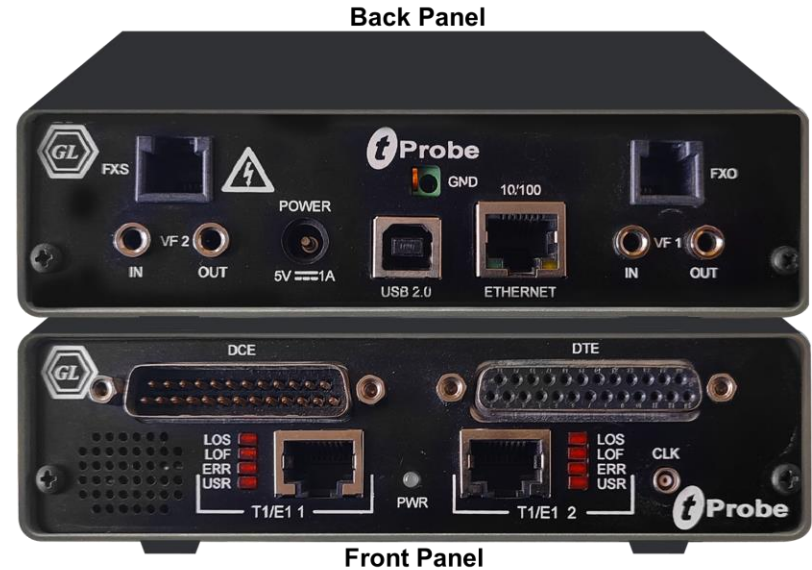

T1 E1 VF FXO/FXS and tProbe™ Datacom Analyzer



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

tProbe™ Units

- tProbe™ T1 E1 is an enhanced USB Based T1 and E1 solution that is capable of both T1 and E1 interfacing
- Available with Dual T1 or E1, FXO, FXS, DTE, and DCE interfaces
- Forward thinking hardware design for future daughter board expansion applications
- Connects to a PC via a USB 2.0 port
- Access it remotely



Why the product is superior?

- Portable with advance test features such as Pulse Shape Analysis, Jitter Measurement and Analysis
- “Cross-port Through” Mode and “Cross-port Transmit” Mode – these settings make cabling with Drop/Insert and Fail-Safe Inline Monitoring very easy
- Enhanced VF Drop and VF Insert Capabilities (including 3.5mm or Bantam physical connection options)
- Improved circuitry for very accurate Digital Line Level measurements
- Forward thinking hardware design for future daughter board expansion applications
- Available with Dual T1 or E1, FXO, FXS, DTE, and DCE interfaces

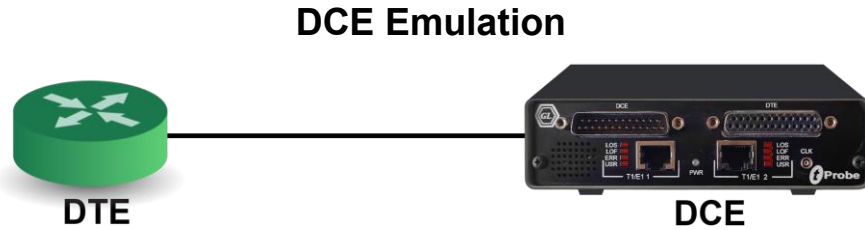
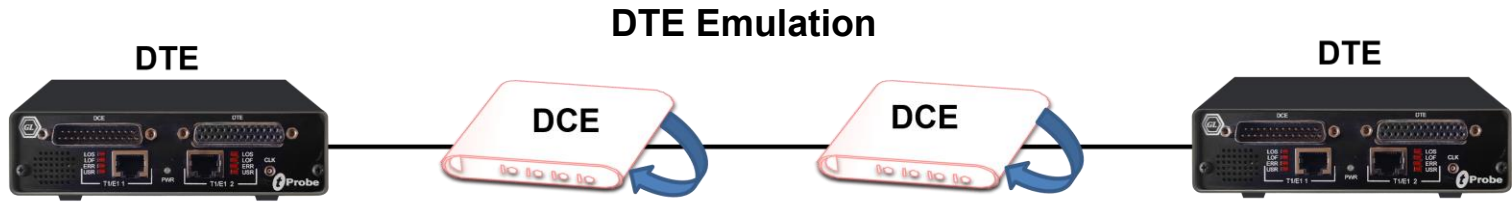
What the unit does ?

- Used for installation, test, and troubleshooting of T1 E1 lines - routine testing of errors, such as pulse testing, bit errors, frame errors, and bipolar violation
- Capability of T1 E1 PCM signal visualization, capture, storage, analysis, and emulation
- Includes BERT, voice band analysis, data, signaling, and protocol analyzer all in one
- Most all “[basic applications](#)” and “[special applications](#)” are available for tProbe™ T1 E1 analyzer including Comprehensive Analysis / Emulation of voice, digits, tones, fax, modem, raw data, and Echo Testing
- Capable of simulating as well as decoding and demodulating fax calls over T1 E1 lines using [Fax Simulator](#) and [FaxScan™](#)
- Compares incoming T1 (E1) pulses against the pulse shape mask specified by the ITU G.703 standard
- Emulates and decodes all 24 for T1 (32 for E1) channels simultaneously for signaling bits, power level, frequency, and multi-frame data

tProbe™ Datacom Analyzer

- Designed for the service installation, verification, and maintenance of data communications and telecommunication equipment
- Provides a software selectable interface to emulate DTE, DCE and monitor the Datacom lines for both synchronous (sync), and asynchronous (async) modes of operation
- Supported Line interfaces - V.35, RS-232, RS-449, RS-485, EIA-530 and EIA-530A
- Sync BER from 300 b/s to 16.384Mbps
- Async BER from 300 b/s to 115.2Kbps
- DTE or DCE emulation mode
- SYNC clock source and sense selection
- Frequency measurement

Datacom Analyzer



Monitoring Datacom Lines

Data Comm Rx Status

| Ports | | | |
|-------|------------|------------|--|
| | 1 | 2 | |
| RxD | | | |
| RxC | | | |
| TxC | | | |
| CTS | | | |
| Ri | | | |
| DSR | | | |
| DCD | | | |
| TM | | | |
| Freq | 16 383 928 | 16 383 928 | |

2-Wire FXO/FXS

- FXO port on tProbe™ allows to simulate a two-wire FXO device such as a telephone or a fax machine
- FXO port allows you to capture and analyze data from a two-wire telephone line, as well as to generate and transmit analog data onto that two-wire line
- The FXS port on tProbe™ emulates a two-wire FXS service such as a telephone wall jack
- This feature allows you to interface with an FXO device such as a telephone

2-Wire FXO/FXS (Contd.)

