Windows Client Server

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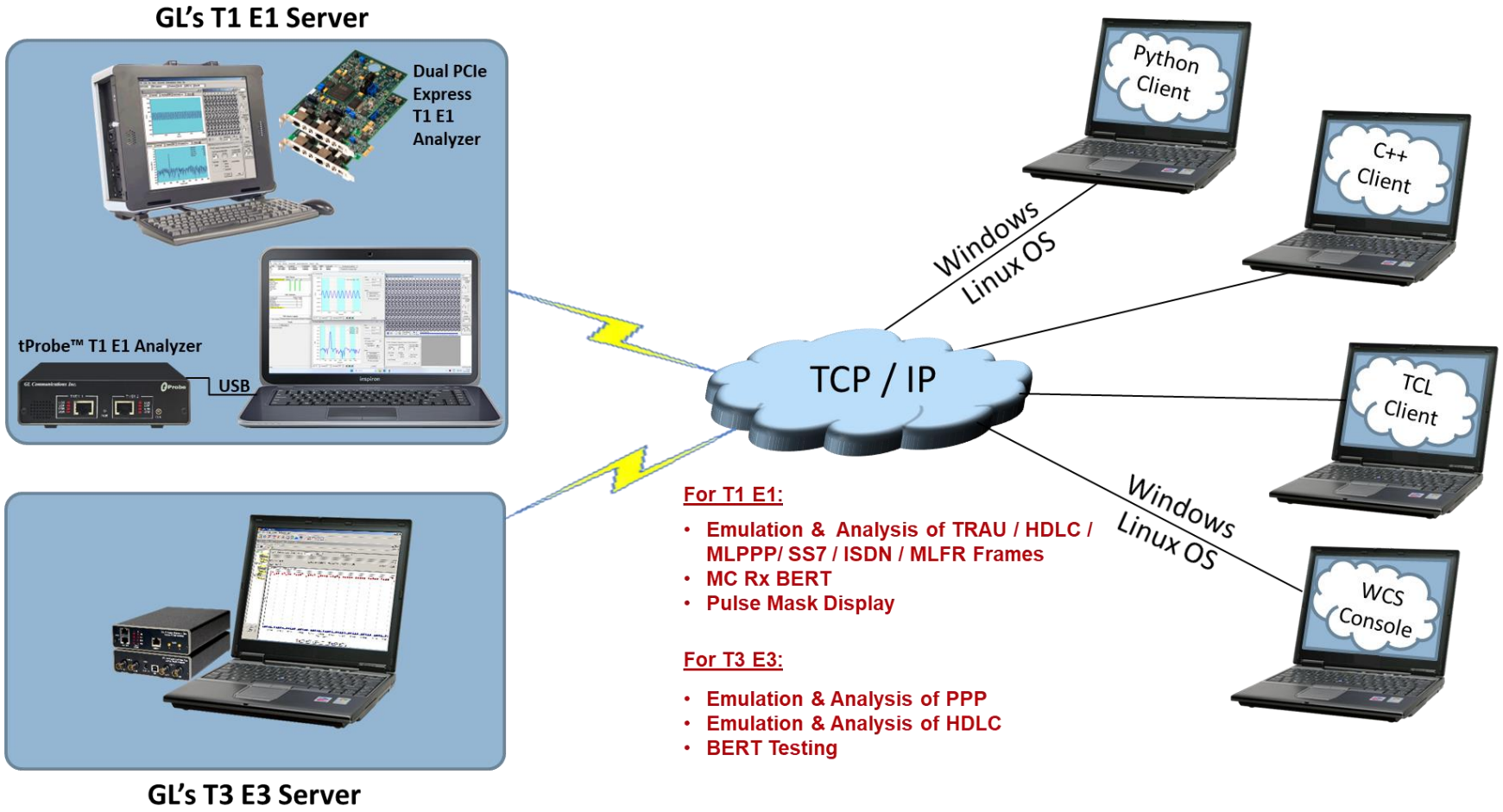
Index

Windows Client Server (WCS)

- GL's Windows Client/Server software allows the user of T1 E1 analyzers, the capability of remote operation, automation, and multi-site connectivity



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Applications

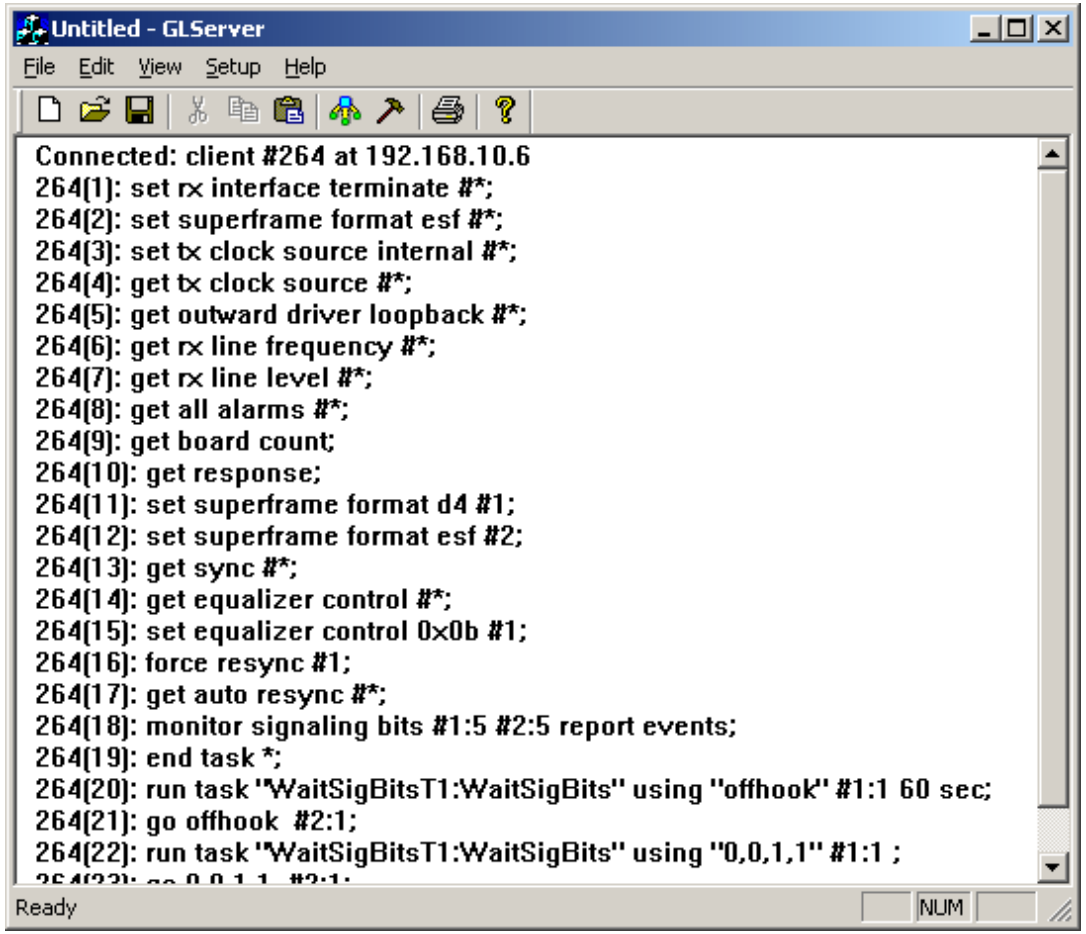
- Intrusive / Non-intrusive T1 E1 testing
- Monitoring multiple site locations from a single client
- Shared use of T1 E1 test equipment from multiple client locations
- Automated factory testing on production lines
- Simultaneous testing of high capacity T1 E1 systems through a single Client
- Integration of T1 E1 testing into more complex testing systems
- Collection of call records from remote locations based on signaling (SS7, CAS, ISDN)

Features

- Easy control of T1 E1 servers through software clients via TCP/IP sockets
- Supported on Windows®/Linux® operating systems
- Server software can run multiple tasks simultaneously
- Simple modifiable scripts may be developed to perform simple to complex testing
- Perform G.168 EC compliance tests, protocol analysis (HDLC, ISDN, SS7, FDL, MLPPP)
- Perform BERT on selected timeslots involving multiple paths simultaneously
- Monitor, report, and record alarms at various sites every two seconds or as they occur
- Detect and report DTMF/MF/MFC-R2 digits on channels as they occur
- Remote Protocol Analyzers (SS7, ISDN, GR303, V5, HDLC, and Frame relay) can be integrated with Windows Client Server to remotely analyze protocols

Windows Client / Server Software
T1 E1 Server

- The log display area is read-only, and normally shows a record of transactions of various types
- Commands and tasks from the client are logged



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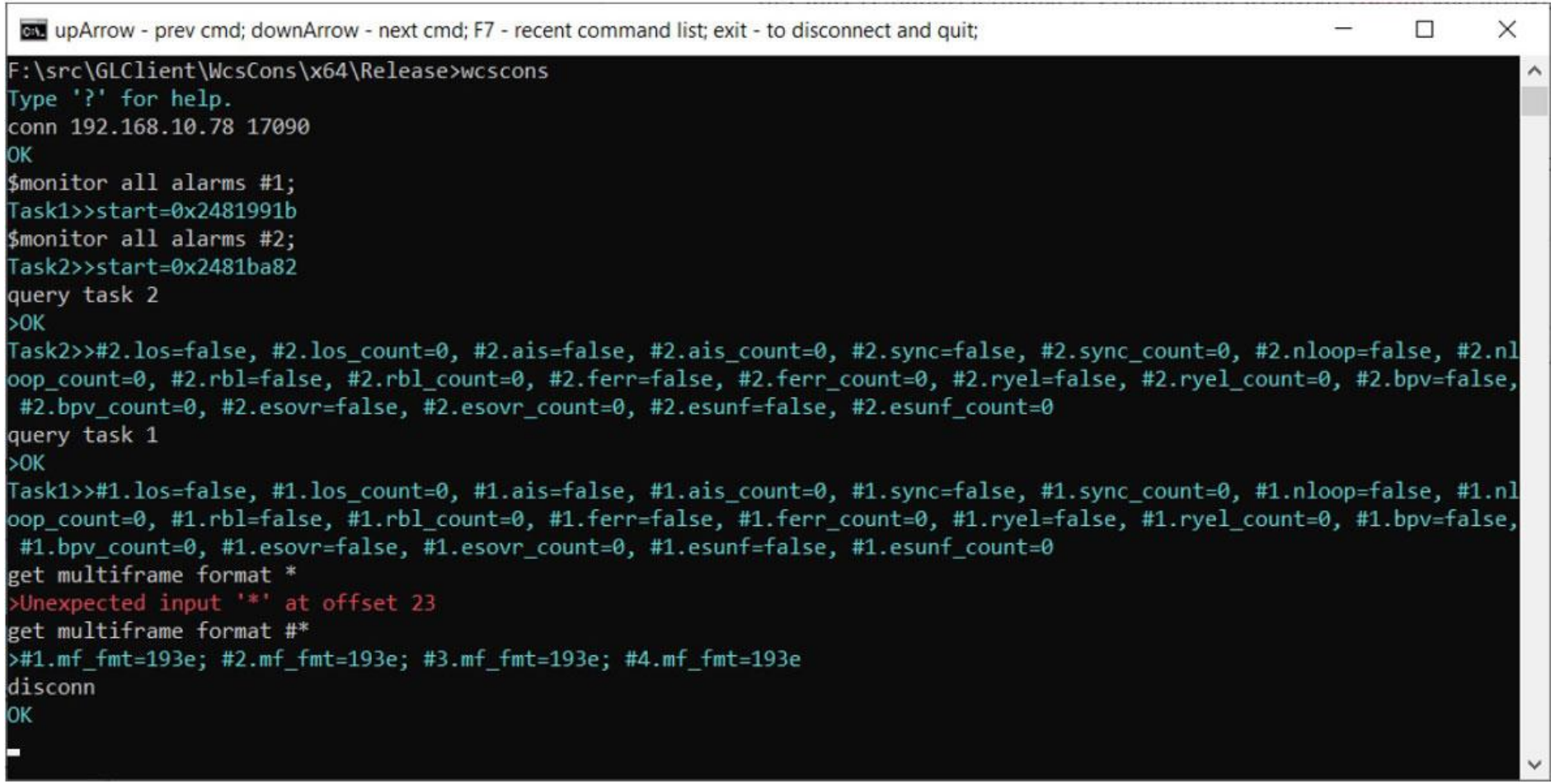
Windows/Linux Client Console

- Windows/Linux Client (WLC) is a Command Line Interface (CLI) application that issues commands to T1 E1 WCS server and display replies into Console/PowerShell/Terminal Windows. WLC works in Windows® and Linux® versions. However, through SSH or another remote access terminal it can be used on any operating system. WLC is a portable Windows/Linux WCS client communication library compatible with WCS server



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Launch the Server

- Launchpad specifies which TCP/IP port should be used to listen for incoming connection requests from clients, as well as the messaging options (ASCII or binary, version 3 or 4)
- The version 4 messaging strategy improves the reliability of message reception at the other end of the communications link

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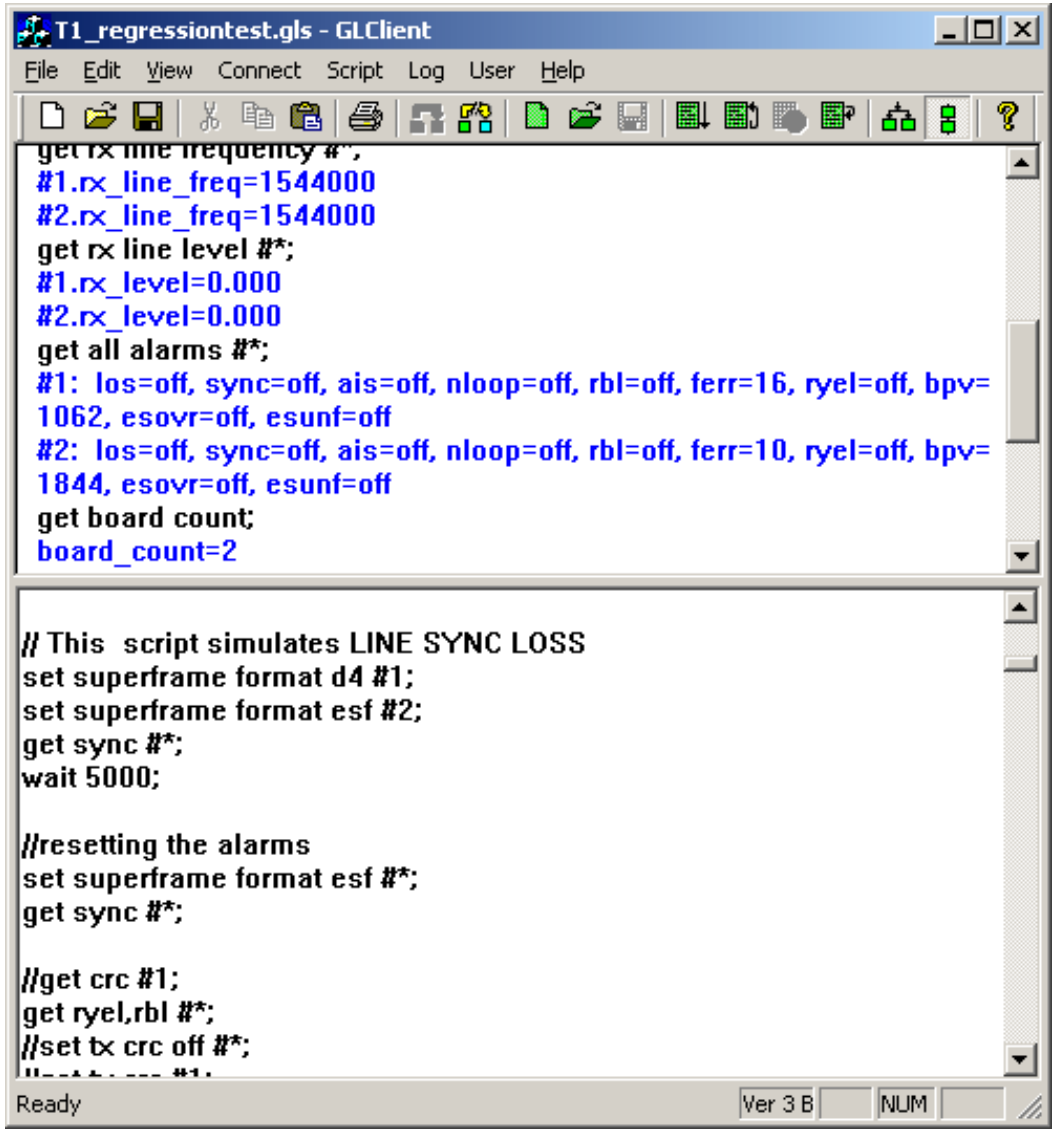
T1 E1 Client

- In the lower workspace area, the client users key in commands or load in commands from previously saved files
- The upper log area displays the script and the server responses



WCS Basic Commands Provisioning T1 E1 Cards

- Card Type and Count
- Idle Code
- Signaling Bits
- Audio Operations
- Loopback Settings
- Multi-frame (“Superframe”) Format
- Line Coding
- Transmit Unframed All 1s
- Signaling Modes
- Cyclic Redundancy Check (T1 E1)
- Receiver Interface
- Transmit Clock Source
- Transmit / Receive Equalizer Control
- Jitter Attenuation
- Network Loopback Detection
- International, National, and Extra Bits
- Frame and Multiframe Synchronization
- Drop / Insert
- Alarms
- Power

Tasks Control

- File Recording and Playback
- Bit Error Rate Test
- Error Insertion
- Alarm Monitoring
- Power Monitoring
- Signaling Bits Monitoring
- Tone and Digits Transmission
- Digit Detection
- Advanced Tone Generation and Detection
- Awaiting Specified Signaling Bits Patterns

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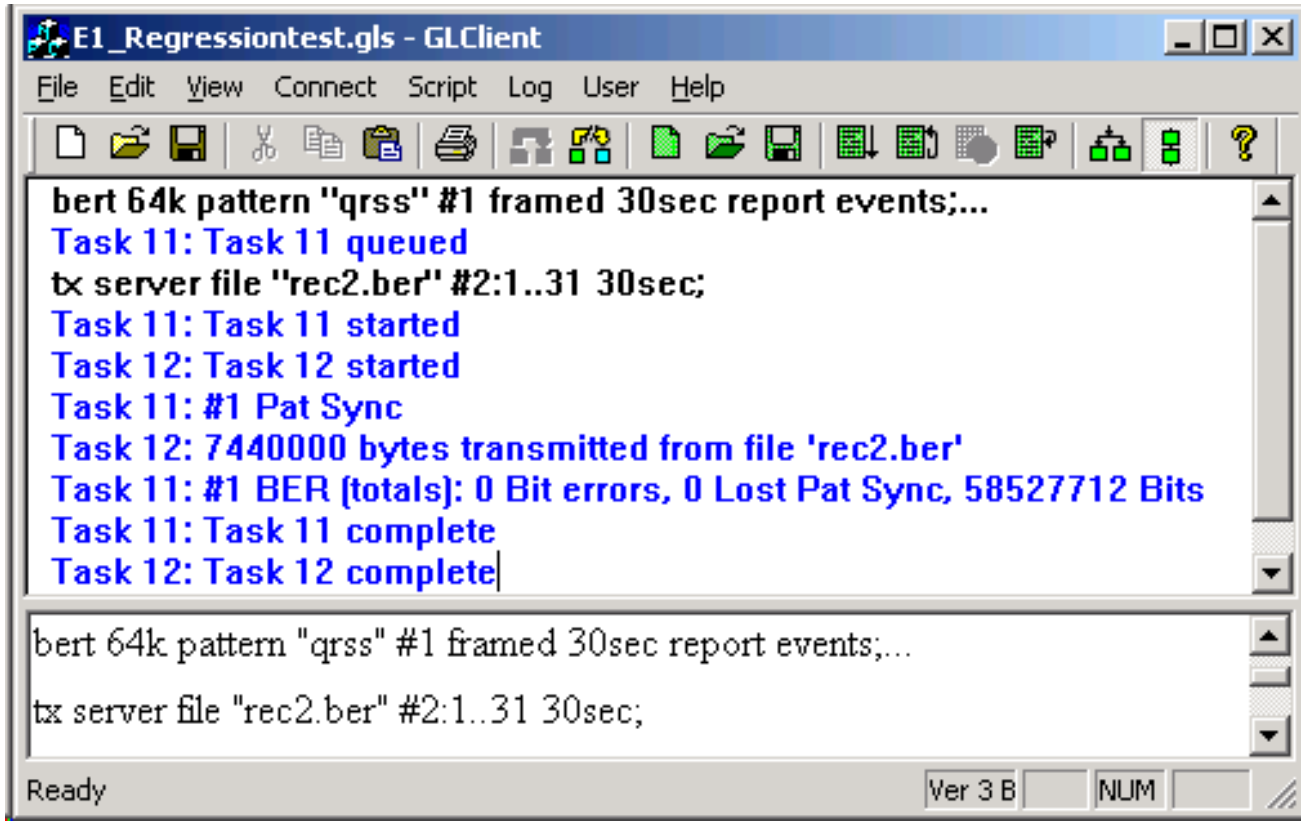
WCS Modules (DLL Based Commands)

- Place and Answer Calls
- Precision Delay Measurement
- Transmit and Receive Files (Module license #-XX610)
- Transmission and Detection of Digits (Module license #- XX620)
- Client-Server w/ CAS Simulator (Module license #- XX625)
- SS1 Emulation and Analysis (Module license # - XX626)
- ISDN Emulation (Module license #- XX629)
- Pulse Mask Testing
- DSP Operations (Module license #- XX630)
- Dynamic DSP Capability (Module license # XX631)
- Multi-Channel HDLC Emulation and Analysis and File based High Throughput HDLC Record / Playback (Module license #- XX634)
- PPP, MLPPP, and Multi-Channel Emulation and Analysis (Module license #- XX635, 36)

WCS Modules (DLL Based Commands Contd.)

