analysis - Decode LAPD protocol Decodes layer 3 variants including Information Elements(IE's). Summary and Detailed views.

Statistics - % utilization, packets/second, throughput, errors, number of frames and frame size. Drag and zoom into any graph for more detail.

(Optional) ISDN BRI U Interface Specifications

Physical Interfaces - RJ-45.

Monitoring - Monitor D, B1, B2, and B1+B2 channels from NT/CPE and LT/CO devices.

Simulation - Simulate a NT/CPE or LT/CO devices. Place data or voice call on B1 or B2 channels. Receive calls on B1 or B2 channel. Call placement as user or CPE only

Bit Error Rate Tests - Perform BERT tests on B1, B2, or B1+B2 channels. Test B channels to and from the network by calling self and send pattern on one B channel and receive on other B channel.

Call Placement - Place a one-click call on D channel to set up voice, data or BERT on B channels.

Call Answering - Auto-answer incoming calls on D channel and automatically cut-through to the correct B channels for voice, data or BERT.

Call Expert - Step-by-step analysis of calls. Analyze and interpret cause codes Recommend corrective actions. Check timing between user and network

Physical Line Analysis - Simultaneously monitor physical line status of link in both directions. Real-time indicators of superframe, linkup, activation, EOC decodes and errors.

Protocol Analysis - Decode LAPD protocol Decodes layer 3 variants including Information Elements(IE's). Summary and Detailed views.

Statistics - % utilization, packets/second, throughput, errors, number of frames and frame size. Drag and zoom into any graph for more detail.

Voice Testing - Monitor and simulate via an external telephone handset. Select A-Law or μ -Law.

ParaScope 2000 ISDN Technical Specifications

(Optional) DDS Interface Specifications

Physical Interfaces - RJ-45

Clock Type - 2400 bps, 3200 bps, 4800 bps, 9600 bps, 19.2 Kbps, 38.4 Kbps, 56.0 Kbps, 64.0 Kbps, 72.0 Kbps.

Clock Source - internal, recovered

Framing - Unframed and Primary Channel

Monitoring - Monitor DTE and DCE devices. Synchronization status.

Simulation - Simulate a DTE or DCE device.

Measurements - Real-time display of amplitude (dB), frequency and loop current.

Status Indicators - Real-time indicators of Loss of Sync, Loop Up/Loop Down, Simplex Current, Frequency, Level and Power. Pass/Fail indicators with user definable thresholds.

Loop Codes - Automatic or manual loop up and loop down.

BERT Specifications

Measurements - Simultaneously measures bit errors, block error, errored seconds and percent error free seconds for synchronous and asynchronous data lines.

Patterns - 63, 511, 2047, 4095, Alt 1/0, Mark, Space, ASCII FOX, Alt ASCII FOX, EBCDIC FOX, Alt EBCDIC FOX, 1 in 7, 3 in 24, (2**15) -1, (2**15) -1 inverted, (2**20) -1, (2**23) -1, O.151 QRSS, Loop Codes.

Presentation - Displays G.821 and bit/block errors.

Character Framing - Select Sync or Async 5, 6, 7 or 8 bits per character sequence.

Error Injection - Inject single or burst.

Flow Control - Select None, Leads or XON/XOFF.

General Specifications

Monitoring - Monitor DTE and DCE devices.

Simulation - Simulate DTE and DCE.

Data Line Analysis - Real time or post processing

Protocols - HDLC, SDLC, QLLC, LAPB, LAPD, Frame Relay, X.25, SNA, ISDN, SS7(ANSI & ITU), Async PPP, Sync PPP, GR-303 TMC/CSC/EOC, V.5x, TCP/IP suite, AppleTalk, Novell Netware suite, Custom protocol stack, Customized protocols, Async, Sync, BSC, IPARS and inverted IPARS. More protocols under development.

Frame/String Simulator - Traffic generator with user-defined % utilization, transmit period and idle period. Supports user-defined frames, canned messages, and frame relay headers.

Time Stamping - User may select to time stamp characters received, frames received, or lead transitions. Select absolute time of day or time relative for timestamp display format.

General Specifications - *continued*

Search/Display Filter - User selectable search for time-stamp, frame length, error, display text, capture data and protocol-specific information.

Capture Filter - Capture only the data of interest. Set up separate filters for DTE, DCE or both.

Character Suppression - Allows elimination of characters, such as idle, sync or user-definable characters from the display.

Send String - Up to 1,024 characters per string.

Display Screen - Windowing technology, includes: move, size, minimize, maximize, tile cascade, and arrange.

Line Data Display - Chronological order of DTE/DCE data, lead states, and triggers. Display can be synchronized to Decode Display windows. Supports both CHAR and HEX

Data Codes - ASCII, EBCDIC, Baudot, Six Bit Transcode, IPARS (Line and Sabre), Inverted IPARS, HEX and EBCD.

Bit Sense - Normal or inverted.

Bit Order - MSB or LSB first.

Lead Status - 8 fully user programmable leads: 4 as output and 4 as input. Any input lead may be connected to any interface signal. Names are user-definable.

Triggers - Programmable triggers consisting of character strings, errors, interface lead transitions, timers, time of day, and keyboard. Bit and character masking, "and," "not" and "don't care" characters are supported. Trigger events can be selectively displayed and stored with "pre" and "post" trigger data.

Timers - Ten timers with a maximum count of 65,535 and a resolution of 1 msec.

Counters - Ten counters may be incremented up to 65,535.

Error Checking - CRC-CCITT, CRC-16, CRC-12, CRC-6, LRC, and Parity.

Parity - Odd, Even, None, Ignore.

Decode Data Display - DTE/DCE single and encapsulated protocols. Summary I, II, and Detail windows offer increasing decode information. Protocol Summary decomposes each frame by protocol type. Windows can be duplicated and synchronized to each other and to the Line Data Display window. Protocol filtering.

Character Framing - 5, 6, 7 or 8 information bits, plus parity. For asynchronous systems: 1, 1.5, or 2 stop bits per character.

Alarm Logging - Timestamp and log alarms, signal threshold violations, Frame Relay status, errors and BERT results to disk.

Printer Support - Standard printer support for generating hardcopy of data status and timing information (all data, DTE only, DCE only, DCE and DTE), analysis, programs, setups, and protocol decodes.