2-Wire FXS

2-wire FXS

Audio Selection: None VF FXS

Ports: 2

Audio In: Tx Insert, TS: 01, Gain: 0.000

Audio Out: Rx Drop, TS: 01, Gain: 0.000

Termination: 600

Polarity: Forward (Tip-Ring)

Encoding: A-law

Audio Out: Dual Tone, Freq 1 (Hz): 340, Freq 2 (Hz): 440, Level 1 (dB): -10.5, Level 2 (dB): -10.5

Ring: Freq (Hz): 20, Voltage: 63.1, Cadency (ms): On: 2000, Off: 4000

Battery Volt: 48.0

Monitoring:

Buttons: Apply, Exit, Dial Tone

2-Wire FXO

2-Wire FXO

Audio Selection: None VF FXO

Ports: 1

Audio In: Tx Insert, TS: 00, Gain: 0.0 dB

Audio Out: Rx Drop, TS: 00, Gain: 0.0 dB

Signaling: on-hook, off-hook, monitor

Termination: USA

Start: ground

Encoding: A-law

Sample Rate: 8 kbps

Monitoring Information: Loop Current: 0.0 mA, Tip Ring Voltage: 0 V, Ring Detect Current: History: Clear

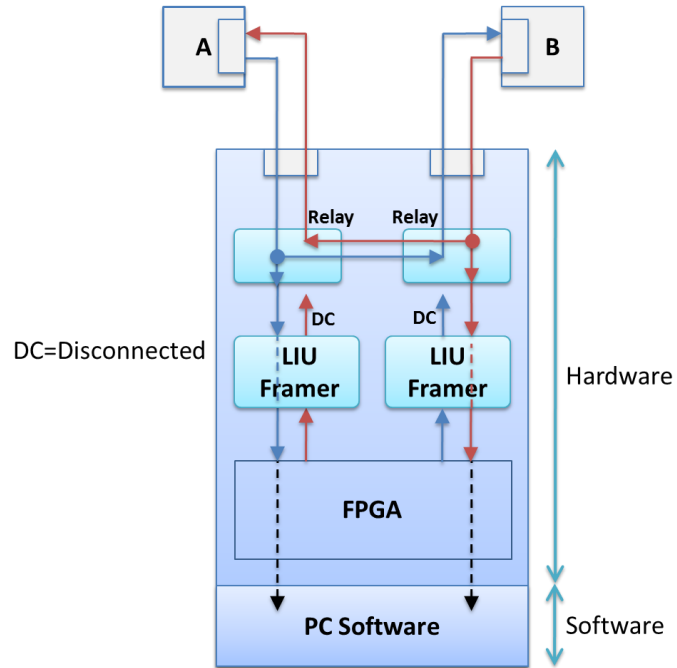
Caller ID: Clear

Buttons: Default, Exit, Clear

Benefits

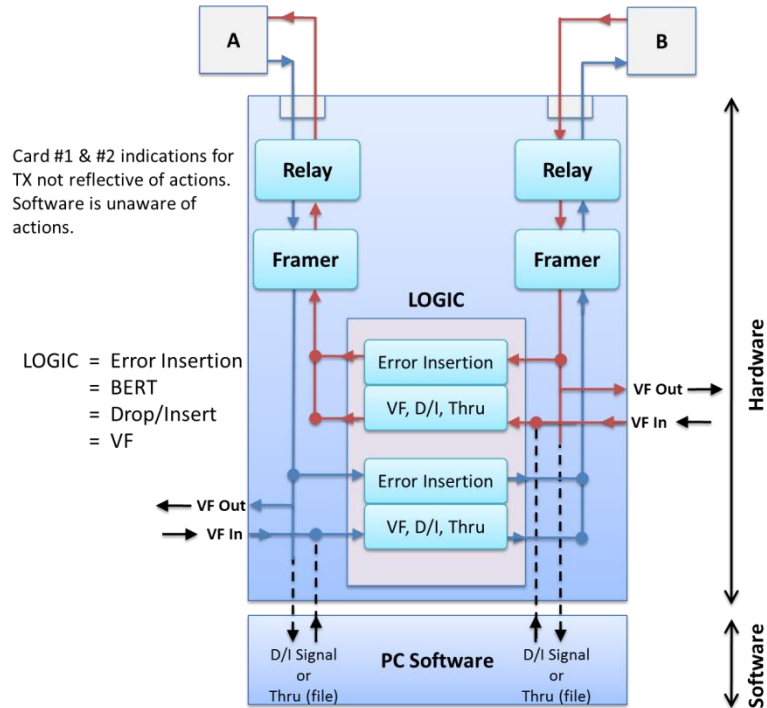
- Compatibility with Windows® 11 64-bit operating system and user-friendly real-time software
- Boards are significantly faster, and significantly more efficient
- CPU utilization with the newer boards is negligible
- Adjustable transmit clock frequency (+ / - 300ppm) for testing frequency lock sensitivity of T1 or E1 equipment
- Supports individual speakers per card
- VF Tx Gains for tProbe™ analyzer ranges from -12 dB to +59.5 dB in 0.5 dB steps
- VF Rx Gains for tProbe™ analyzer ranges from -63.5 dB to +9 dB in 0.5 dB steps
- VF Tx and Rx impedance is 135-, 150-, 600-, and 900-Ohm terminations, New High Impedance Monitor Termination (>25K Ohms), and Mic/HS impedance (Microphone Headset impedance is 1K Ohms)

Cross-port Through Mode



- This mode is similar to the standard “Outward Loopback” which allows monitoring T1 E1 lines “in-line” while still being protected from loss of power to the board

Cross-port Transmit Mode



- Used for Drop and Insert applications in which the board analyzes the traffic running between two pieces of T1 E1 equipment. This feature also eliminates complex cabling

T1 E1 Basic Software

- Board Configuration
- VF Options
- Monitoring Options
- Intrusive Testing
- Dual VF Tx Rx
- Windows Client / Server
 - Remote access to T1 E1 server
 - Clients - Python
- Configuration Options for T1, E1, Datacom, FXO, FXS
 - T1 E1 Configuration
 - Encoding Options – A-law, u-law, and Bit Inversion
 - URB Settings
 - WCS Configuration
 - 2-Wire FXO
 - 2-Wire FXS

T1 E1 Basic Software (Contd.)