- File based HDLC Record / Playback and Remote Record / Playback Module (Module license #- XX640, 41)
- File based TRAU Record / Playback Module (Module license #- XX645)
- Multi-channel TRAU Emulation and Analysis Module (Module license #- XX646)
- File based HDLC Record / Playback over SA bits Module (Module license #- XX650)
- MAPS-ISDN (Module License# - XX648)
- MAPS-SS7 (Module License # - XX649)
- Multi-link Frame Relay Emulation Module (Module license #- XX655)
- File based HDLC Record / Playback over FDL Module (Module license #- XX660)
- Multi-Channel Rx BERT Module (Module license #- XX670)
- Client-Server w/ Traffic Classifier (Module license #- XX680)
- SS7 Decode Agent (Module license #- XX690)
- ISDN Decode Agent (Module license #- XX691)
- MAPS-GSM A Interface Emulator (Module License#- XX692)
- MAPS-GSM Abis Interface Emulator (Module License#- XX693)

Transmit and Receive Files (Module license #-XX610)

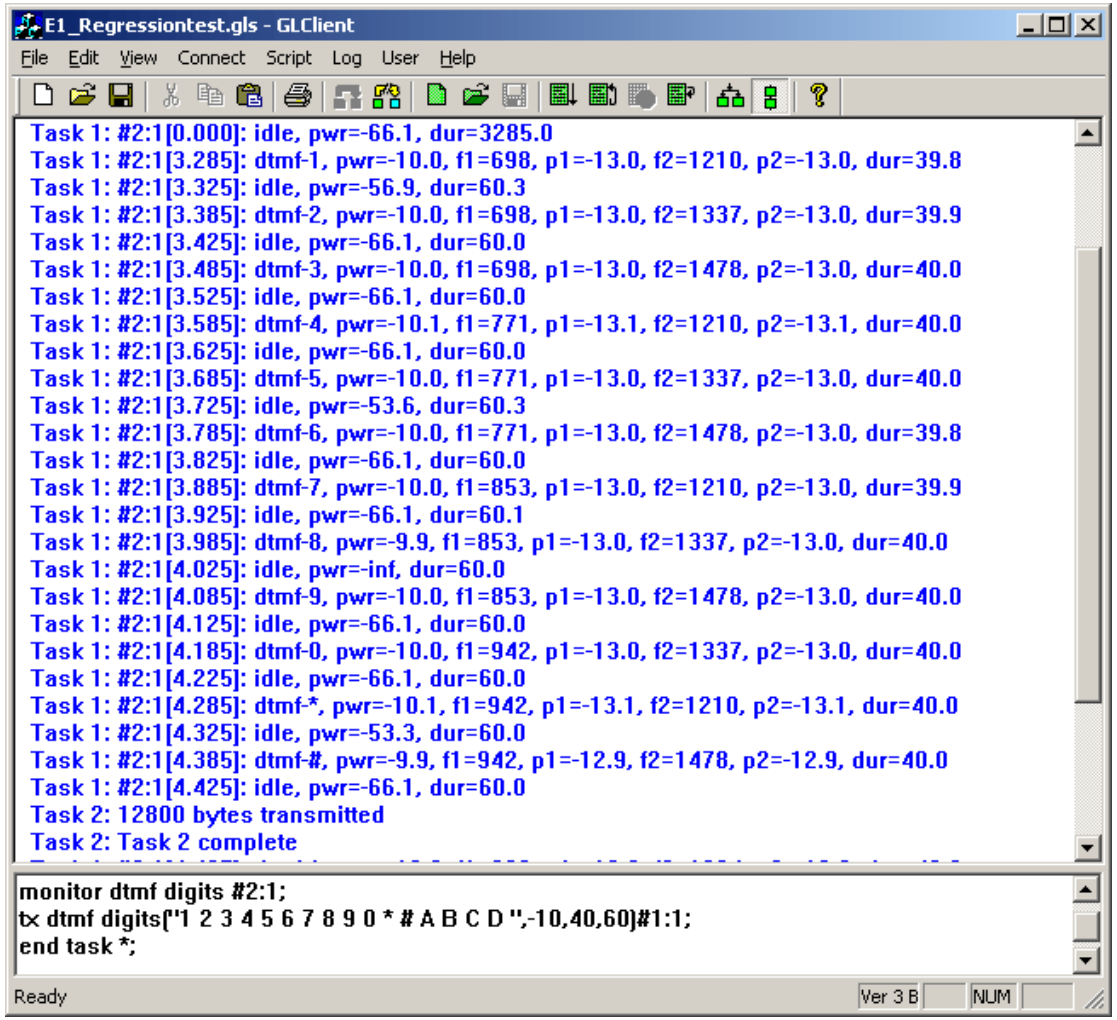


- Transmit only / Receive only on all or selected timeslots with one single command

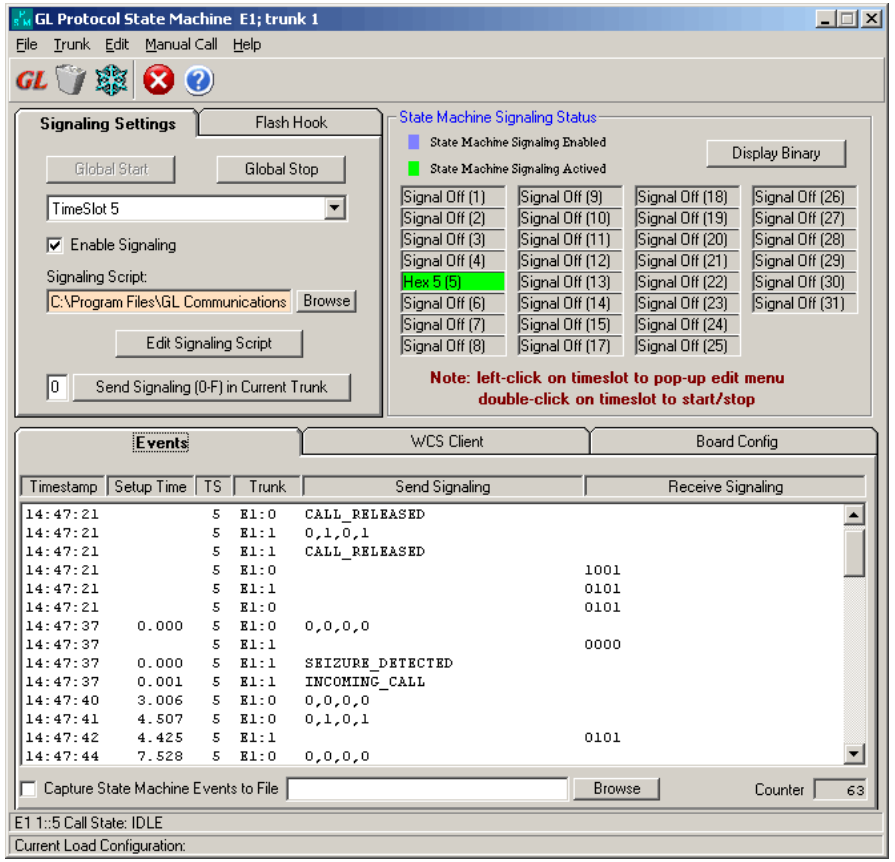
Transmission and Detection of Digits (Module license #- XX620)

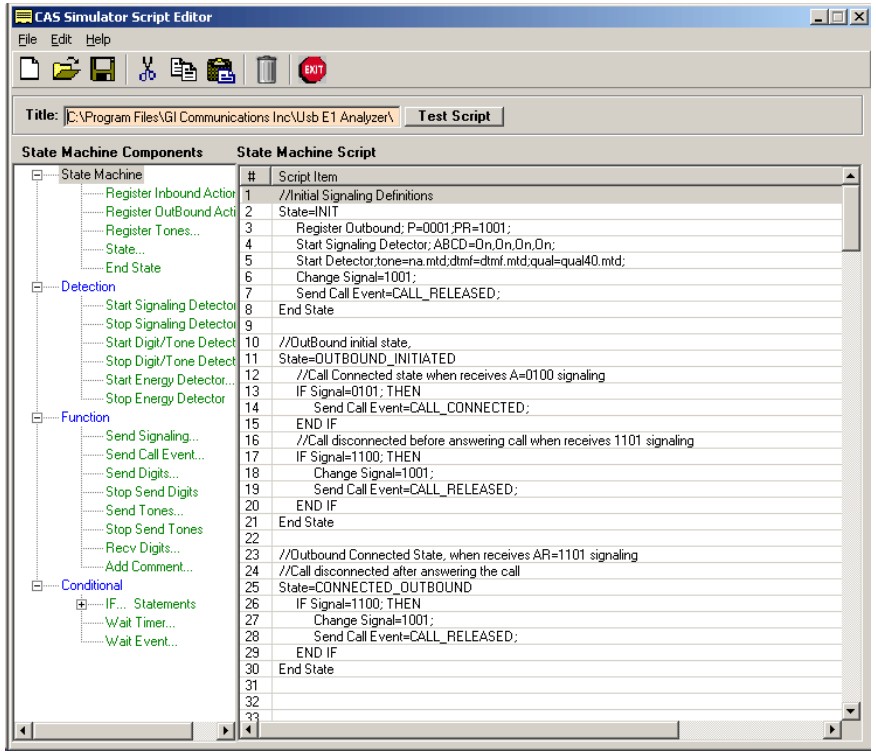
- Detects and reports DTMF/MF/MFC-R2 digits on channels as they occur

Sample script for Transmitting and Monitoring DTMF Digits



CAS Simulator (Module license #- XX625)

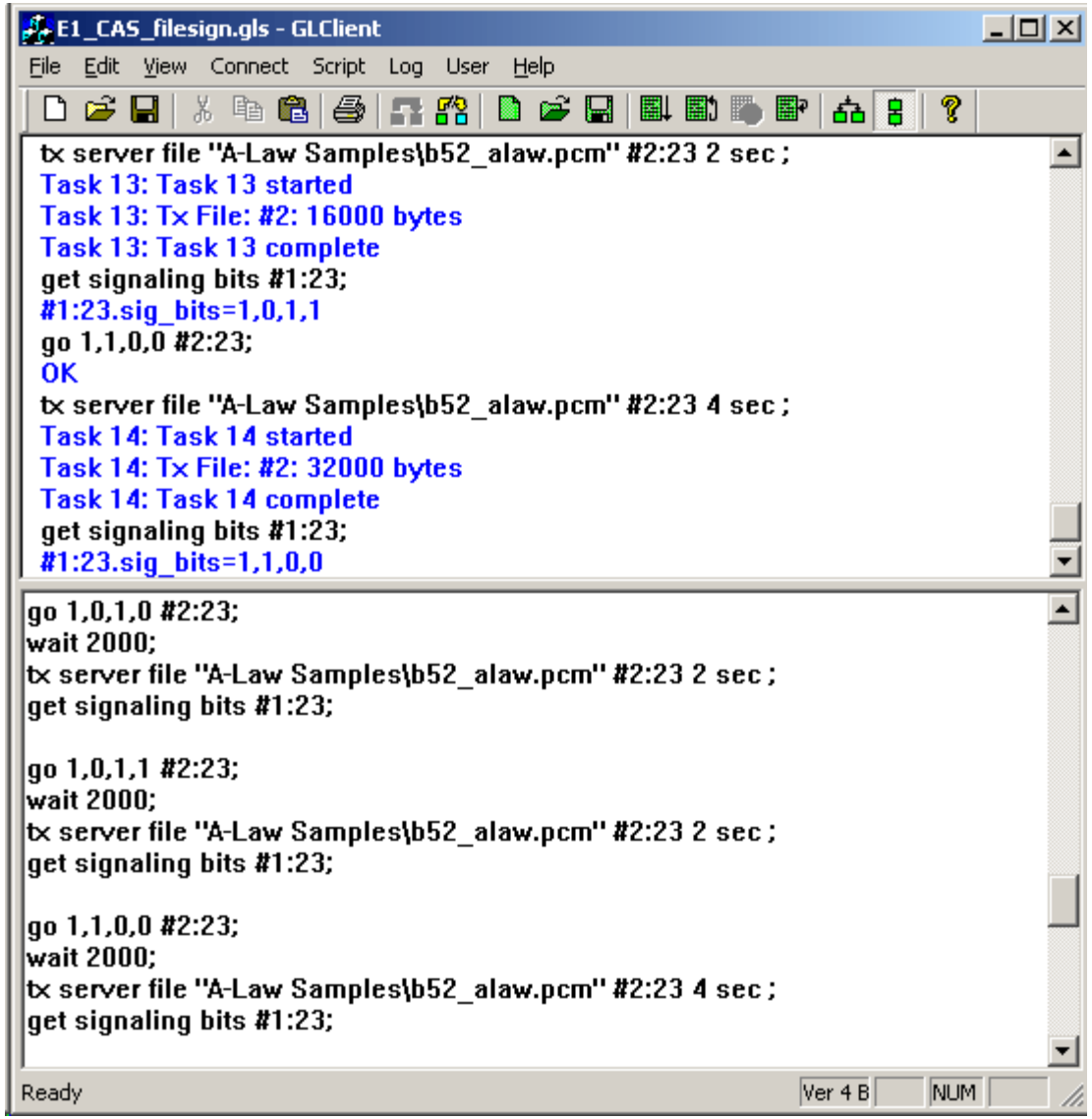




- CAS simulation using GUI based client-side application
- Simulates and analyzes any user-defined CAS protocols by providing signaling bit transitions and forward / backward frequency tones / digits

CAS Simulator

- CAS simulation using client-server command line application
- Create user-defined CAS scripts with a script editor
- Supported Protocols:
  - E1 MFC-R2 (All variants, fully/semi compelled)
  - T1 Winkstart (R1 wink)
  - T1 Loopstart
  - T1 Groundstart
  - E1 European Digital CAS (EUC)
  - User-defined CAS Protocol



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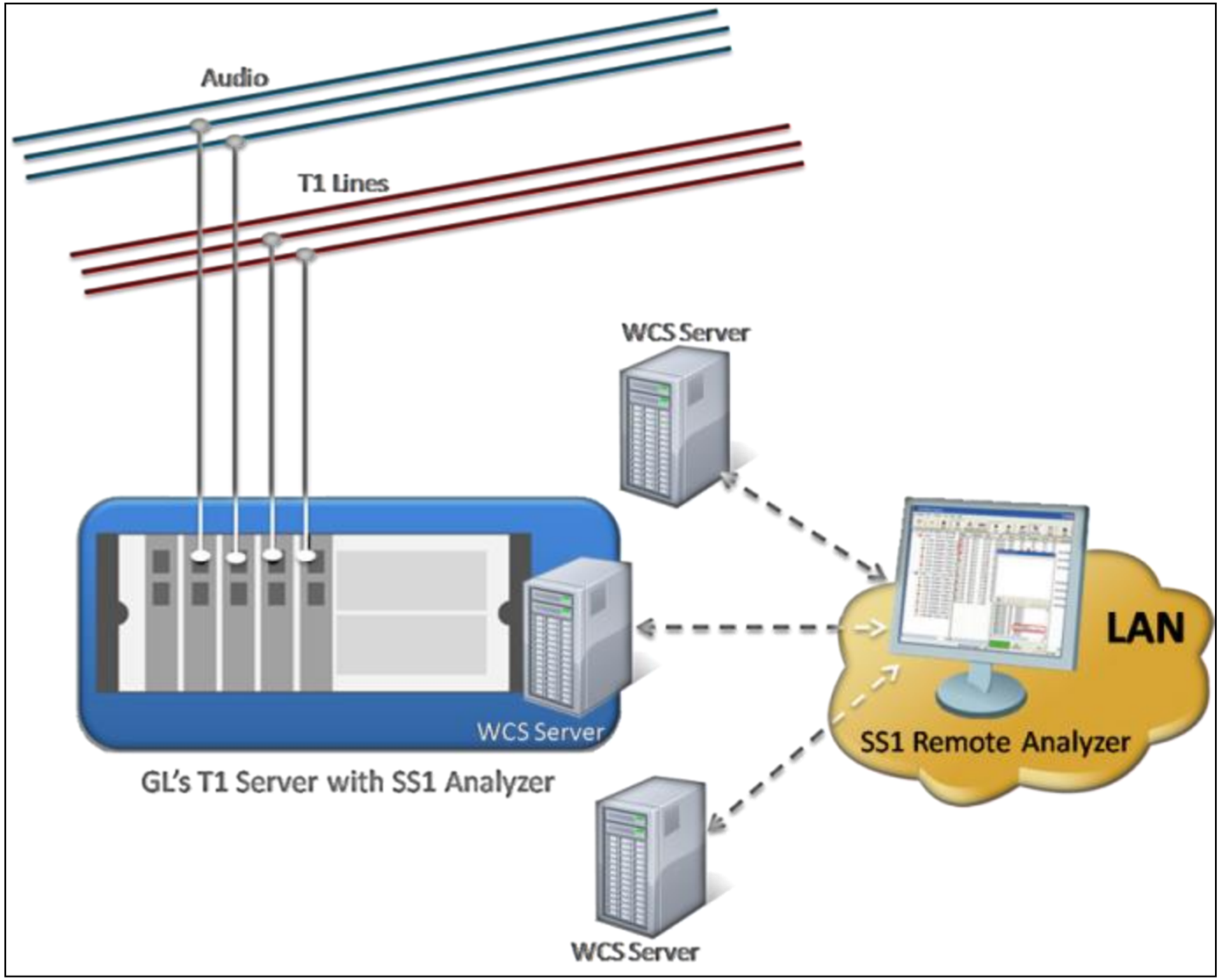
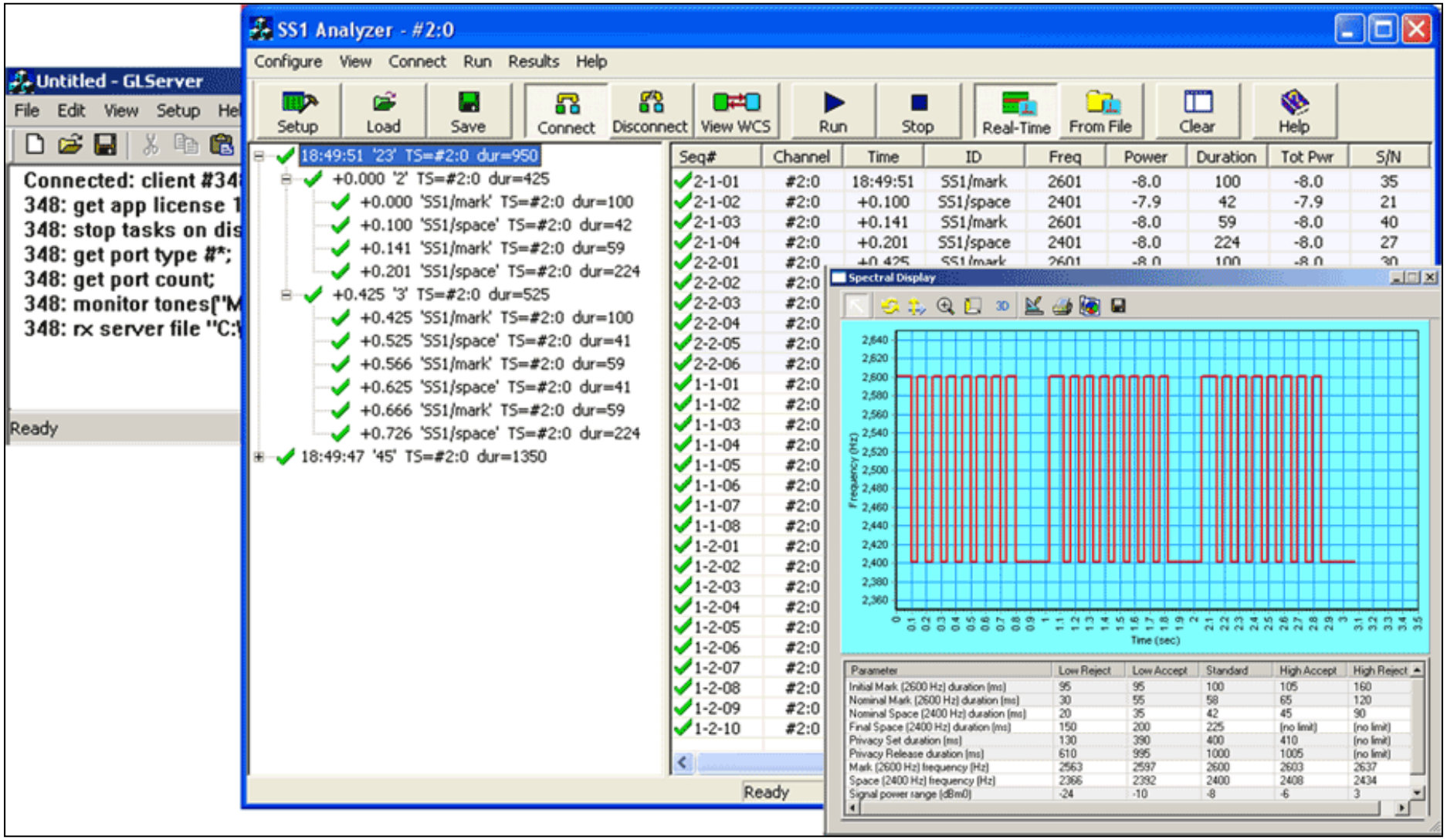
Real-time/ Remote SS1 Emulator and Analyzer (Module License # - XX626)



Highlights

- Supports Remote, Real-time and File-based analysis using client-server based SS1 Analyzer
- Analyzer can capture either TDM or VF audio signals
- Analyzer can analyze either 2-digit or 3-digit dial codes
- Analyzer displays received dial codes, including the characteristics of the underlying tones
- Generate and introduce SS1 Dial Codes on Transmit Channels using SS1 Dialer
- Dual monitoring capability allows multiple instances of SS1 analyzer to simultaneously tap E and W direction traffic
- Operate the SS1 Analyzer either remotely from the data acquisition site, or on the local PC
- Spectral Graph feature presents a captured dial code as a graphical waveform

SS1 Analyzer (Module License # - XX626)



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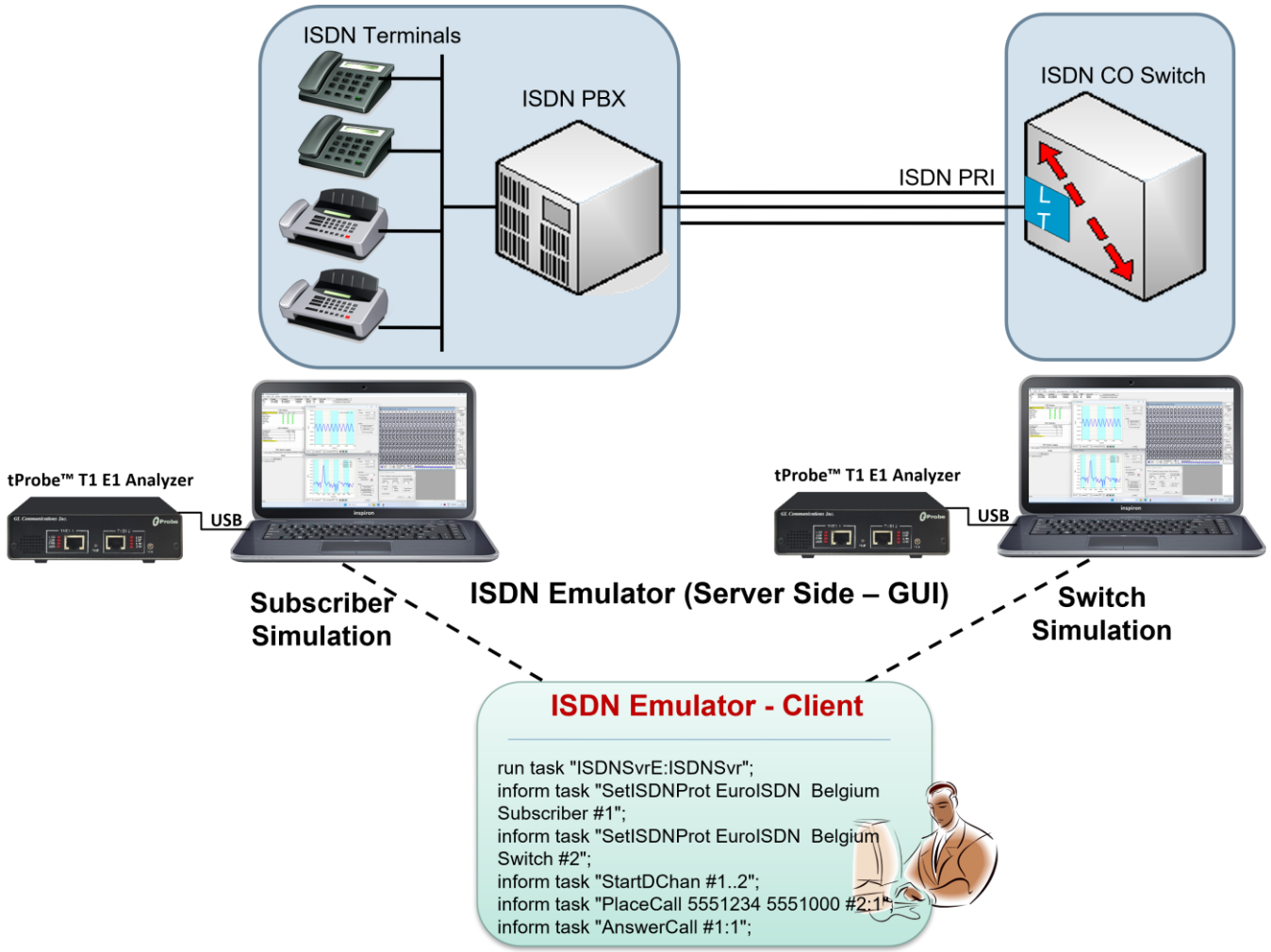
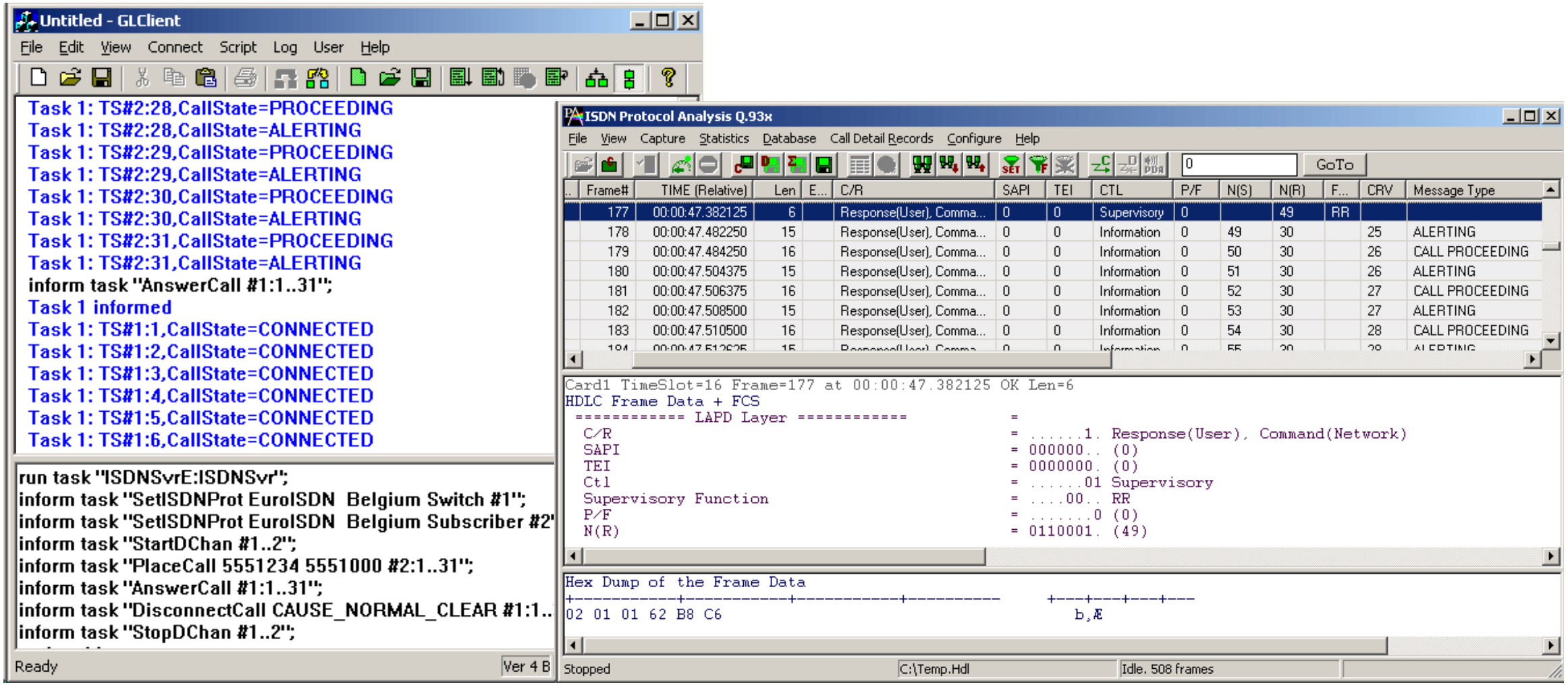
ISDN Emulation (Module license # - XX629)

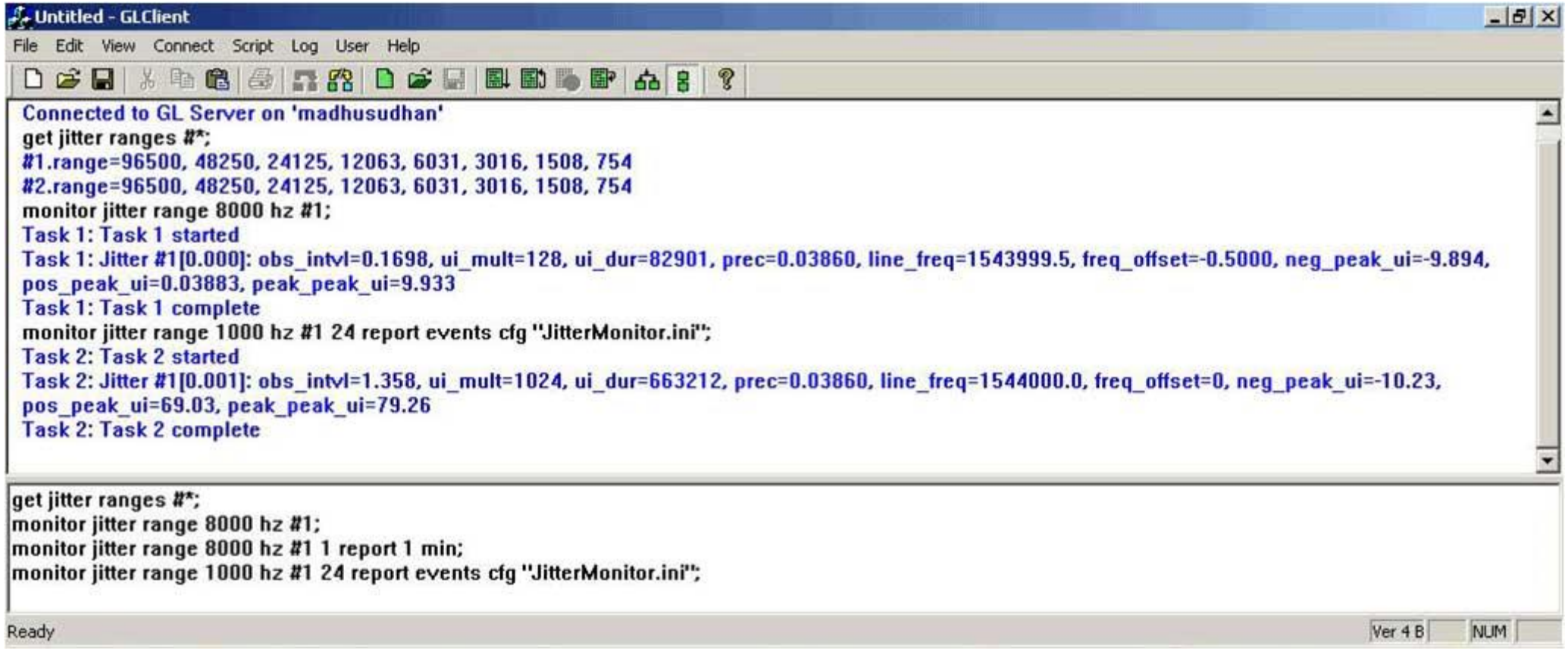


Sample script for Placing and Answering ISDN calls

- Place and Answer ISDN Calls
- Monitor all link state and call state



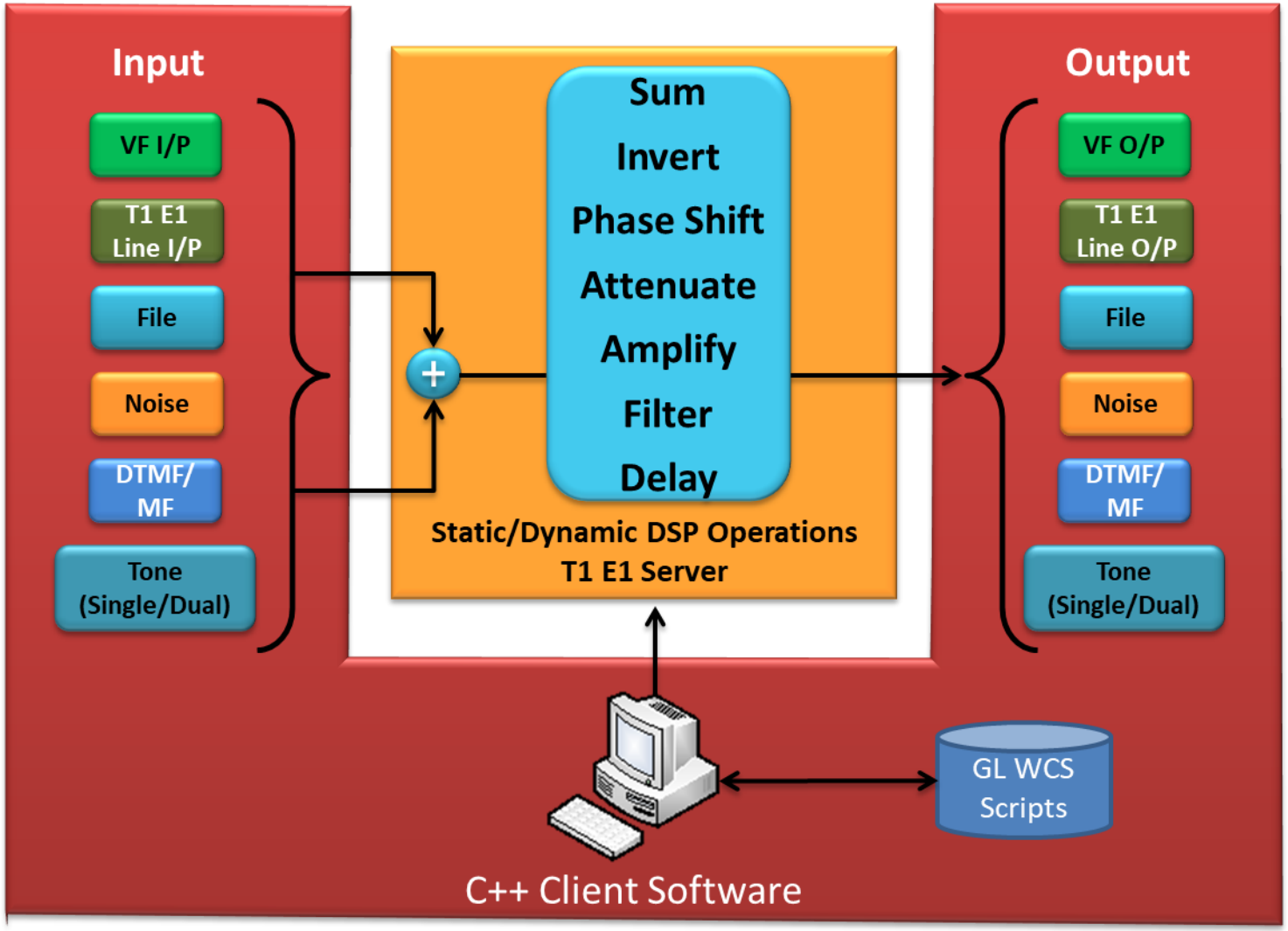
WCS Jitter Measurement



- Monitor Jitter ranges and perform Jitter measurement through Windows Client-Server commands

Digital Signal Processing (DSP) (Module license #- XX630)

- Static Operators - provides the ability to specify a sequence of digital signal processing steps to be performed on incoming and/or outgoing timeslots
- Dynamic Operators - perform dynamic or time-varying operations via schedules, which specifies a sequence of digital signal processing steps to be performed at specified time offset for each operator on incoming and/or outgoing signals



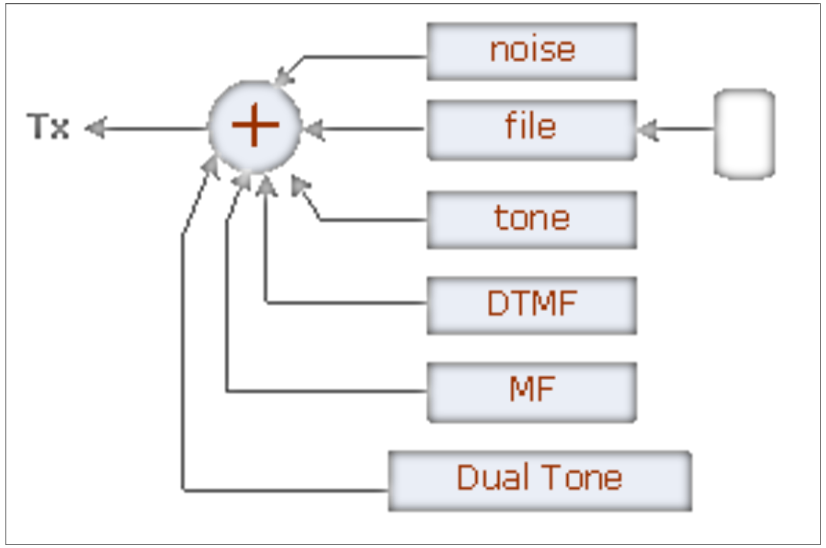
Static DSP Operations

- Following functions can be performed using Static DSP operators:
  - Sum
  - Invert
  - Filter
  - Delay
  - Amplify
  - Attenuate
  - Bxor, Bor, Brev, Bnot, Band
  - Infile, Outfile
  - White noise, Tone, Dual Tone, Phase Shift, DTMF Digits, MF Digits, MFCR2 Digits
  - Power monitor, Signaling Bits monitor, Const, Bytes, and many others