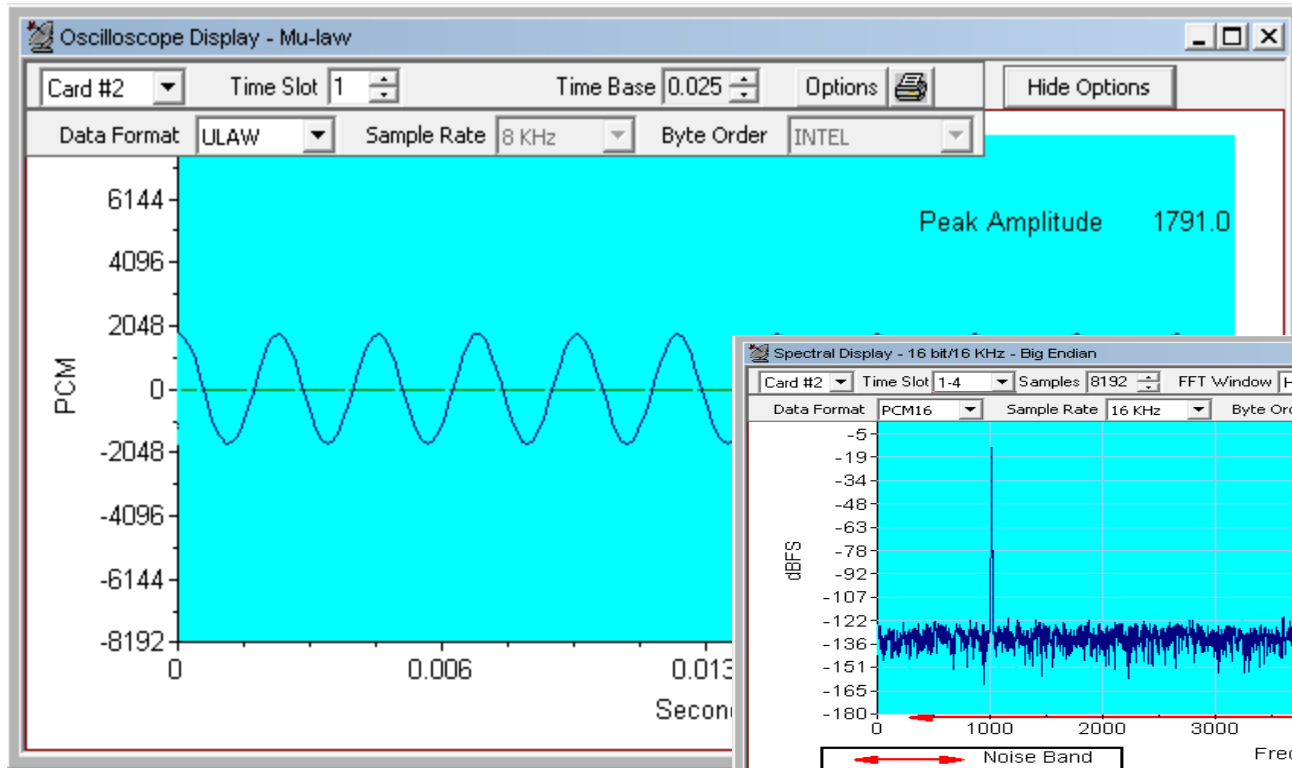
- VF Options
 - Speaker
 - Drop and Insert
 - VF In/Out TS settings
- Monitoring Features
 - Monitor T1 E1 Line
 - Byte Values and Binary Byte Values
 - Signaling bits, Power Level, DC Offset, and Frequency
 - Multiframe, and Real-time Multiframe
 - T1 E1 Data as Real-time Bitmap
 - Time-slot Window
- Monitoring Features
 - ASCII Timeslot Display
 - Oscilloscope and Power Spectral
 - Audio Monitoring
 - Active Voice Level
 - Jitter Measurement
 - Pulse Mask Display
 - Capture Dialed Digits
 - Realtime Strip Chart
 - Realtime Multichannel Audio Bridge
 - Signaling Bit Transitions

T1 E1 Basic Software (Contd.)

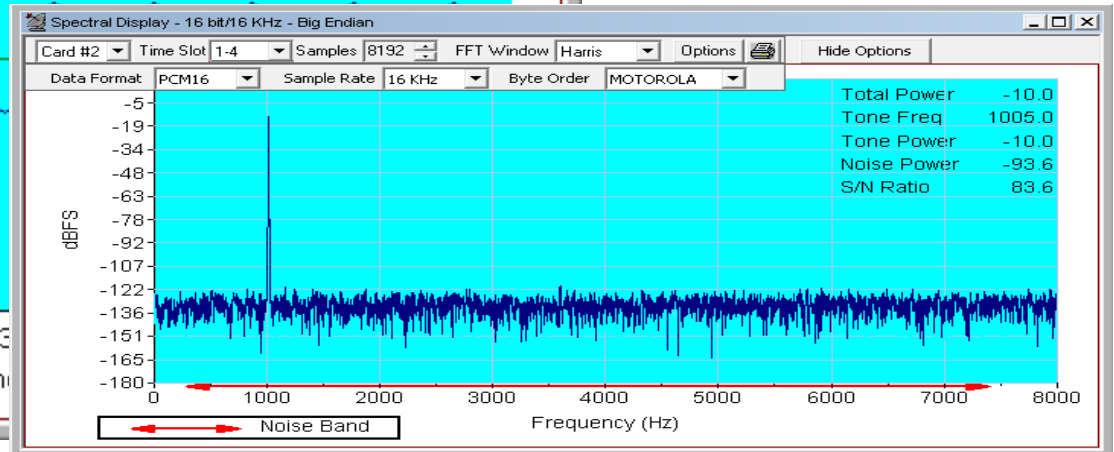
- Intrusive Tests
 - Bit Error Rate Test
 - Enhanced Bit Error Rate
 - ATM BERT
 - Transmit Tone
 - Transmit Gaussian Noise
 - Transmit Multiframe
 - Transmit Signaling Bits
 - Precision Delay Measurement
 - Rx-to-Tx Loop back
 - Error Insertion
 - Jitter Generation