Static DSP Operations

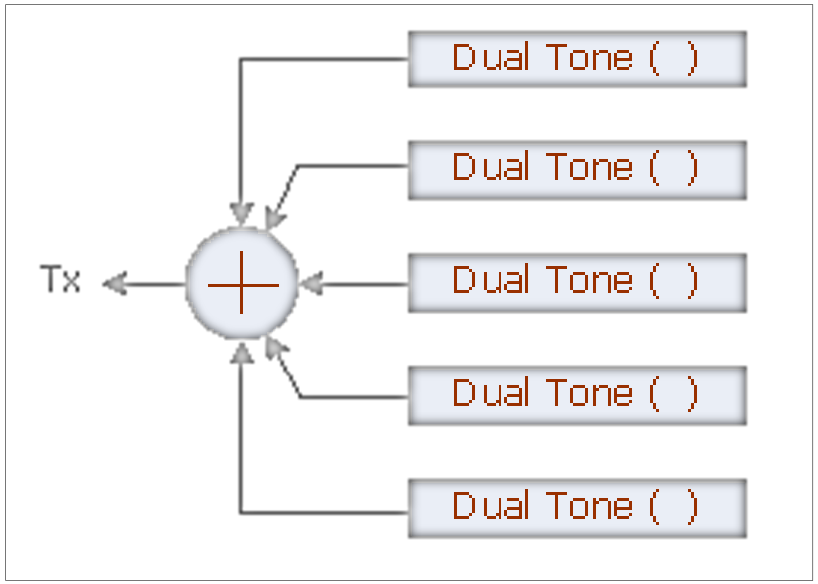
- Basic Static Operations for Echo Paths Simulation
- Sum digitally synthesized sources
- Sum multiple Dual tone generators
- Sum signal with delayed and attenuated version of itself
- Parallel echo paths summed with digitally synthesized tone / noise / file
- Sum signal with inverted version of itself
- Static Operations using C++ Client
- Transmit filtered tones and white noise
- Adding speech and noise to the receive data
- Adding noise and phase shift tone to the speech data
- Testing Arithmetical Functions on Incoming Bit Stream
- Double talk simulation for echo canceller testing

Static DSP Operations - Examples



Digitally synthesized generators of tone, noise, DTMF digits, MF digits, and dual tone are summed and transmitted into timeslot

Multiple dual tone generators with possibly different parameters are summed and transmitted into timeslot



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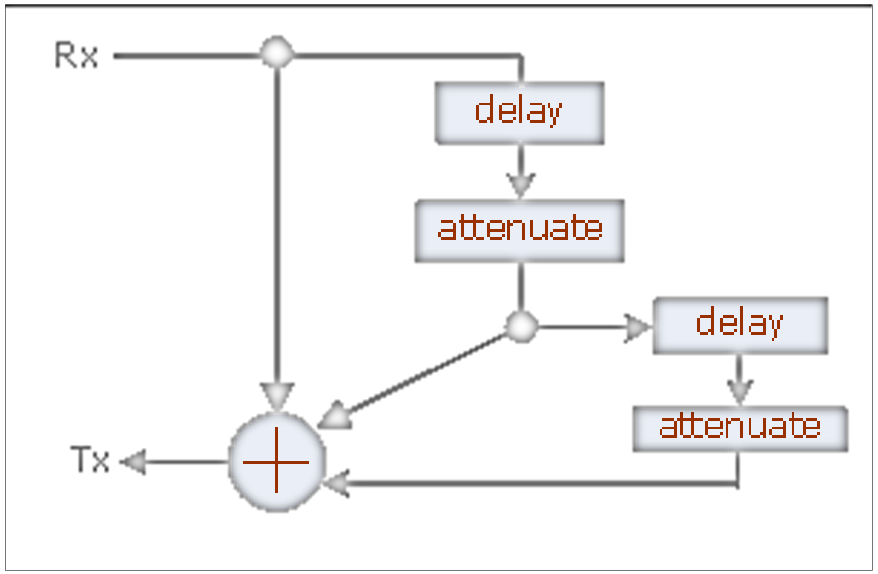
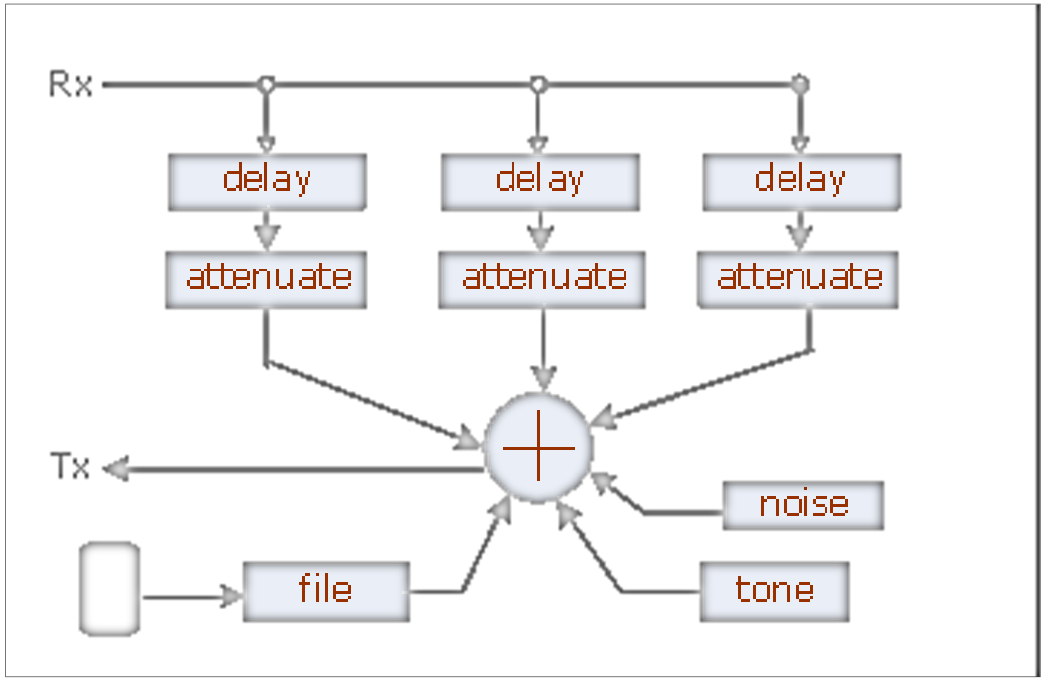
Static DSP Operations – Examples (Contd.)



Receive timeslot is summed with delayed and attenuated versions of itself and transmitted back

Three parallel echo paths are summed with a digitally synthesized tone and noise and a PCM file, a more complex structure for echo path modelling



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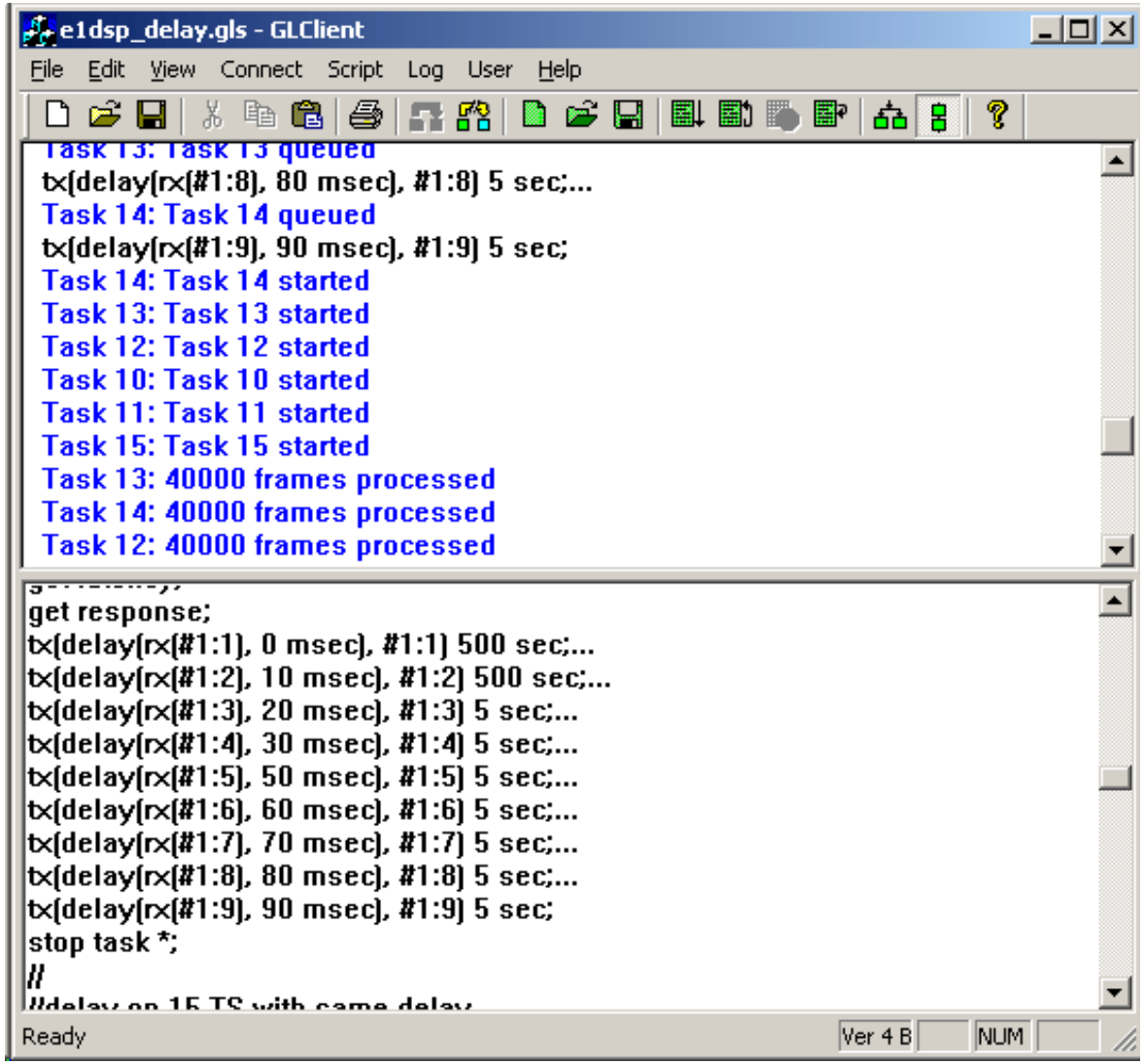
Static DSP Operations – Examples (Contd.)



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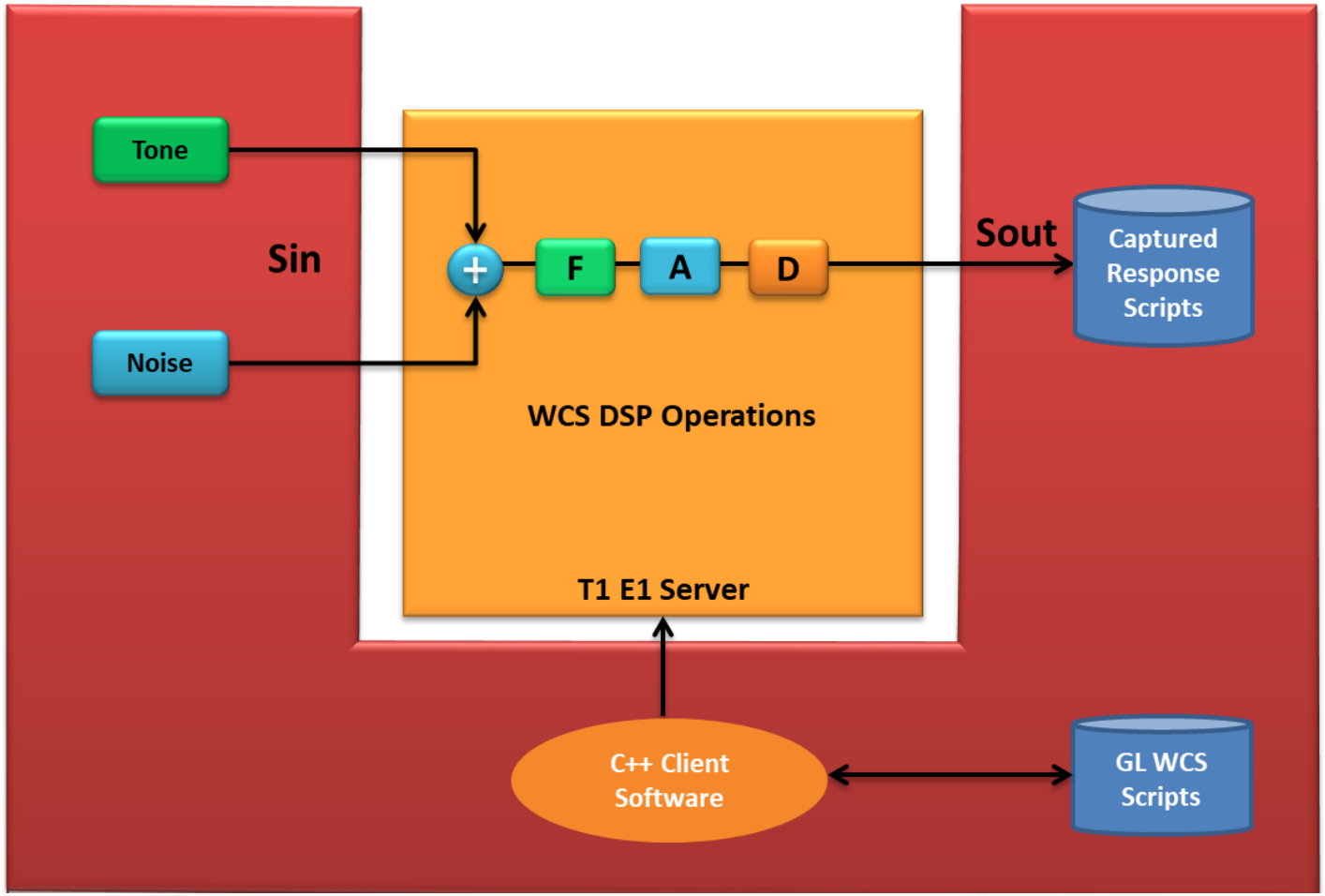
Dynamic Digital Signal Processing (DSP) (Module license #- XX631)

- Scripted DSP commands provide the ability to specify a sequence of digital signal processing steps to be performed on incoming and/or outgoing timeslots
  - The operations can be made dynamic or time-varying via schedules
  - Schedules are categorized into Time, Operators, Transition, and Value



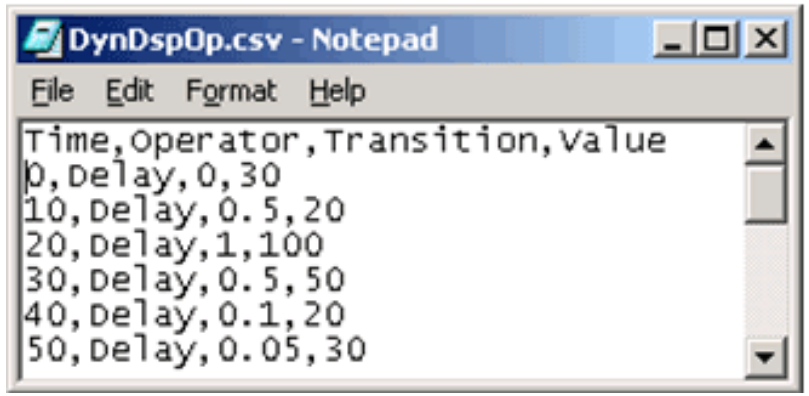
Dynamic DSP Operations

- Offline Dynamic DSP Operations
  - Amplify ("AmplifyDspOp" - dynamic amplification)
  - Attenuate ("AttenDspOp " - dynamic attenuation)
  - Delay ("DelayDspOp" - dynamic delay)
  - Filter ("FiltDspOp" - dynamic filter models)
- Real-time Dynamic DSP Operations
  - Delay / Attenuate ("AttenDspOp " and "DelayDspOp")
  - Filter ("FiltDspOp")

Example - Offline Delay Testing ("DelayDspOp")

DelayDspOp WCS Test Script

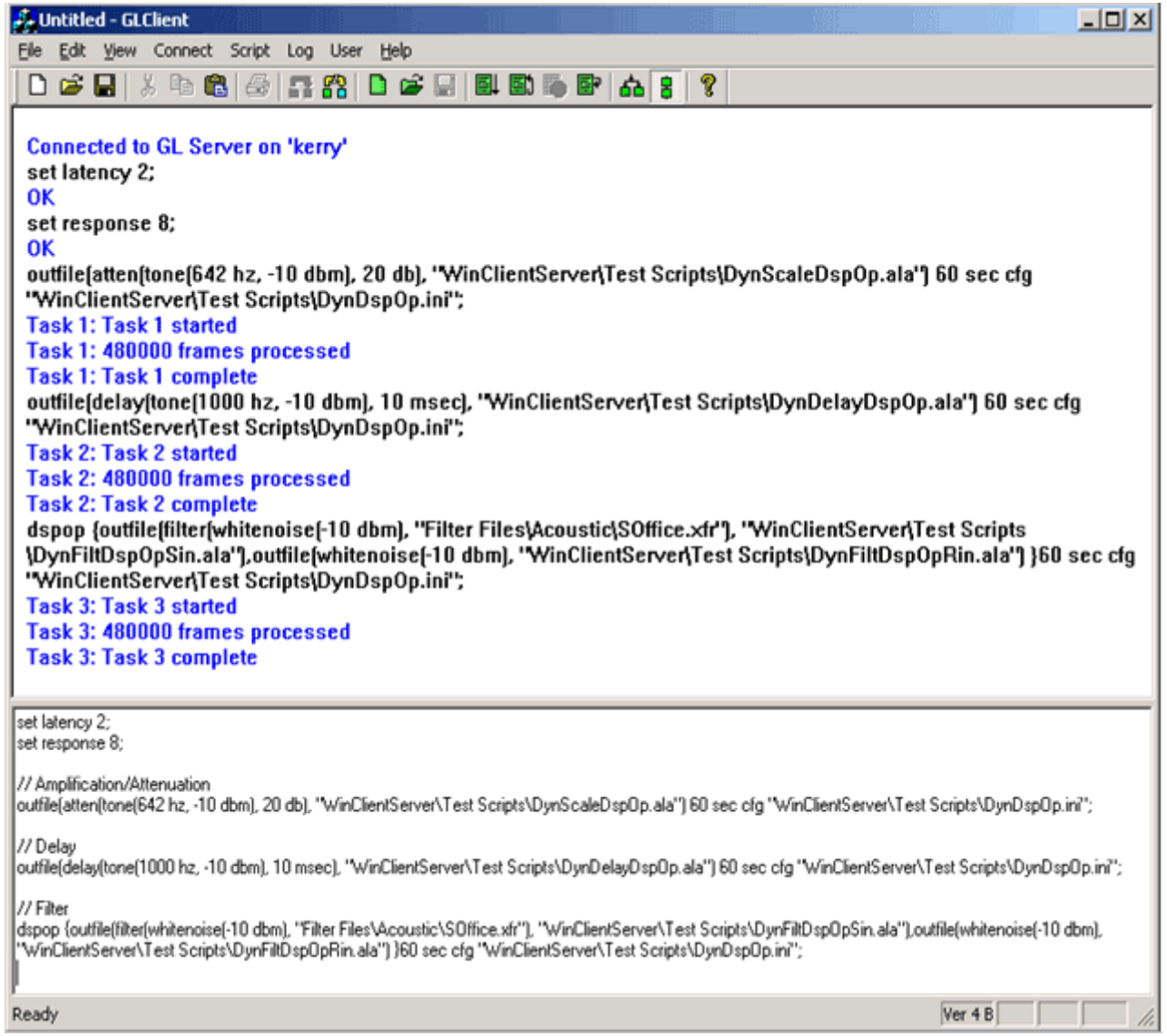
```
set latency 4;
set response 6;

// (2) Delay
outfile(delay(tone(1000 hz, -10 dbm), 10 msec), "WinClientServer\DynDspOp\
DynDelayDspOp.ala") 60 sec cfg "WinClientServer\DynDspOp\DynDspOp.ini";
```