Monitoring Features

Oscilloscope Display

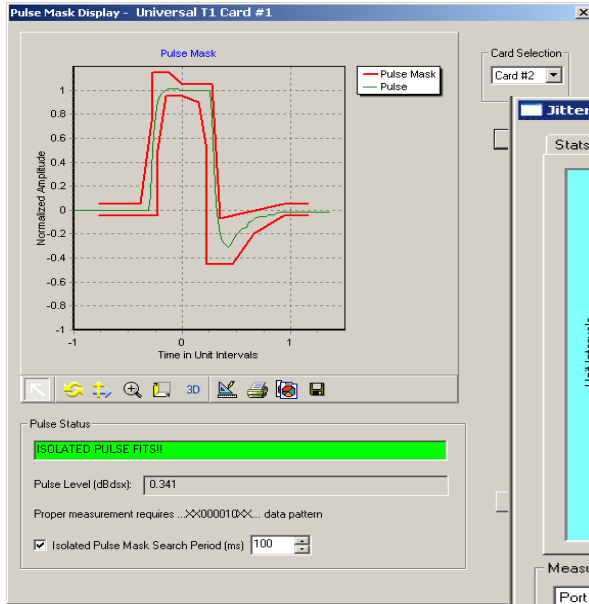


Spectral Display

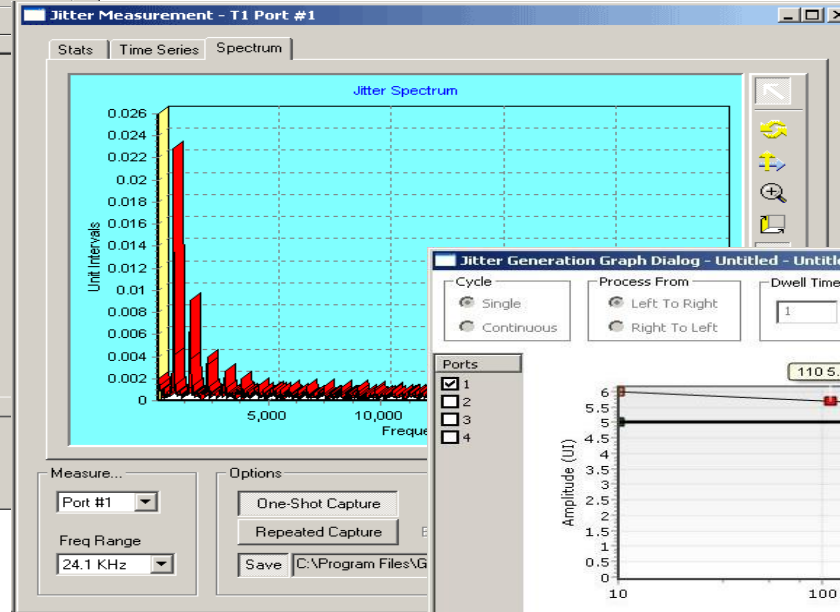


Jitter Measurement and Pulse Mask

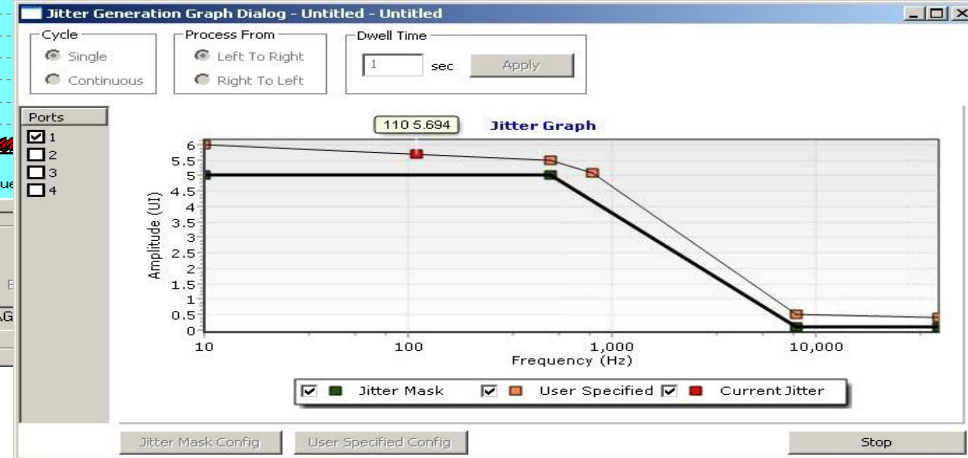
Pulse Shape Display



Jitter Measurement

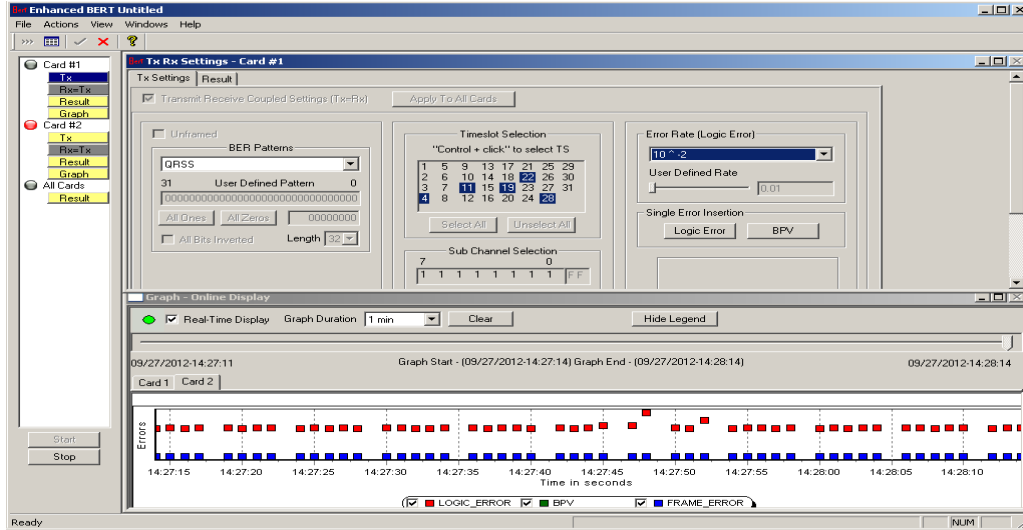


Jitter Generation

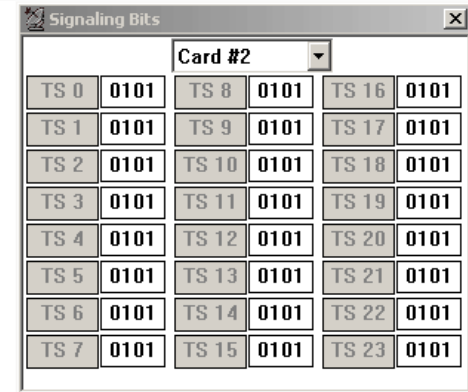
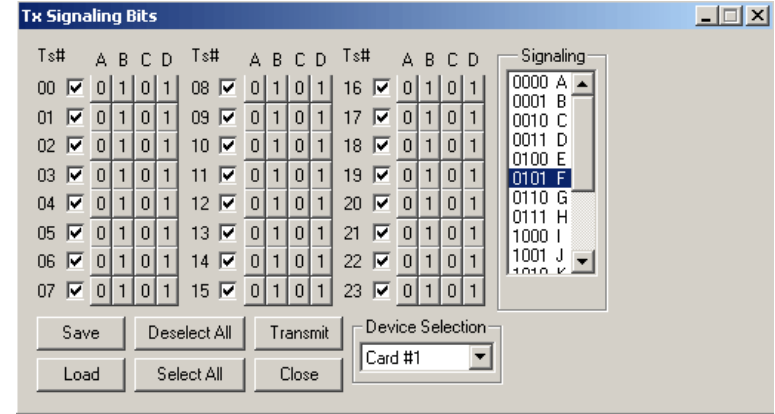


Enhanced BERT and Tx Signaling BITS

Enhanced BERT



T1 E1 Basic Software



Client Server

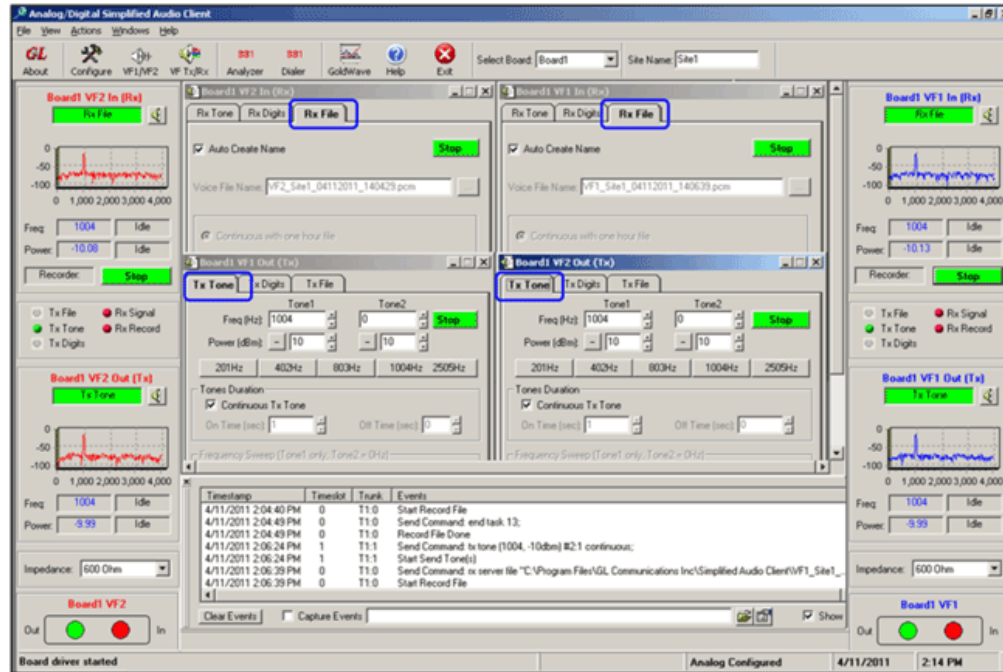
```
E1_Regressiontest.gls - GLClient
File Edit View Connect Script Log User Help
get board count;
board_count=2
get response;
response = 500.0
go 0,0,0,0 #1;
OK
get signaling bits #2:1..15;
#2:1.sig_bits=0,0,0,0
#2:2.sig_bits=0,0,0,0
#2:3.sig_bits=0,0,0,0
#2:4.sig_bits=0,0,0,0
#2:5.sig_bits=0,0,0,0
#2:6.sig_bits=0,0,0,0

// setting both the cards to cas mode to get all four signaling bits
//getting the signaling bits transmitted from card#1
//cross connect card 1 and 2
go 0,0,0,0 #1;
get signaling bits #2:1..15;
// transmitting different formats of signaling bits as mentioned before for time slots 1 to 15 only
go 0,0,0,1 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
wait 2000;
go 0,0,1,0 #1;
get signaling bits #2:1..15;
Ready

Untitled - GL.Server
File Edit View Setup Help
Connected: client #404 at 192.168.1.63
404: set rx interface terminate #*;
404: set signaling mode cas #*;
404: set crc4 on#*;
404: set tx clock source internal #*;
404: set outward driver loopback off #*;
404: get tx clock source #*;
404: get outward driver loopback #*;
404: get rx line frequency #*;
404: get rx line level #*;
404: get all alarms #*;
404: get board count;
404: get response;
404: go 0,0,0,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
404: go 0,0,1,0 #1;
404: get signaling bits #2:1..15;
Ready
```

- Allow the user (with an appropriate client) to operate analyzers remotely, write scripts for automation, or provide multi client connectivity to a single T1 E1 VF Data analyzer

Dual VF Tx/Rx



- Performs non-intrusive and intrusive VF audio monitoring, VF audio recording, and testing easily
- Provides an alternate and simple GUI as against the T1 E1 Analyzer applications in basic software to perform analog Tx/Rx functions