Applicable Schedule

- Input tone is delayed as per the specified Time, Transition, and Values defined in the Schedule *.csv file

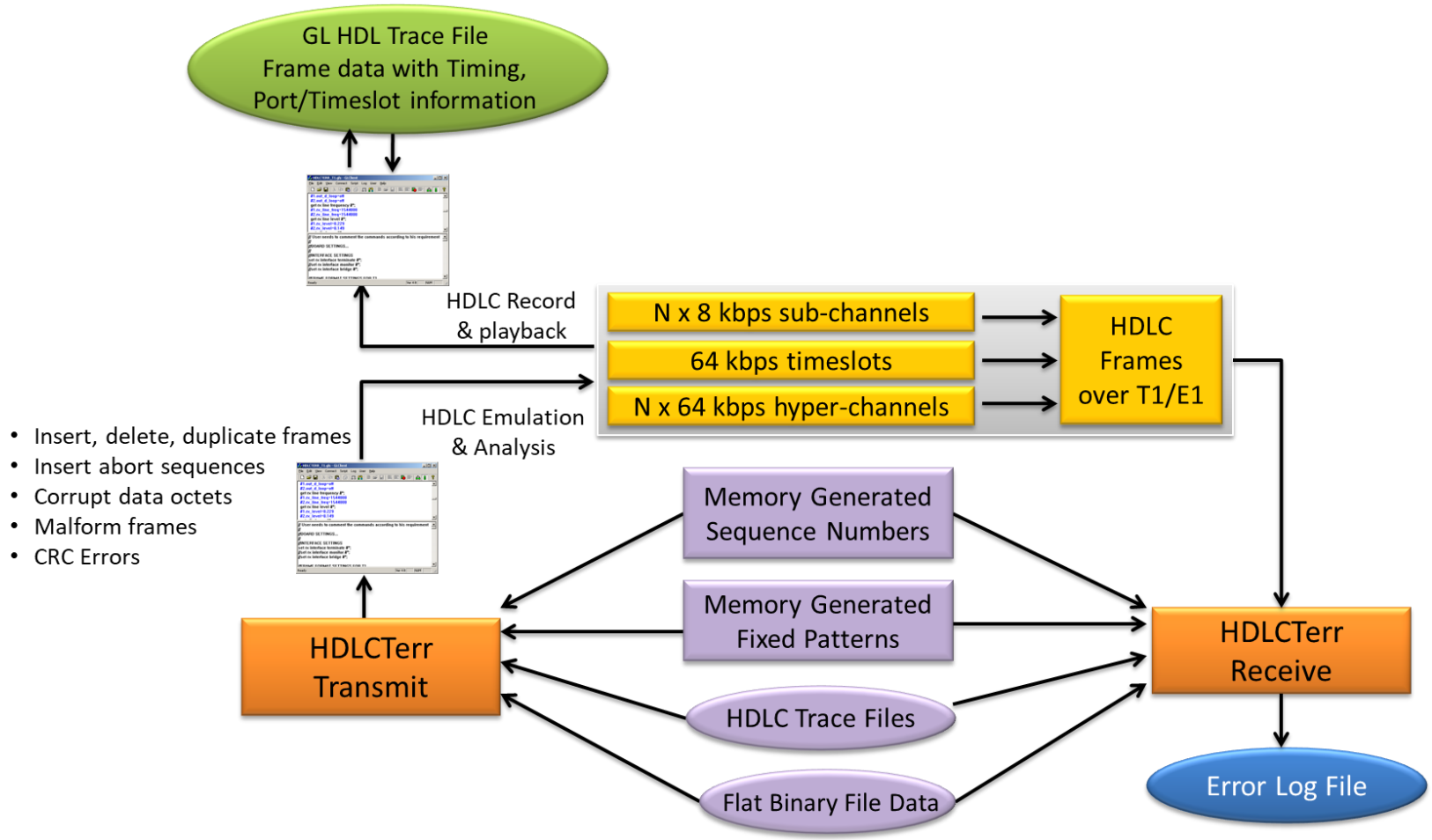
Dynamic Digital Signal Processing (DSP)



GL Communications

HDLC Emulation and Analysis (Module License #- XX634)

- Offers high throughput file–based HDLC record and playback (support for various bandwidth over multiple links and option to speed up / slow down the transmission)
- Performs multi-channel HDLC emulation and analysis



Overview

- The HDLCTerr module performs multi-channel HDLC emulation and analysis
- It permits frame error testing and transmission of memory generated sequences of fixed or variable length HDLC frames, GL *.HDL Trace file frames, and various bandwidth streams
- The HDLCHpio module performs file–based HDLC record and playback actions
- It permits receive / transmit of HDLC streams of various bandwidth (hyper channel, timeslot, and multiple sub-channel streams per timeslot)

Key Features

- Port, timeslot, subchannel translation
- Time preservation, speeding up and slowing down during playback
- Advanced performance support for multiprocessor computers
- Flexible transmit options
- Flexible receive options
- Extensive documentation
- Real-time counters
- Supports transmission and reception on Non contiguous timeslots
- Supports Octet and Bit Sync

Impairments

- Various impairments can be introduced before frames are transmitted. Global impairments (effective for all the HDL streams) can be specified as well as impairments can be introduced per stream basis before frame transmission
- One can specify a limited number of impairments, set continuous impairment in each frame, or apply impairment to each Nth frame leaving some frames intact
- The following types of Impairments can affect an entire HDL frame:
  - Frame deletion
  - Frame insertion
  - Frame duplication

Impairments (Contd.)

Impairments can also modify some octets in a frame at a certain offset and these include:

- Inserting octets
- Deleting octets
- Bitwise ANDing octets
- Bitwise Oring octets
- Bitwise XORing octets

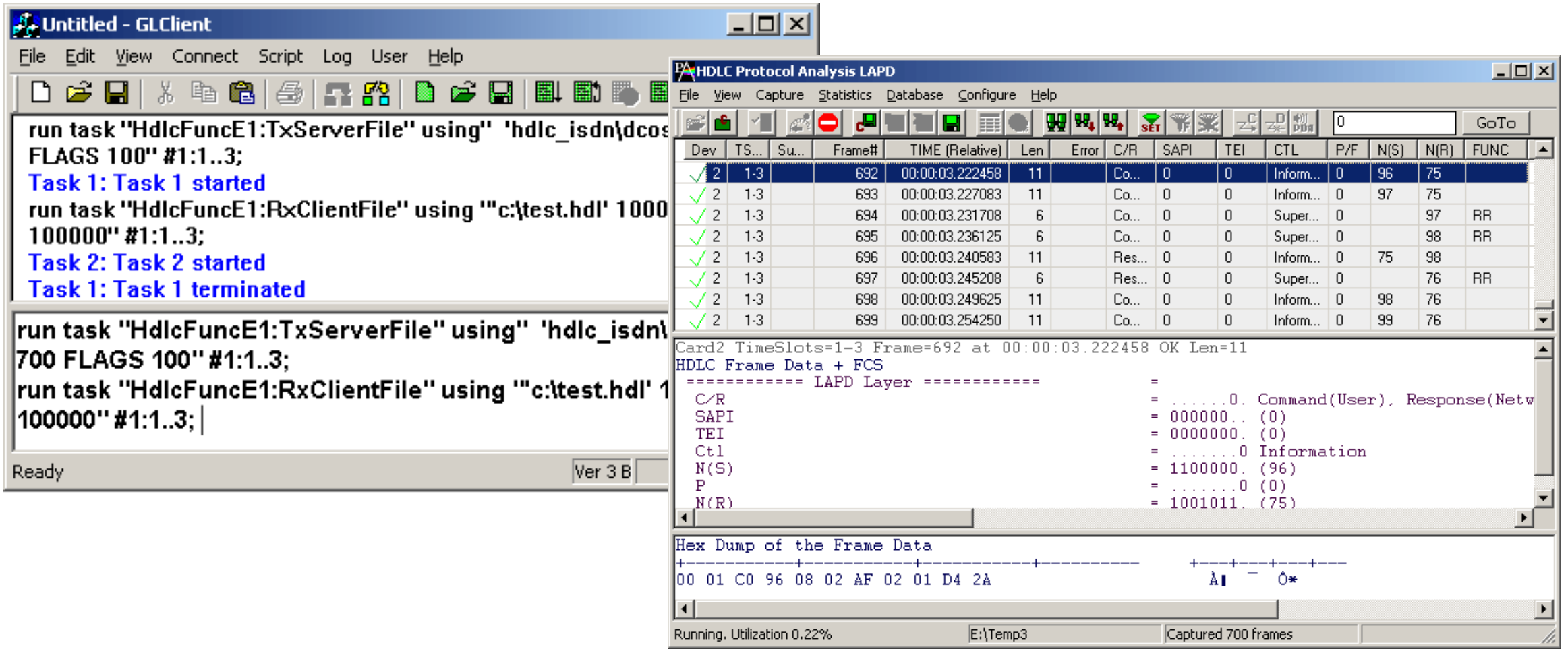
In addition the following frame structure impairments can be introduced:

- CRC (FCS) errors
- Frame errors (non-integral number of octets between flags)
- Abort sequences

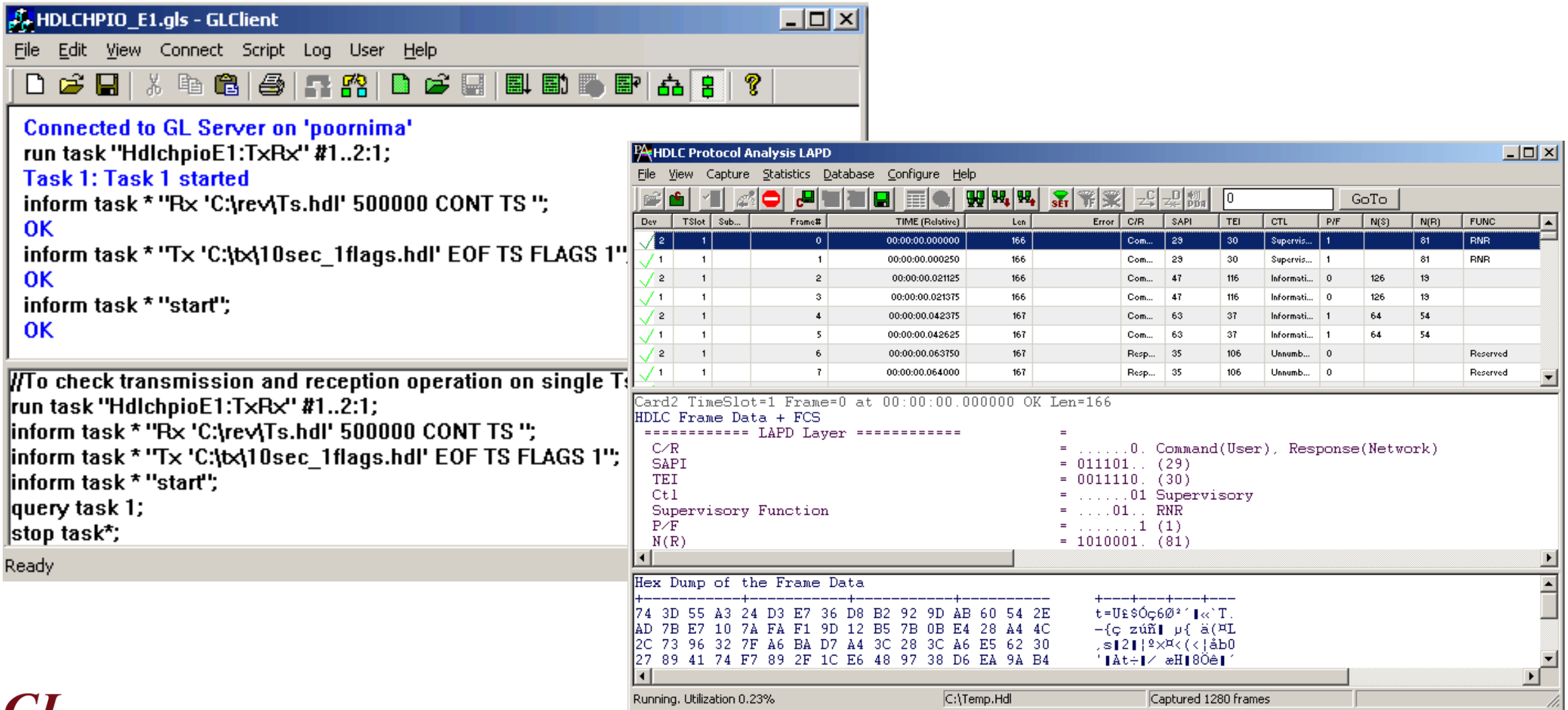
Tx/Rx Performance of HDLC

- Allows transmission/reception of *.HDL frames files located on the server and on client

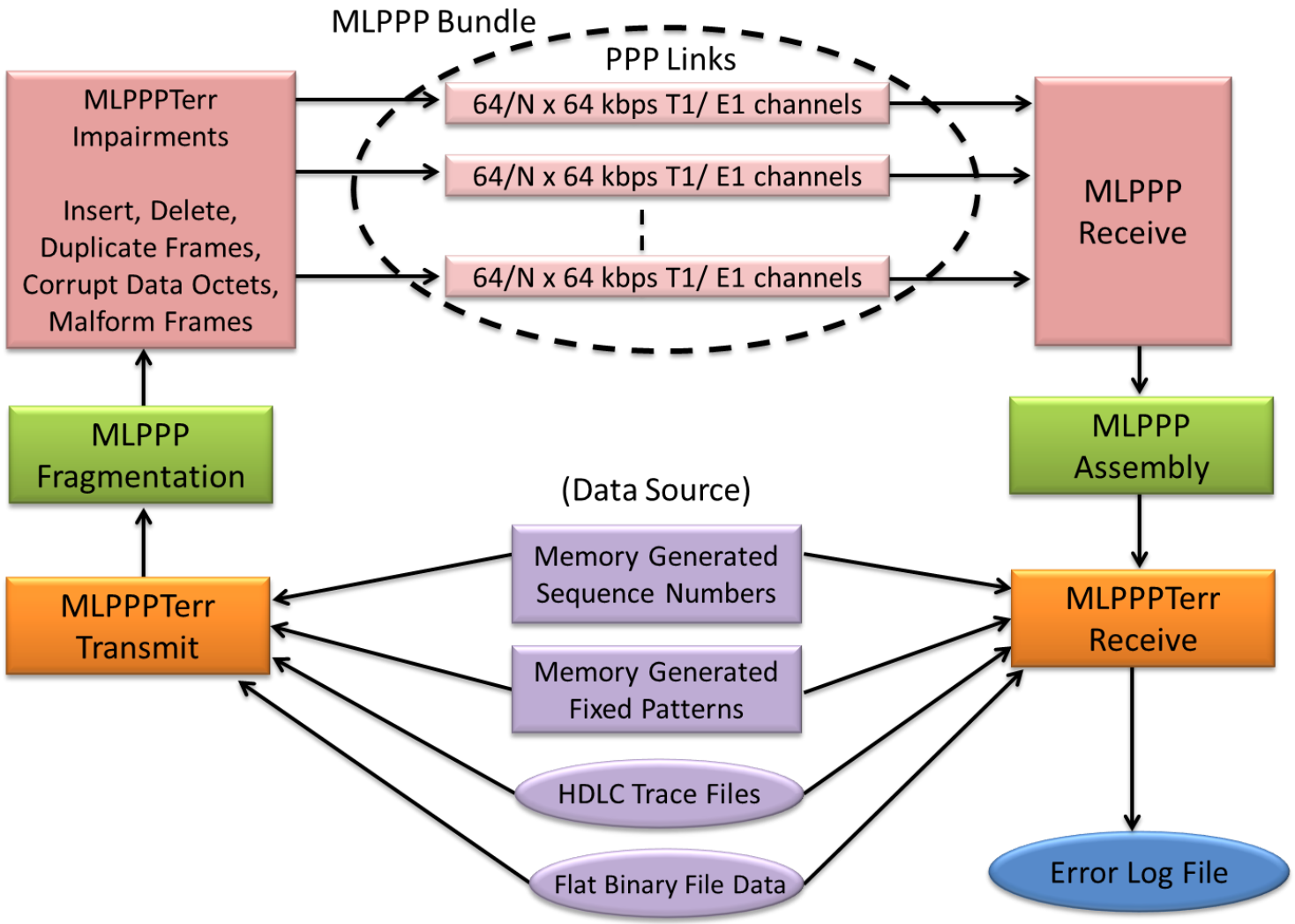
Sample Script for HDLC Capture / Playback



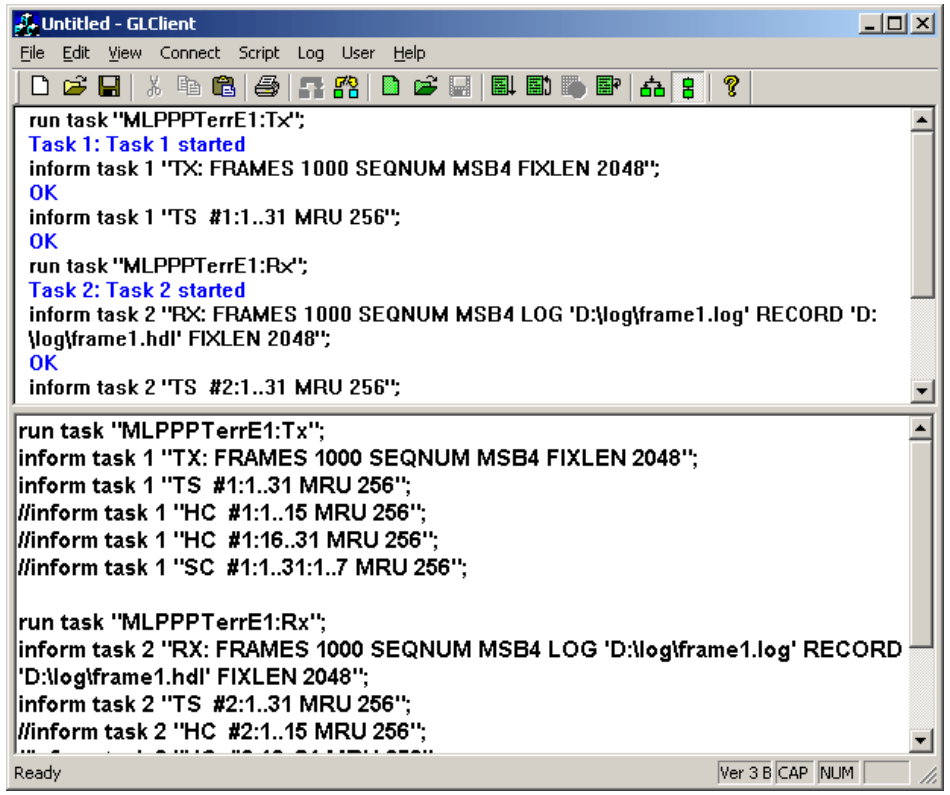
Sample Script for Multi-Channel File–based HDLC Record and Playback Actions