T1 E1 Special Applications

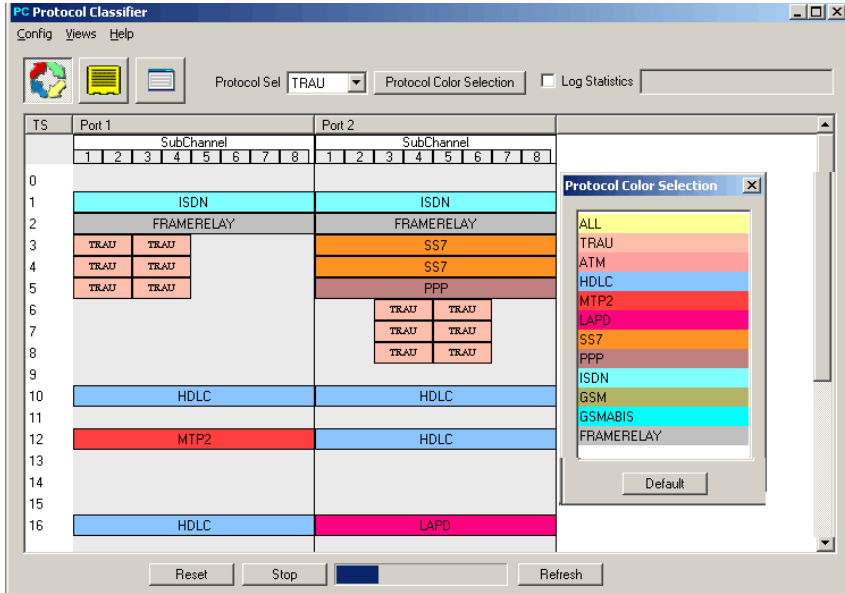
- Protocol Analysis
 - ISDN, HDLC, SS7, Frame Relay, TRAU, CDMA, DCME, T1 Facility Data Link,
 - E1 Maintenance Data Link, UMTS, PPP, ATM, GSM, V5.x, CAS, GPRS, GR303, SS1
- Protocol Emulation
 - ISDN, HDLC, MLPPP, MLPPP Conformance, CAS, TRAU, SS7
 - SS7 conformance suite, GSM A, GSM Abis, MAP, CAMEL, Frame Relay, ATM IMA, and SS1
- Capture, Analysis, and Emulation
 - BER, Playback
 - Manual and Automated Record/Playback files
 - Call Capture and Analysis (CCA)
 - Multiple Call Capture and Analysis

T1 E1 Special Applications (Contd.)

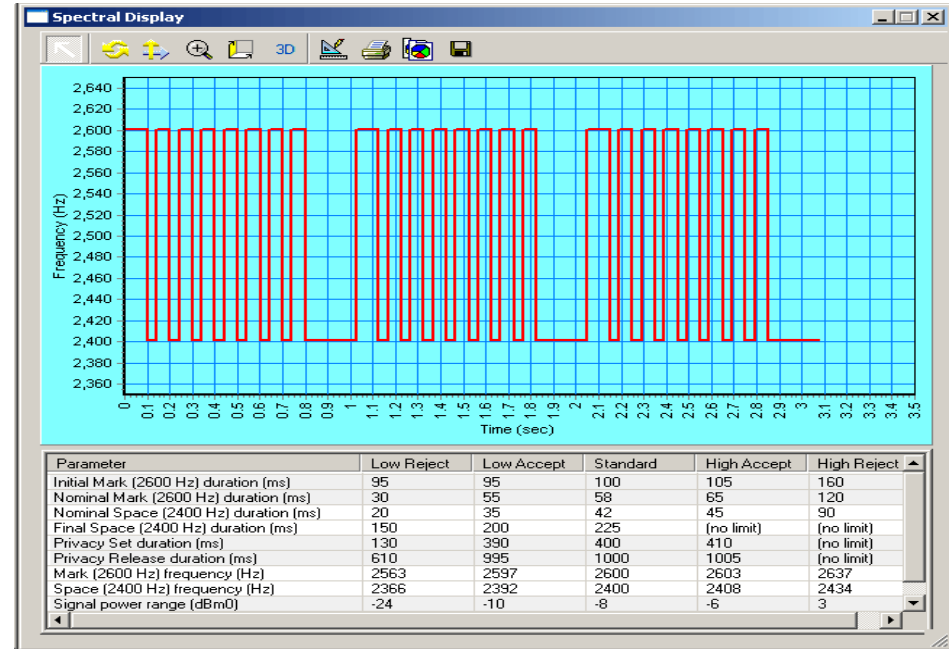
- Voice Band Analysis Software
 - Call Data Records (CDR)
 - Voice Band Analyzer (VBA)
- Fax Emulation and Analysis
 - Fax Simulator
 - Fax Analysis using GLInsight™ or FaxScan™
- Echo Cancellation Testing / Compliance
 - Manual
 - Semi-automated
 - Automated
- WCS Modules
 - Transmission/reception of files/digits
 - Multi-channel BERT
 - CAS Emulation
 - DSP operations, Dynamic DSP capability
 - SA Bits/ FDL/ HDLC/ TRAU/ MC-MLPPP/ SS7/ ISDN / ML Frame Relay
- Protocol Identifier
- Multi-Channel BERT
- Multiplex/Demultiplex Software
- Network Surveillance

Special Application

Protocol Identifier



SS1 Analyzer and Emulator



Call Capture and Analysis

Multiple Call Capture and Analysis

Multiple Call Capture - UsbE1 Card #1 and #2

File Capture Settings

Capture Directory: D:\CapturedFiles\ManualCall1210091146

Capture File #1: Dec10W01.000

Bytes Captured: 17024

Capture File #2: Dec10E01.000

Bytes Captured: 17024

Signaling File: Dec1001.C

Timeslot Activity

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |

Multi Call Capture for Manual - Untitled

File Edit Trigger Options Process

| CC No | Capture Name | West(Port) | East(Port) | Timeslots | Storage Location | Trigger Option | Action |
|-------|--------------|------------|------------|-----------|--|----------------|--------|
| 1 | CCA1 | 1 | 2 | 0-23 | C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer | Edit | Abort |
| 2 | CCA2 | 1 | 2 | 0-23 | C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer | Edit | Abort |
| 3 | CCA3 | 1 | 2 | 0-23 | C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer | Edit | Abort |
| 4 | CCA4 | 1 | 2 | 0-23 | C:\Program Files\GL Communications Inc\Dual Ultra HD T1 Analyzer | Edit | Abort |

| TS | TS Status | West Filename | Bytes Captured(West) | East Filename | Bytes Captured(East) |
|----|-----------|--|----------------------|---|----------------------|
| 0 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |
| 1 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |
| 2 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |
| 3 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |
| 4 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |
| 5 | Capturing | C:\Program Files\GL Communications In... | 742224 | C:\Program Files\GL Communications Inc\Dual Ultra ... | 742224 |