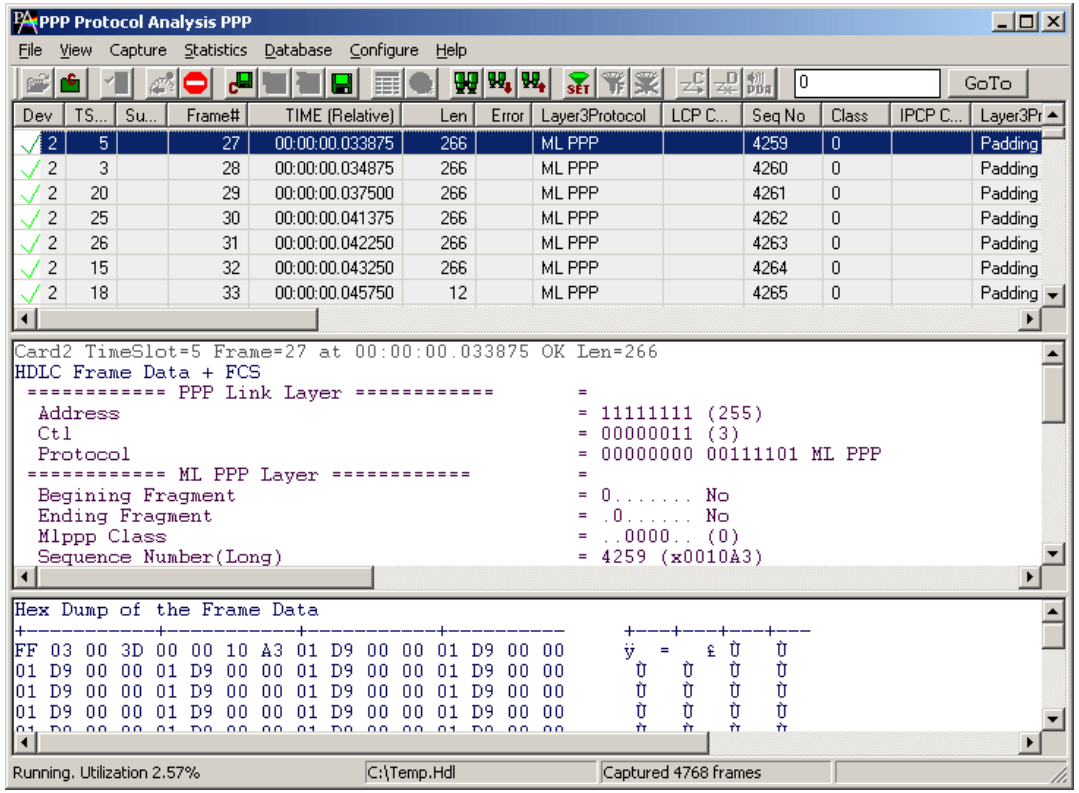


MLPPP Emulation and Analysis (Module License #- XX635, XX636, XX637)



Sample Script for Emulation and Analysis of MLPPP Frames





- Simulates MC-MLPPP and PPP protocols over T1 E1 links
- Offers GUI as well as command line interfaces

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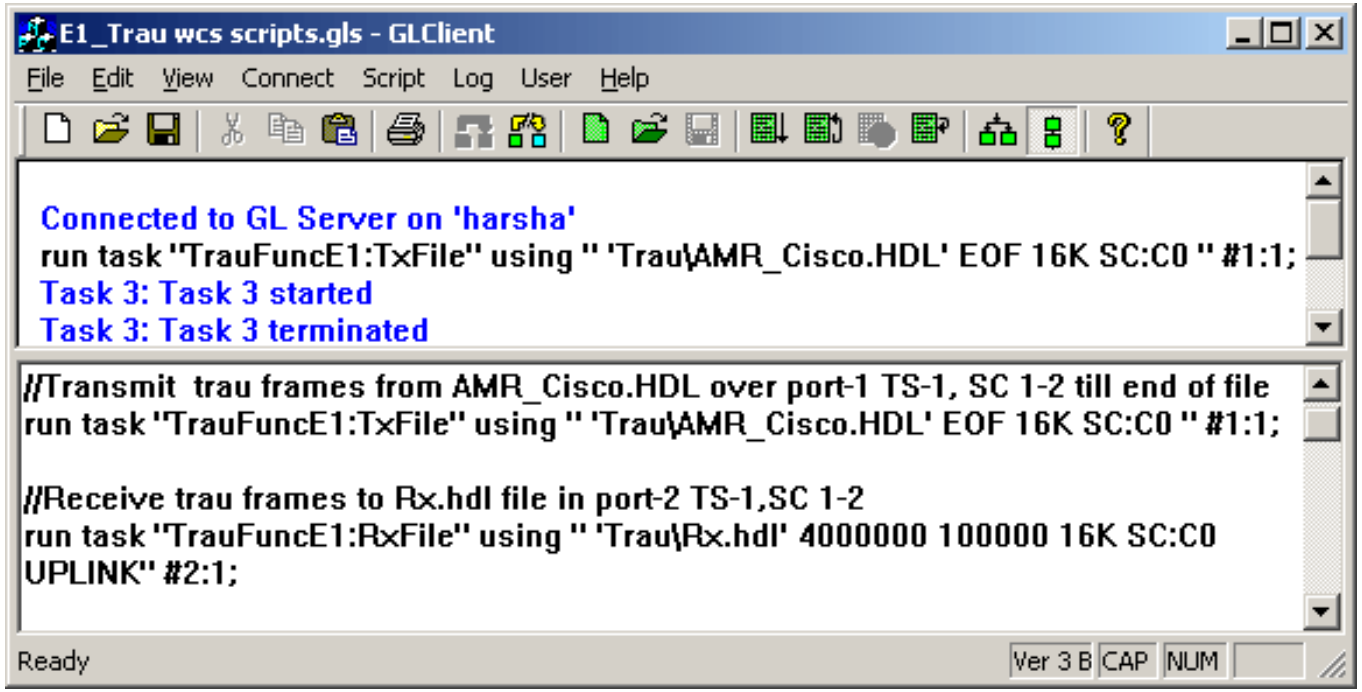
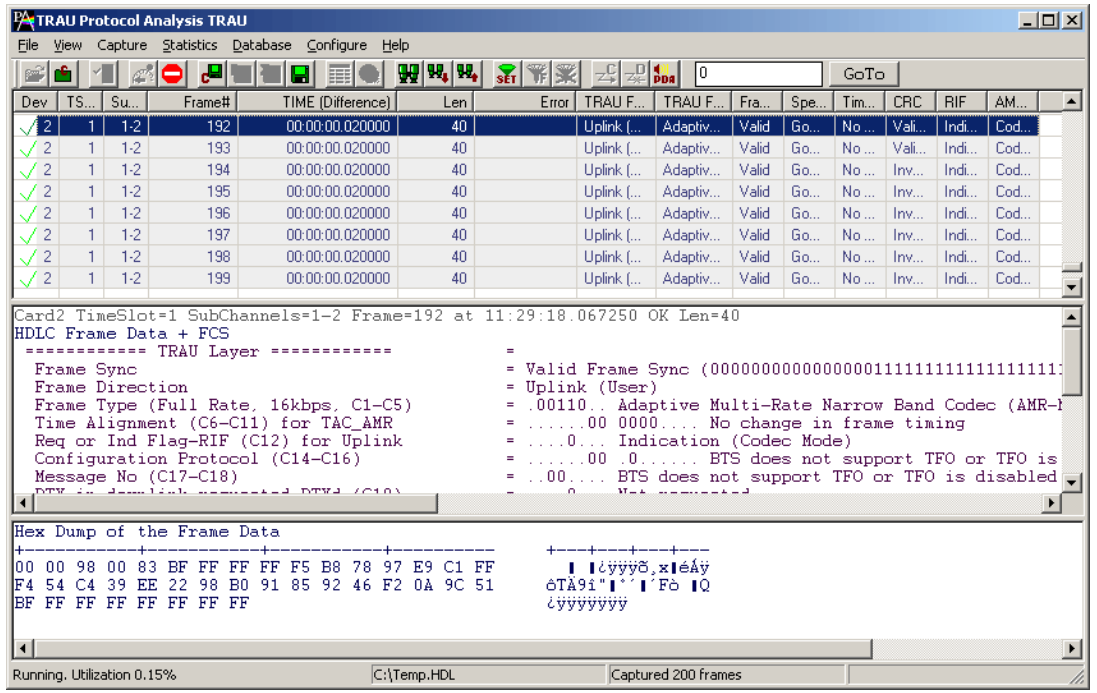
Tx/Rx Performance of TRAU
(Module license #- XX645)

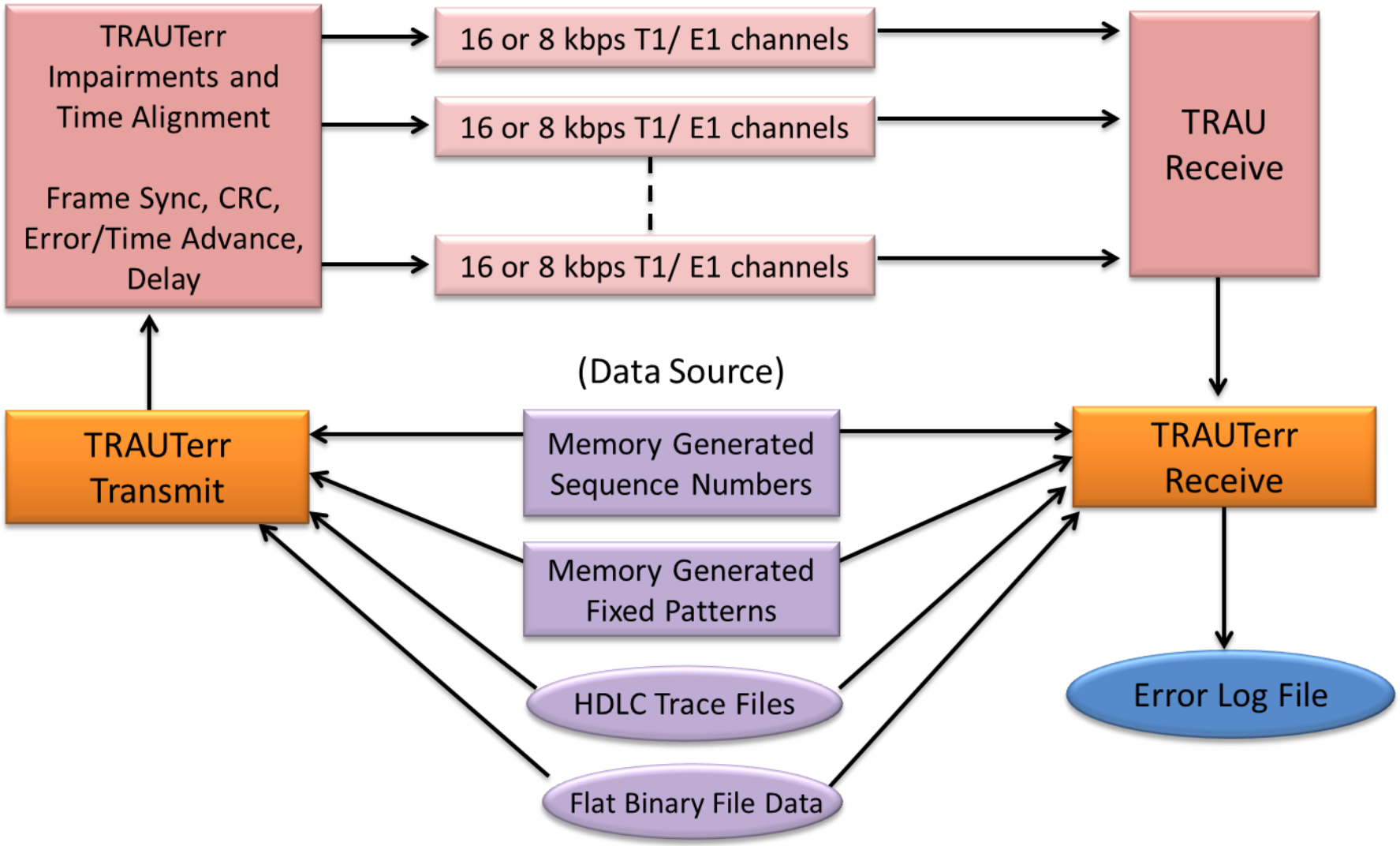
Sample script for Capture/Playback of TRAU traffic





- Receives and transmits TRAU frames in .HDL file format

TRAU Emulation and Analysis
(Module license #- XX646)



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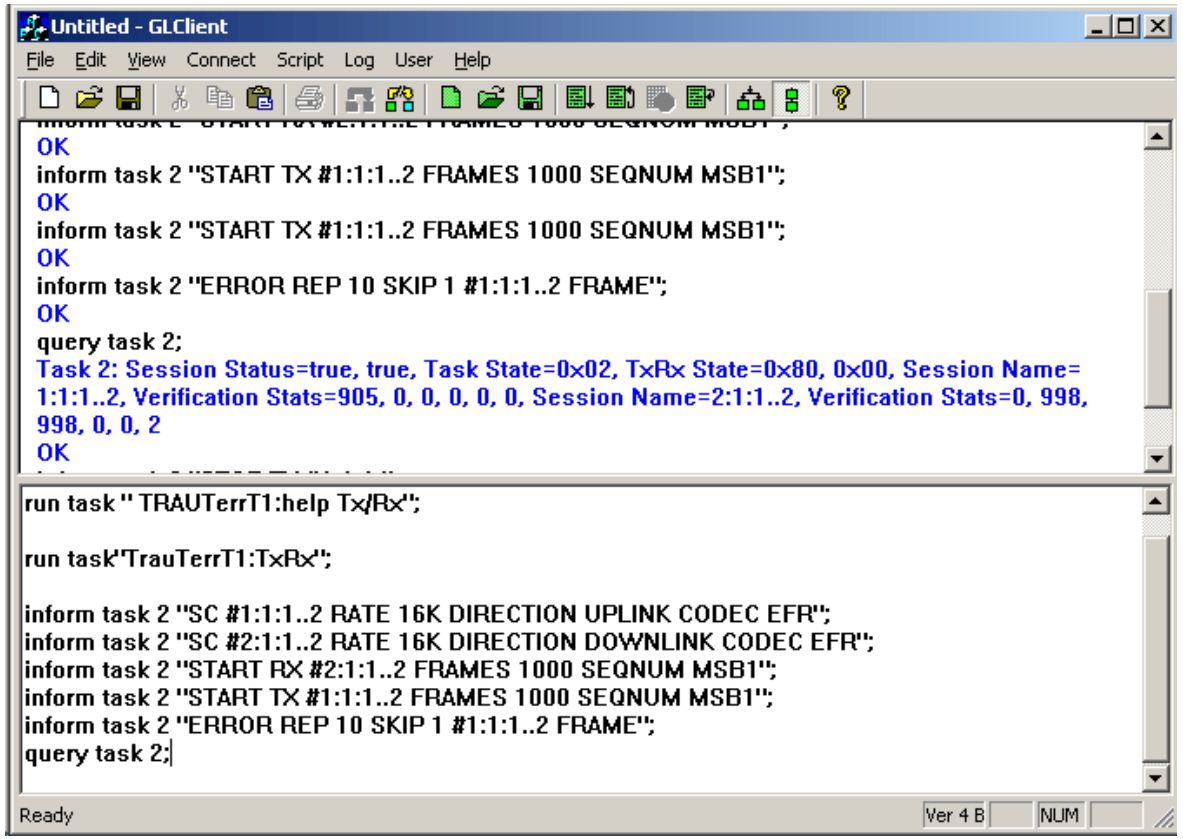
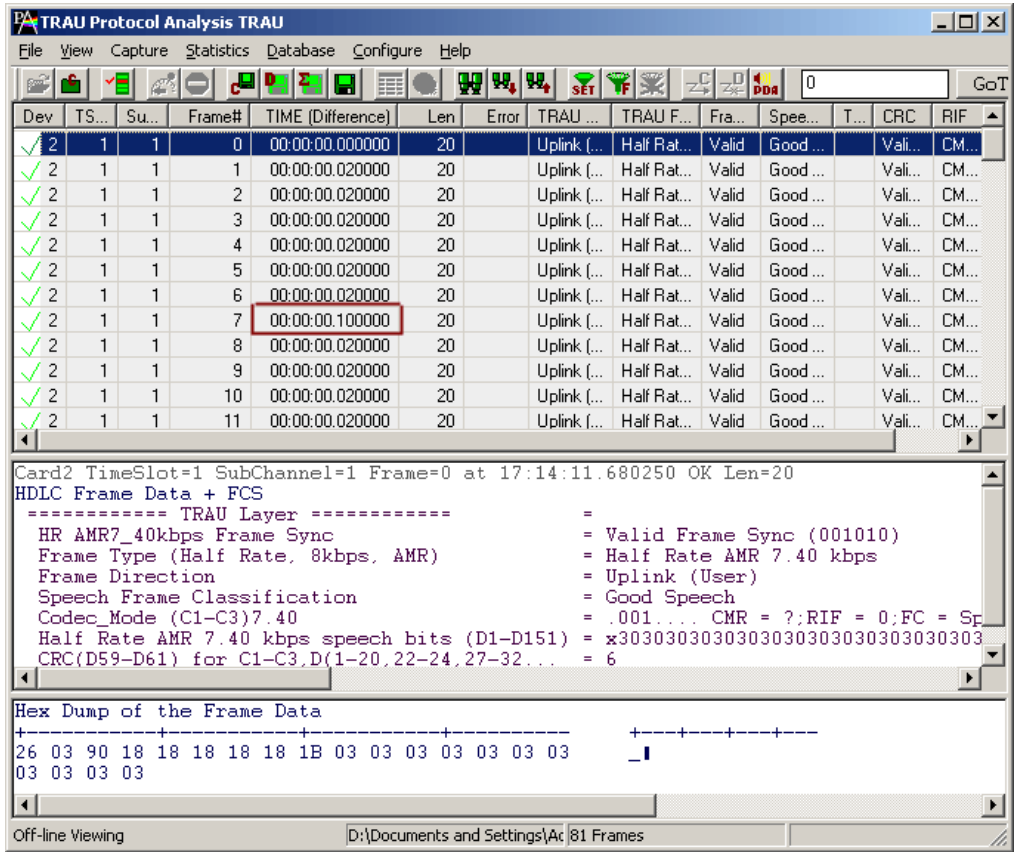
TRAU Emulation and Analysis

Sample script for emulation and analysis of TRAU frames





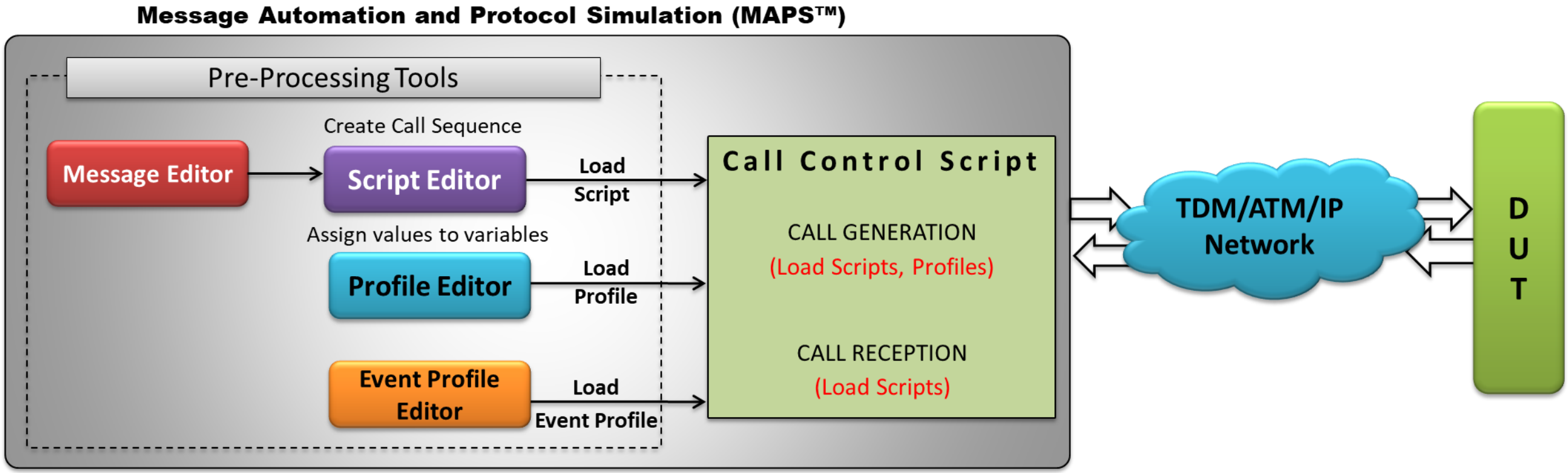
- Send / Receive TRAU frames with or without impairments using sequential numbers, hex octet pattern, flat binary file data, and *.hdl file formats
- Time alignment can be applied to the specified TRAU frames with specified interval