CCA Details Timeslots Map

Protocol Analysis

PPP Protocol Analysis

PPP Protocol Analysis PPP

| Dev | TSlot | SubCh | Fram... | TIME (Relative) | Len | Error | PPP Laye... | LCP Code | IPCP Code | BCF |
|-----|-------|-------|---------|-----------------|-----|-------|-------------|----------|-----------|-----|
| ✓ 1 | 1-31 | | 0 | 00:00:00.000000 | 14 | | Link Co | | | |
| ✓ 2 | 1-31 | | 1 | 00:00:00.000625 | 14 | | Link Co | | | |
| ✓ 2 | 1-31 | | 2 | 00:00:00.088625 | 14 | | Link Co | | | |
| ✓ 1 | 1-31 | | 3 | 00:00:00.092000 | 14 | | Link Co | | | |
| ✓ 1 | 1-31 | | 4 | 00:00:09.993996 | 14 | | Link Co | | | |
| ✓ 2 | 1-31 | | 5 | 00:00:09.994625 | 14 | | Link Co | | | |
| ✓ 2 | 1-31 | | 6 | 00:00:10.082625 | 14 | | Link Co | | | |
| ✓ 1 | 1-31 | | 7 | 00:00:10.082625 | 14 | | Link Co | | | |

Card1 TimeSlots=1-31 Frame=0 at 00:00:00.000000 OK Len=14
HDLC Frame Data + FCS
===== PPP Link Layer =====
Address = 11111111 (255)
Ctl = 00000011 (3)
Protocol = 11000000 0010
===== Link Control Layer =====
Code = 00001001 Echo
Identifier = 172 (xAC)
Length = 8 (x0008)
Magic Number = 16543210 (f0)

Hex Dump of the Frame Data
FF 03 C0 21 09 AC 00 08 09 DC 19 2E 85 63

Off-line Viewing D:\misc\MLPPP.hdl 23 726

PPP Packet Data Analysis

Traffic Analyzer - Summary View

Sip Calls Show All Sessions

| Call # | SSRC | Payload | Packet Received | Conversat MOS/R... | Listening MOS/R... | Packets Discard... | Missing Packets... | Duplicate Packets... | Out Of Sequen... | Average Gap(ms) | Average Delay | Average Jitter | Average Inter Aj |
|--------------|----------------------------|---------------------------|-----------------------------|--|--------------------|--------------------|--------------------|----------------------|------------------|-----------------|---------------|----------------|------------------|
| Call#0000001 | Caller:0001@192.168.40.245 | Callee:0001@192.168.20.20 | CallId:GLPG1413613128143612 | Call StartTime:2011-11-23 09:56:52.064 | Call C | | | | | | | | |
| 1 | 22145... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 1 | 22117... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 2 | 22141... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 2 | 22194... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| Call#0000003 | Caller:0002@192.168.40.245 | Callee:0002@192.168.20.20 | CallId:GLPG1428645128143624 | Call StartTime:2011-11-23 09:57:07.082 | Call C | | | | | | | | |
| 3 | 22137... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 3 | 22168... | PCMU... | 1 | 0.00 / 0 | 0.00 / 0 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0 / 0.00 | 0.00 | 0.00 | 0.00 | 0 |

Active Calls

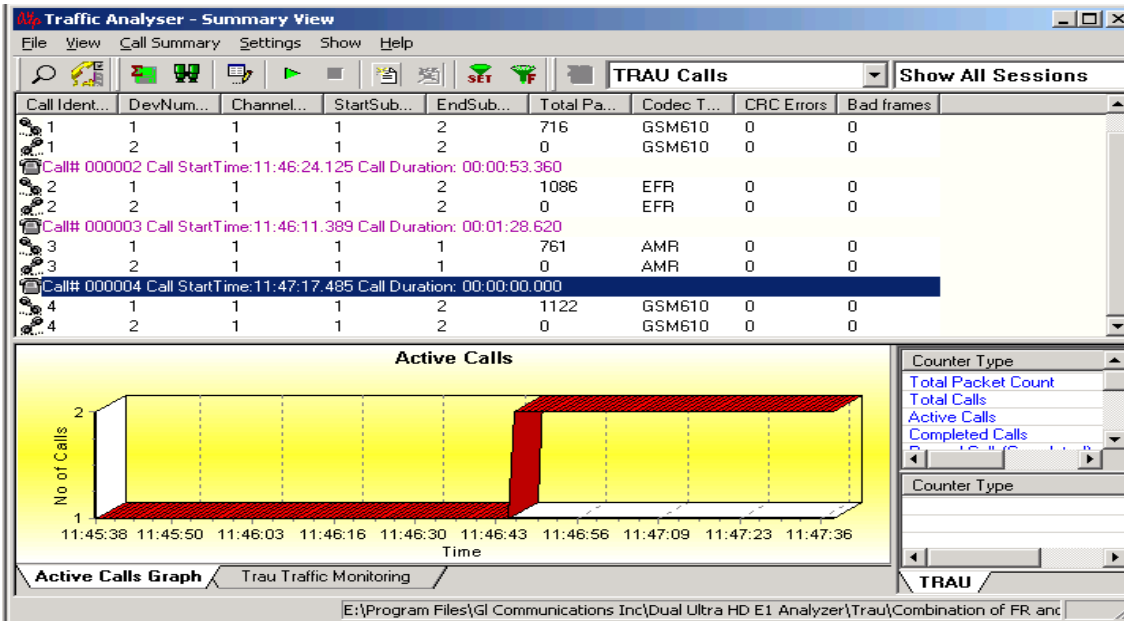
Counter Type Counters

| | |
|-------------------|------|
| Total SIP Packets | 2904 |
| SIP Calls | 67 |
| SIP Active Calls | 0 |