GL Communications

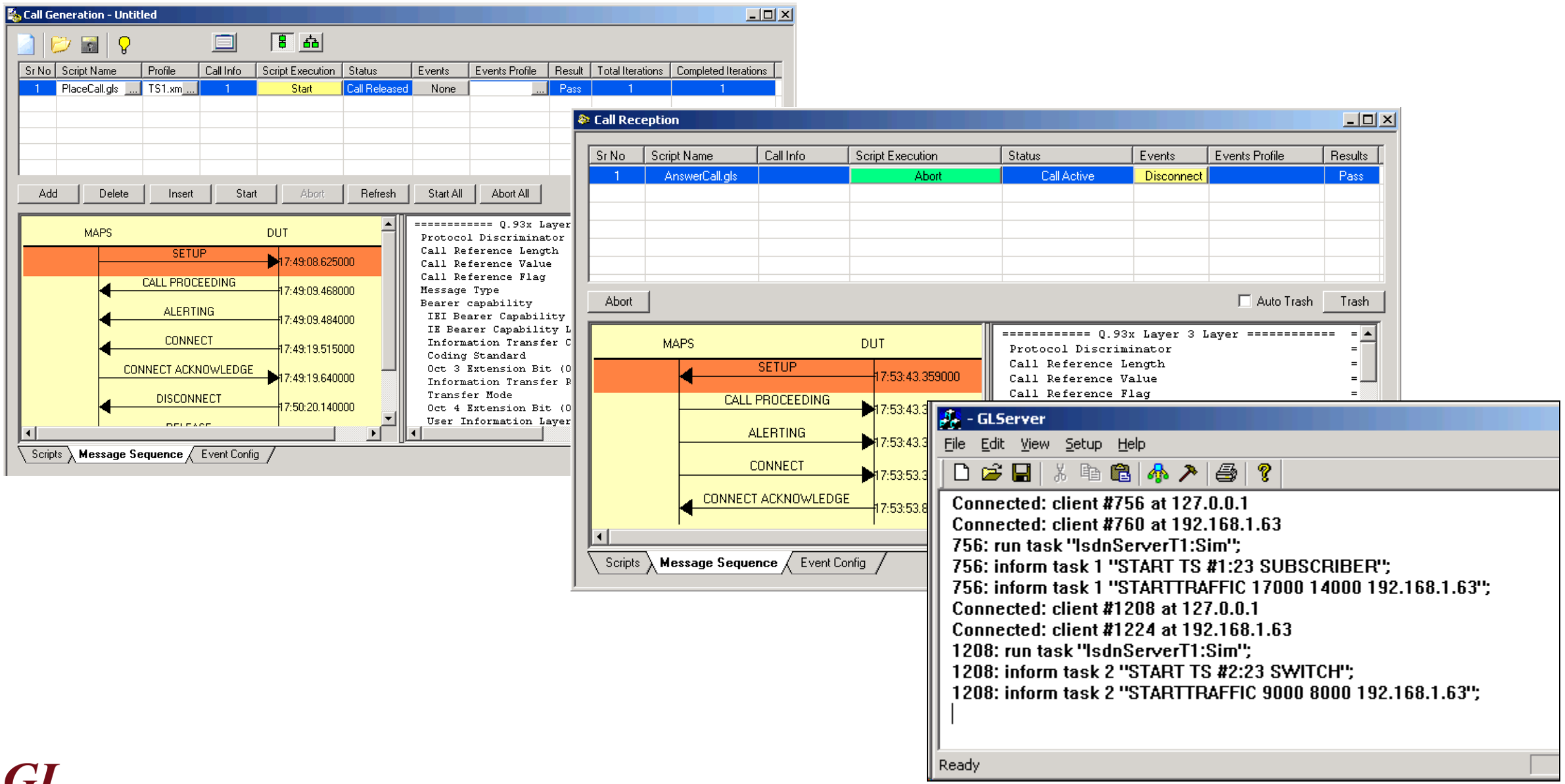
MAPS™ – Script Based Protocol Simulation
ISDN, ISUP, MAP, MLPPP, CAS, and GSM Protocols

- Uses client-server technique and provides a scripted protocol simulation and conformance testing platform
- Supports simulation of a variety of protocols such as SS7, ISDN, GSM, CAS, and MLPPP over T1 E1 network
- This message automation tool covers solutions for both protocol simulation and protocol analysis
- Includes various test plans and test cases to support the testing of a required real-time scenario
- Provides the unlimited ability to edit messages and control scenarios (message sequences) "Message sequences" are generated through scripts

MAPS™ Working Principle



Call Generation and Reception



GL Communications

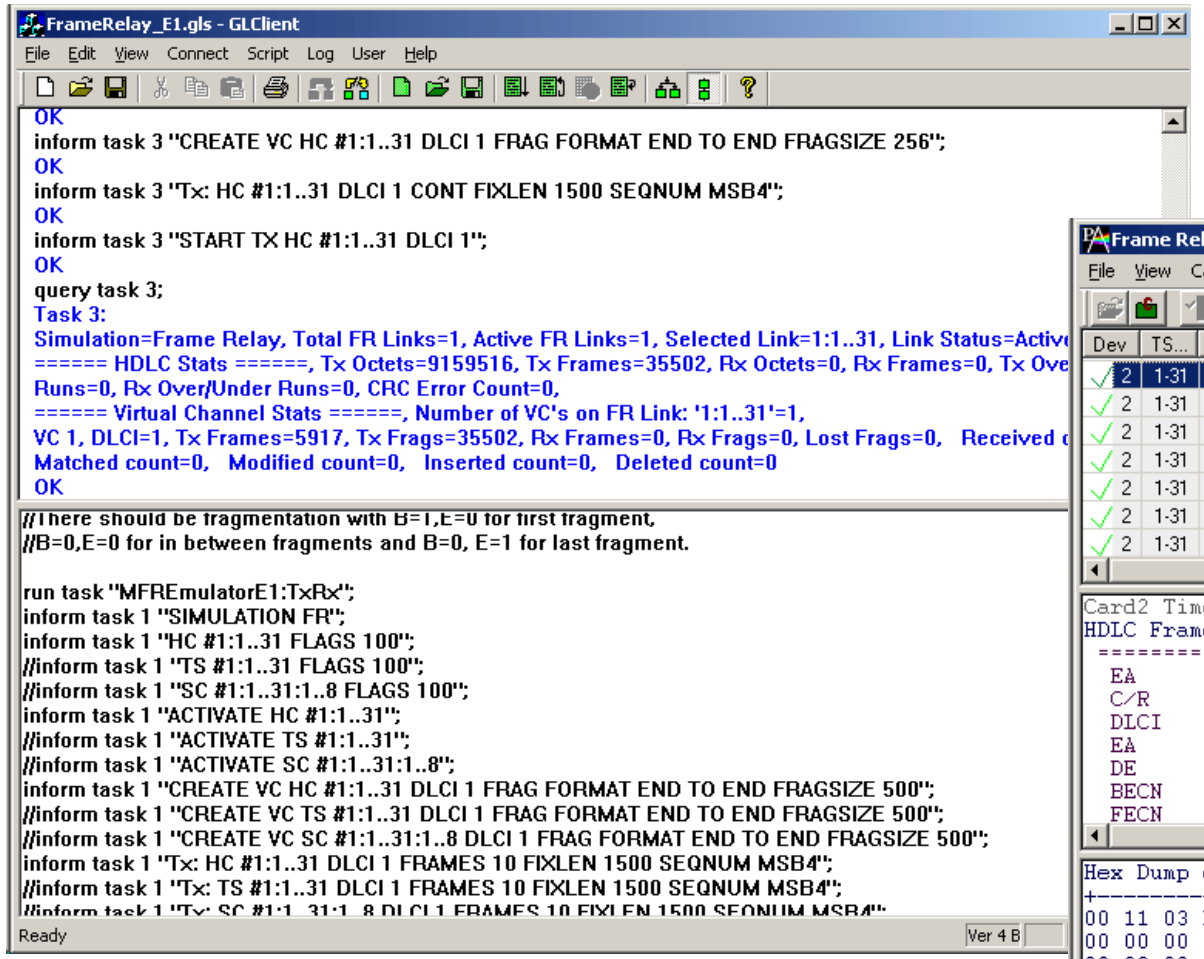
Multi-Link FrameRelay Emulation (Module license # - XX655)

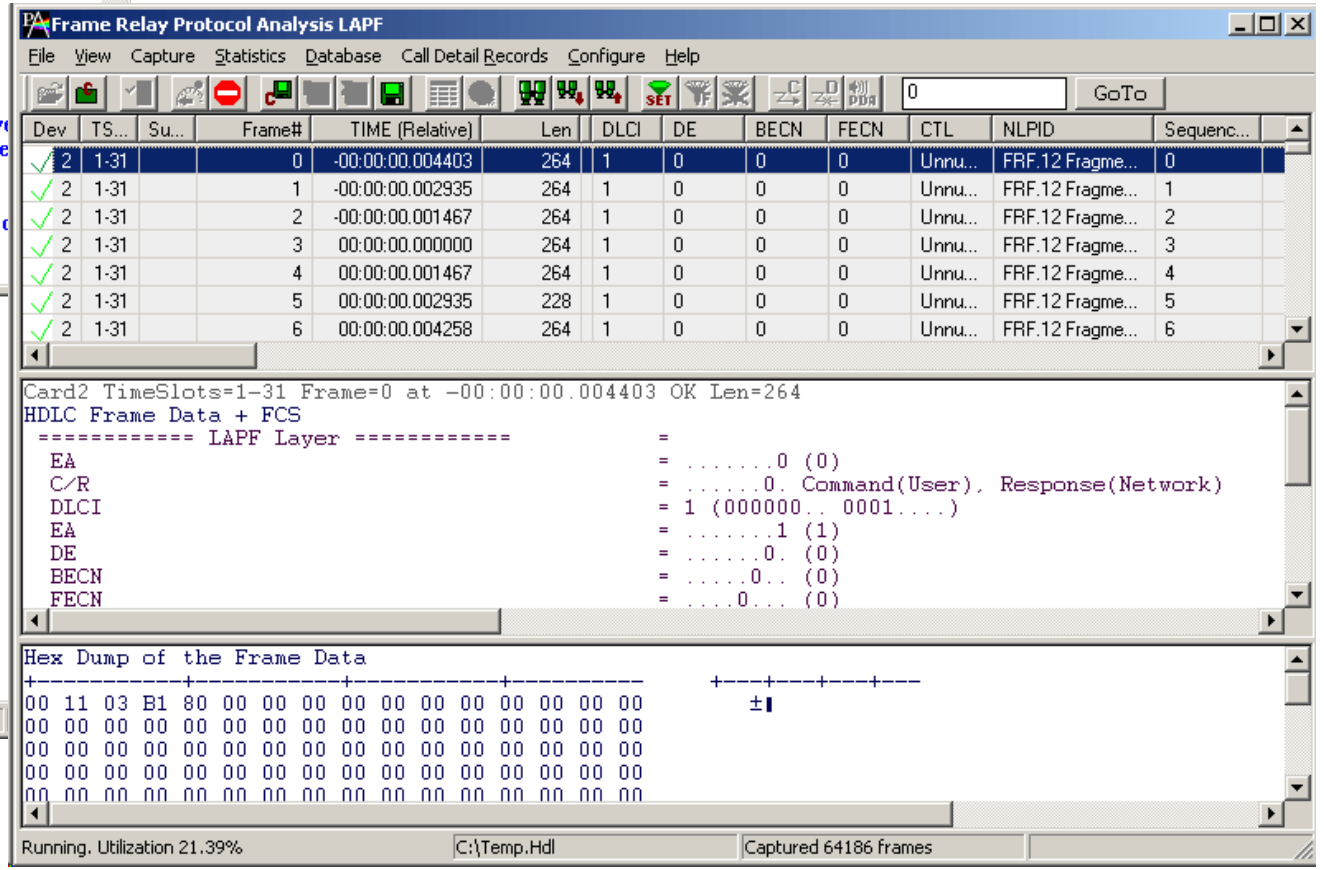
- WCS Multi-Link Frame Relay is a CLI based client application
- Activate/deactivate the individual bundle links in the MFR bundle
- Create/delete the virtual channels on the links
- Sends MFR frames with or without impairments
- Receives MFR frames
- Generates and receives traffic using source and sink types
  - Sequence numbers
  - Hex string frame
  - Binary flat files
  - HDL trace files (GL's proprietary file format)
- Various impairments can be applied on each individual FR links and virtual channels

Multi-Link Frame Relay Emulation (Module license # - XX655)

Sample script for Transmission and Reception of MFR Frames

Multi-Link Frame Relay Emulation
(Module license # - XX655)

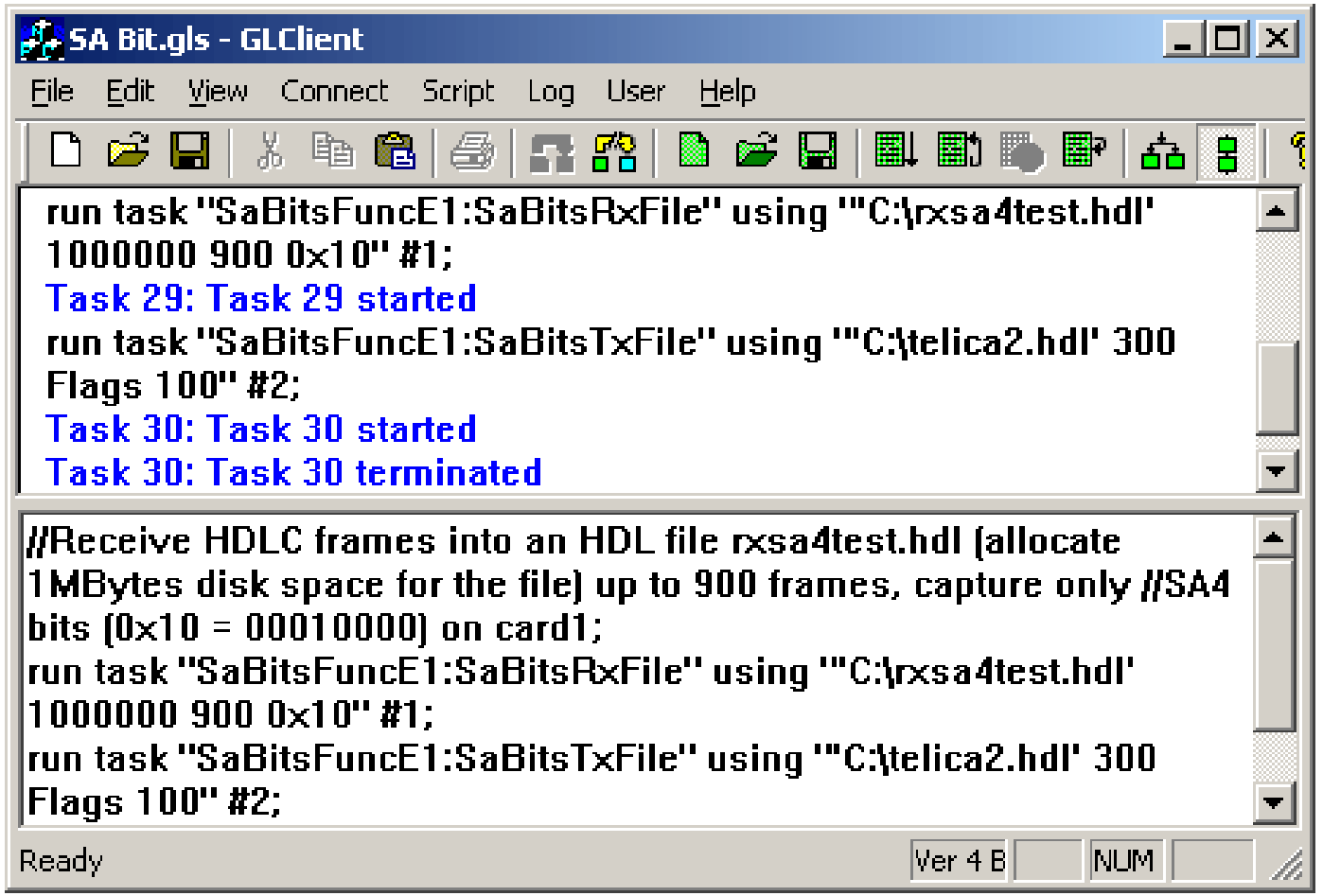




File based Record/Playback over FDL (Module license #- XX660)

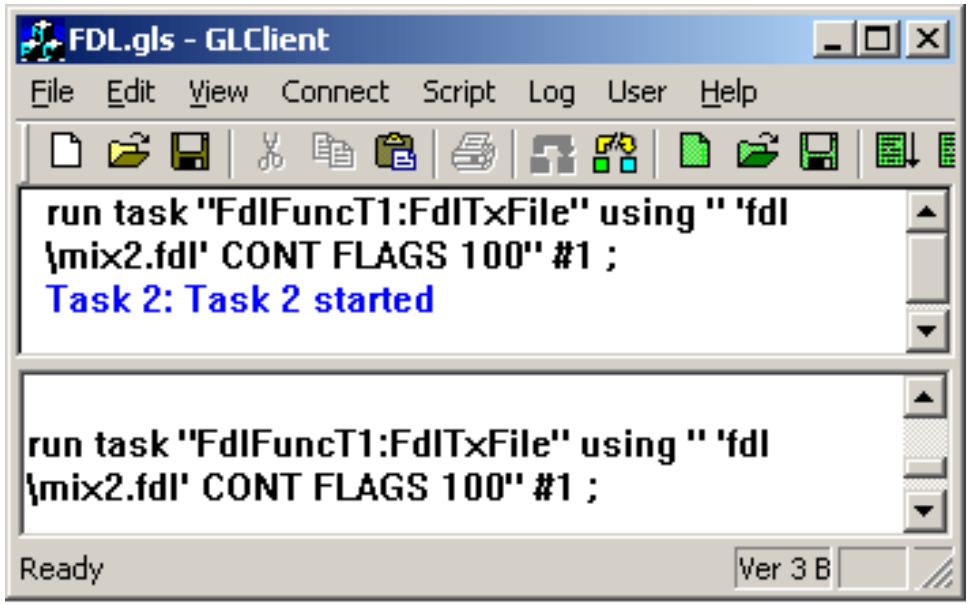
Sample script for Transmission and Reception of SA HDLC frames from an HDL file

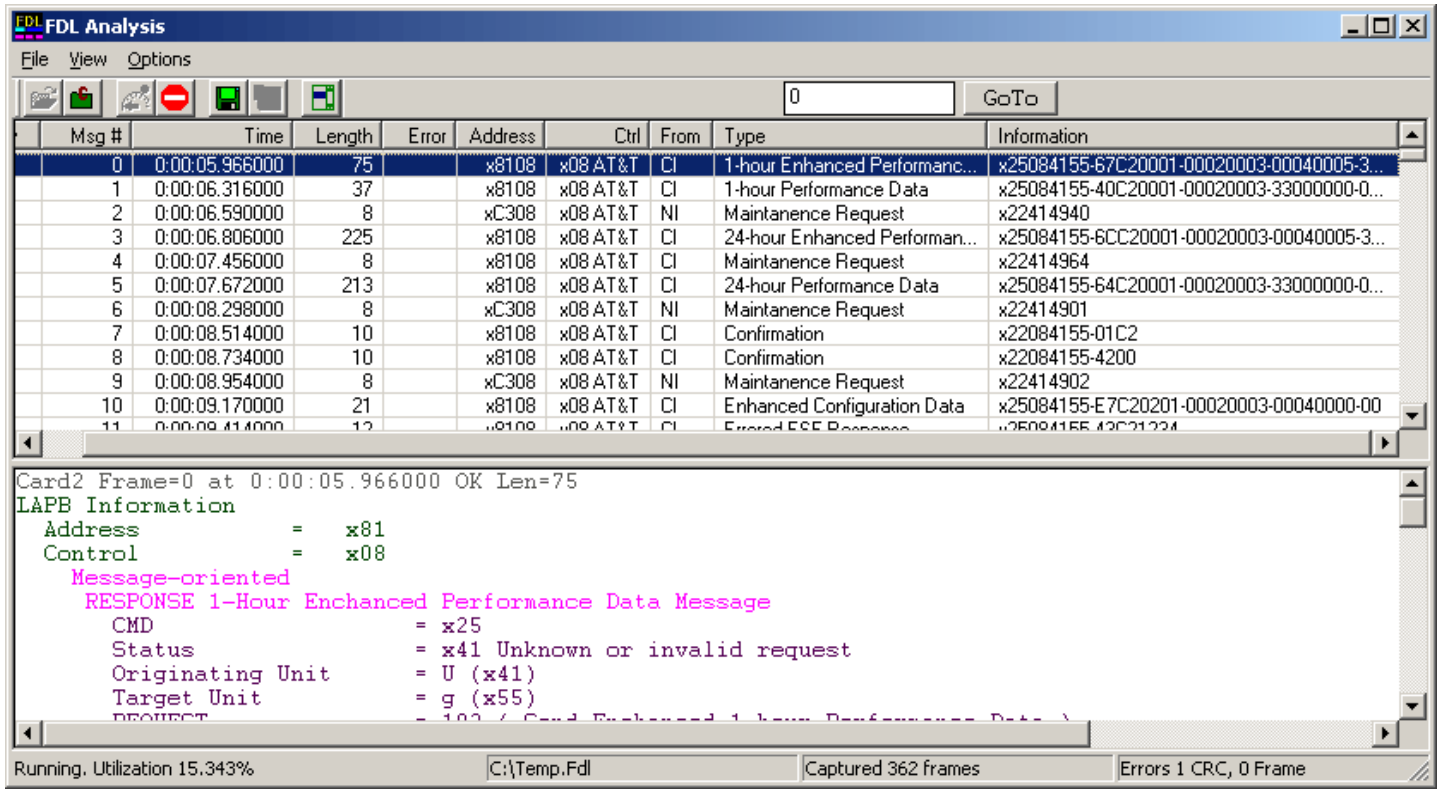
- Receives / Transmits SA HDLC frames in HDL files