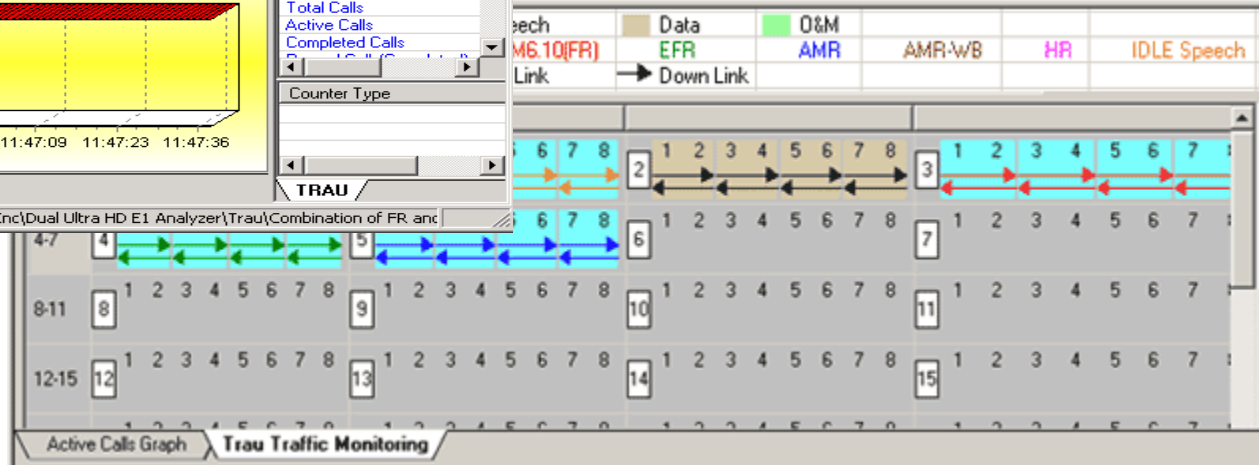
Active Calls Graph Average Jitter Distribution E-Model RTP Packets Graph SIP H323 RTP MEGACO

Protocol Analysis (Contd.)

TRAU Packet Data Analysis - Active Calls Graphs



TRAU Traffic Monitoring



Protocol Emulation

GSM Call Generation

Call Generation - MTC_BulkCall

| Sr No | Script Name | Profile | Call Info | Script Execution | Status | Events | Events Profile | Result | Total Iterations | Completed Iterations |
|-------|---------------|----------|------------|------------------|--------|--------|----------------|--------|------------------|----------------------|
| 1 | BSC_MTC_C2... | Pro0.xml | 0x99999999 | Abort | Pass | None | | Pass | Infinite | 0 |
| 2 | BSC_MTC_C2... | Pro1.xml | 0x22222222 | Start | Pass | None | | Pass | 1 | 0 |
| 3 | BSC_MTC_C2... | Pro2.xml | 0x33333333 | Start | Pass | None | | Pass | Infinite | 0 |
| 4 | BSC_MTC_C2... | Pro3.xml | 0x44444444 | Abort | Pass | None | | Pass | Infinite | 0 |
| 5 | BSC_MTC_C2... | Pro4.xml | 0x55555555 | Start | Pass | None | | Pass | Infinite | 0 |
| 6 | BSC_MTC_C2... | Pro5.xml | 0x66666666 | Abort | Pass | None | | Pass | Infinite | 0 |
| 7 | BSC_MTC_C2... | Pro6.xml | 0x77777777 | Abort | Pass | None | | Pass | Infinite | 0 |
| 8 | BSC_MTC_C2... | Pro7.xml | 0x88888888 | Abort | Pass | None | | Pass | Infinite | 0 |

Buttons: Add, Delete, Insert, Start, Abort, Refresh, Start All, Abort All

MAPS DUT

PAGING CoMmand → 11:44:13.296000

BTSM Layer

```

T-bit
Message Group
Message Type
Channel number
IE Identifier (Ch No)
Channel Type
Time Slot #
Paging Group
IE Identifier (PGr)
Paging Group
MS Identity
IE Identifier (MSId)
Length Of MS Identit
Type of identity
Odd/Even Ind.of ider
    
```

Scripts | Message Sequence | Event Config | Script Flow | Profile

GSM Call Reception

Call Reception

| Sr No | Script Name | Call Info | Script Execution | Status | Events | Events Profile | Result |
|-------|-----------------------|------------|------------------|---------------------------|-----------|----------------|---------|
| 1 | MTC.gls | 9341141850 | Abort | Transmitting File | Terminate | | Pass |
| 2 | MTC.gls | 9341141851 | Completed | Establishing TRAU session | None | | Pass |
| 3 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 4 | MTC.gls | 9341141852 | Abort | Transmitting File | Terminate | | Pass |
| 5 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 6 | MTC.gls | 9341141853 | Abort | Transmitting File | Terminate | | Pass |
| 7 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 8 | MTC.gls | 9341141854 | Abort | Transmitting File | Terminate | | Pass |
| 9 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 10 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 11 | MTC.gls | 9341141855 | Abort | Transmitting File | Terminate | | Pass |
| 12 | RX_Channel Activat... | 4 | Completed | | None | | Pass |
| 13 | MTC.gls | 9341141856 | Abort | Transmitting File | Terminate | | Pass |
| 14 | MTC.gls | 9341141857 | Completed | RR Connection Failed | None | | Unknown |

Buttons: Abort

MAPS DUT

PAGING CoMmand ← 11:41:58.421000

CHANnel ReQuireD → 11:41:58.421000

Immediate Assignment ← 11:41:59.515000

PAGING RESPONSE ← 11:41:59.515000

AUTHENTICATION REQUEST ← 11:41:59.859000

BTSM Layer

```

T-bit
Message Group
Message Type
Channel number
IE Identifier (Ch No)
Channel Type
Time Slot #
Paging Group
IE Identifier (PGr)
Paging Group
MS Identity
IE Identifier (MSId)
Length Of MS Identit
    
```

Scripts | Message Sequence | Event Config | Script Flow | Profile

Thank you