File based Record/Playback over FDL (Module license #- XX660)

Sample script for transmission and reception of HDLC frames and signals over FDL



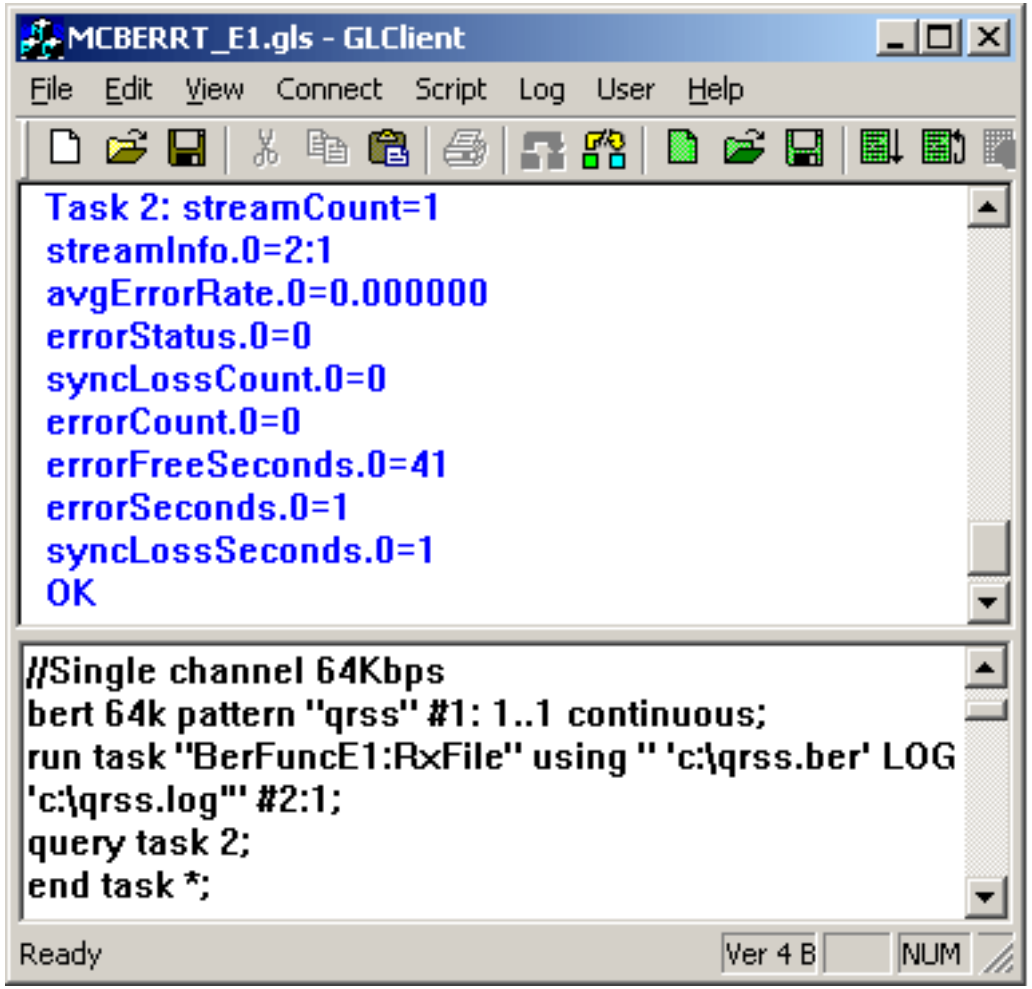


- Receive and transmit HDLC frames and signals in *.hdl file format over facility data link (FDL)

Multi-Channel Rx BER Testing
(Module license #- XX670)

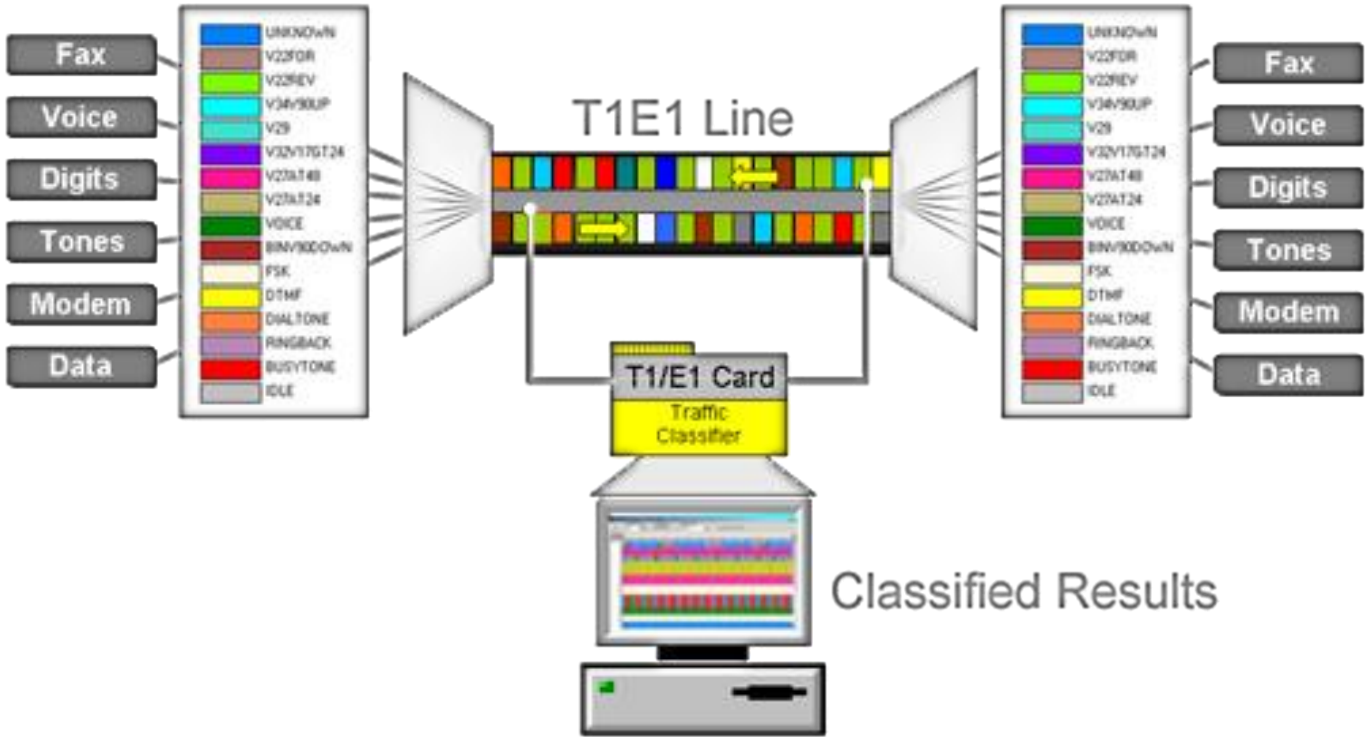
Sample script for transmission and reception of 'QRSS' frame patter at 64 kbps on single channel

- Allows comparing data streams to a pattern file
- Streams may be captured on multiple cards, in a hyper channel Nx64 kbps, multiple channels 64 kbps or multiple subchannels Nx8 kbps



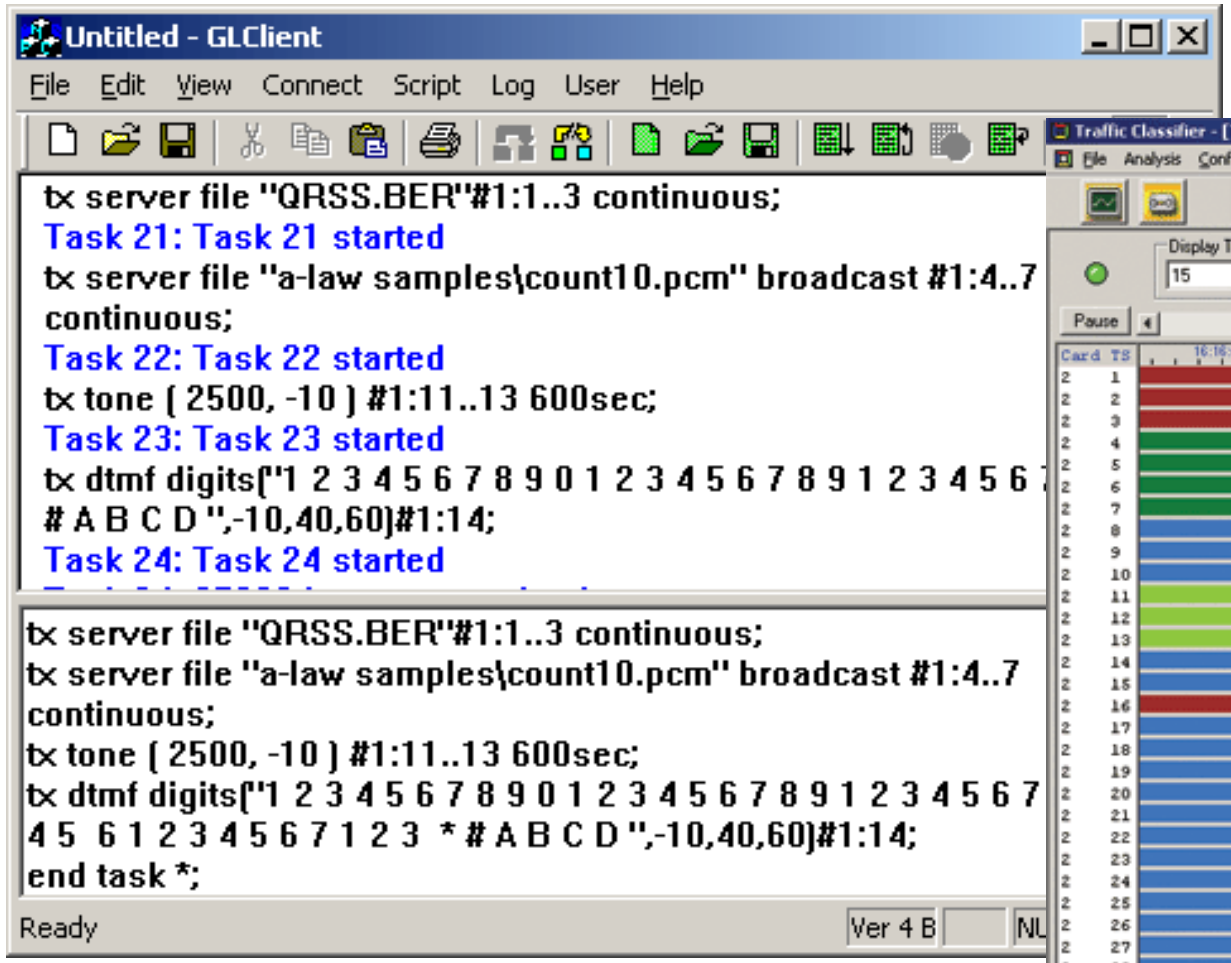
Traffic Classifier (Module license #- XX680)

- GUI based client application
- Analyze and classifies various traffic on a T1 / E1 line such as voice, fax, data, tones (dial tone, ring-back tone, busy tone etc) as well as identify dialing digits and other events
- Uses various identifying schemes depending on the country of your selection and classifies the traffic, based on the dialing tones stipulated for that country

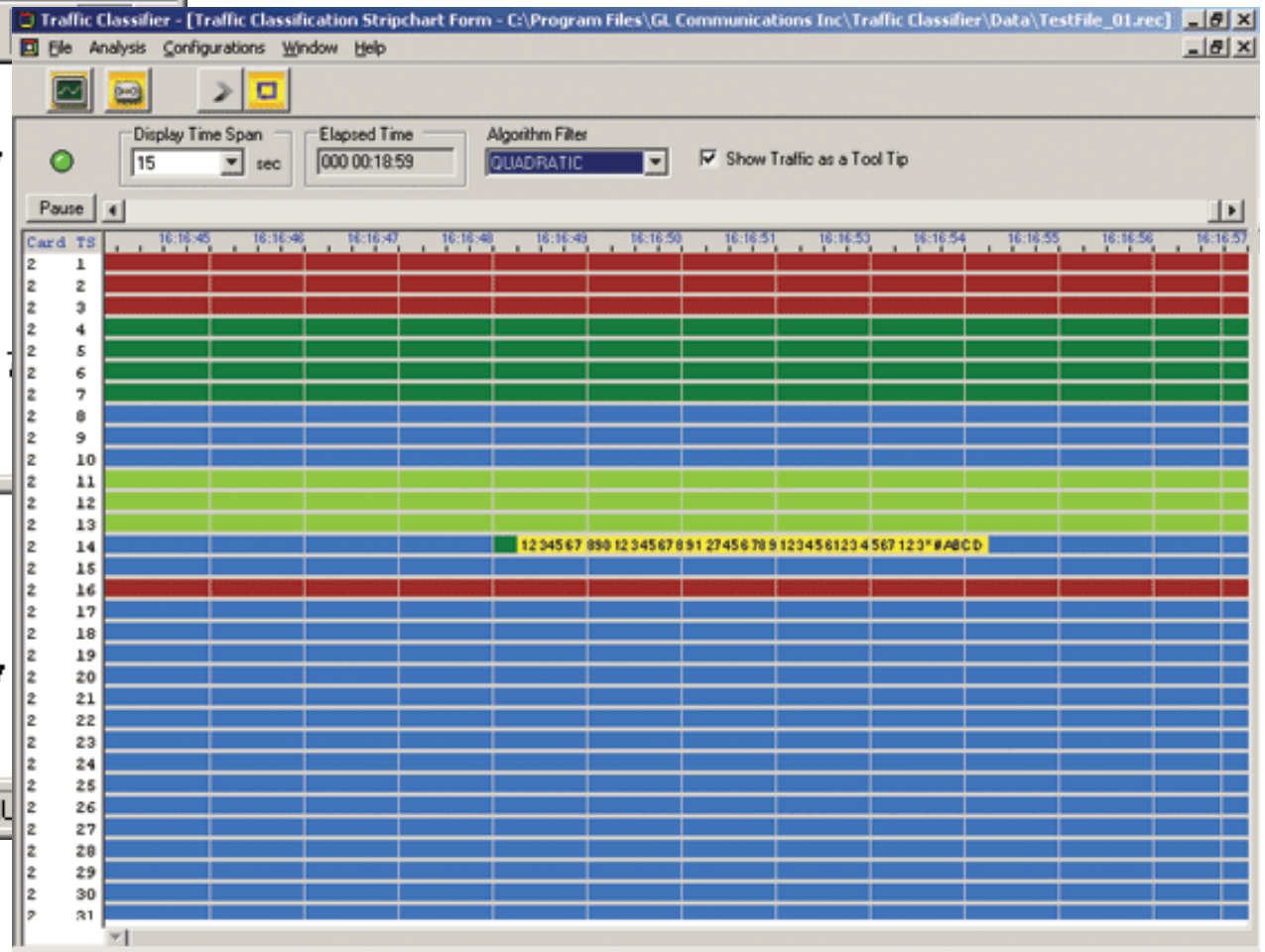


Traffic Classifier

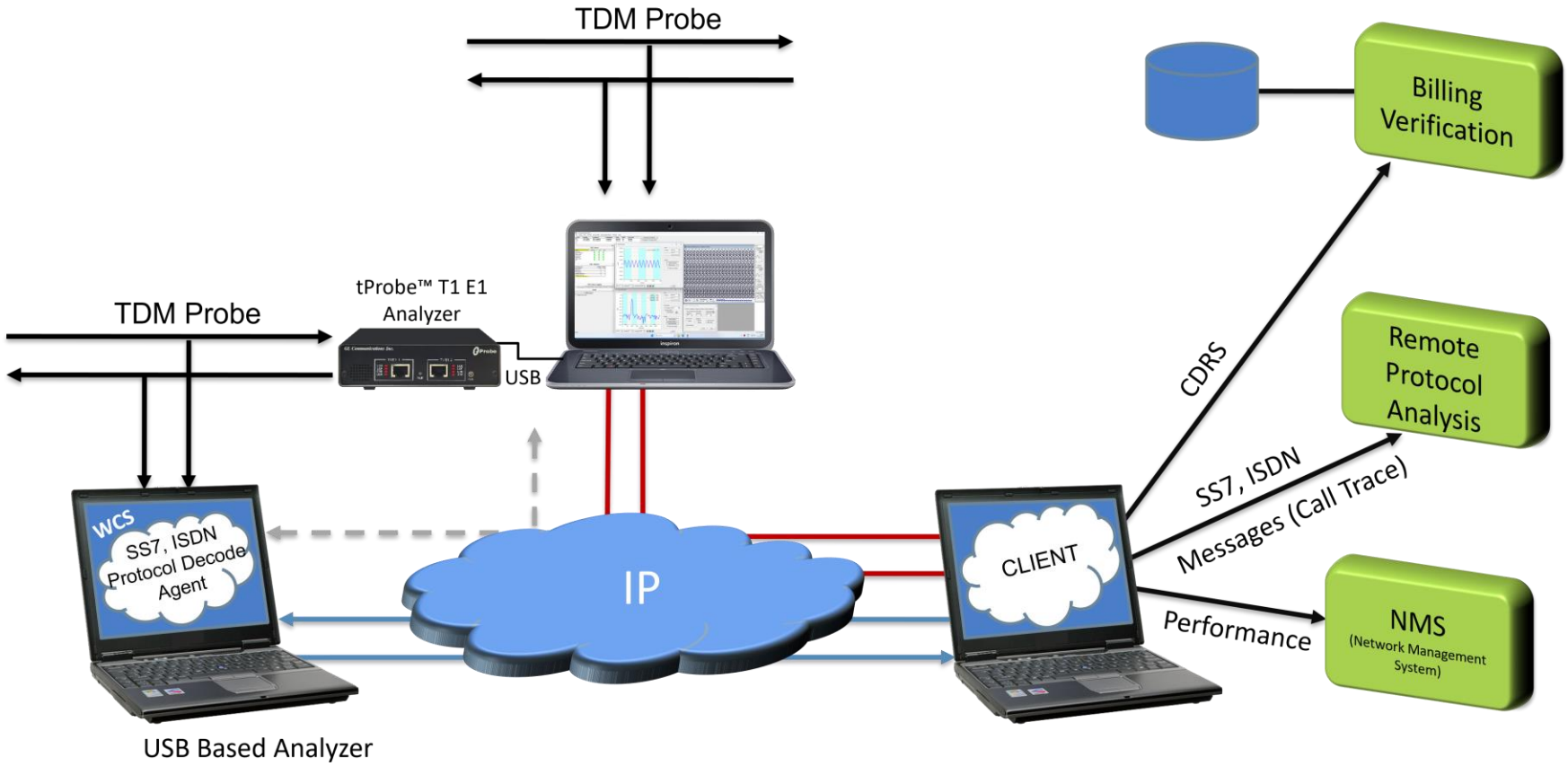
Sample script based transmission of QRSS BER pattern, tone, DTMF digits



Monitor the transmission of QRSS BER pattern, tone, DTMF digits using Traffic Classifier



SS7 and ISDN Decode Agents
(Console Based Clients)



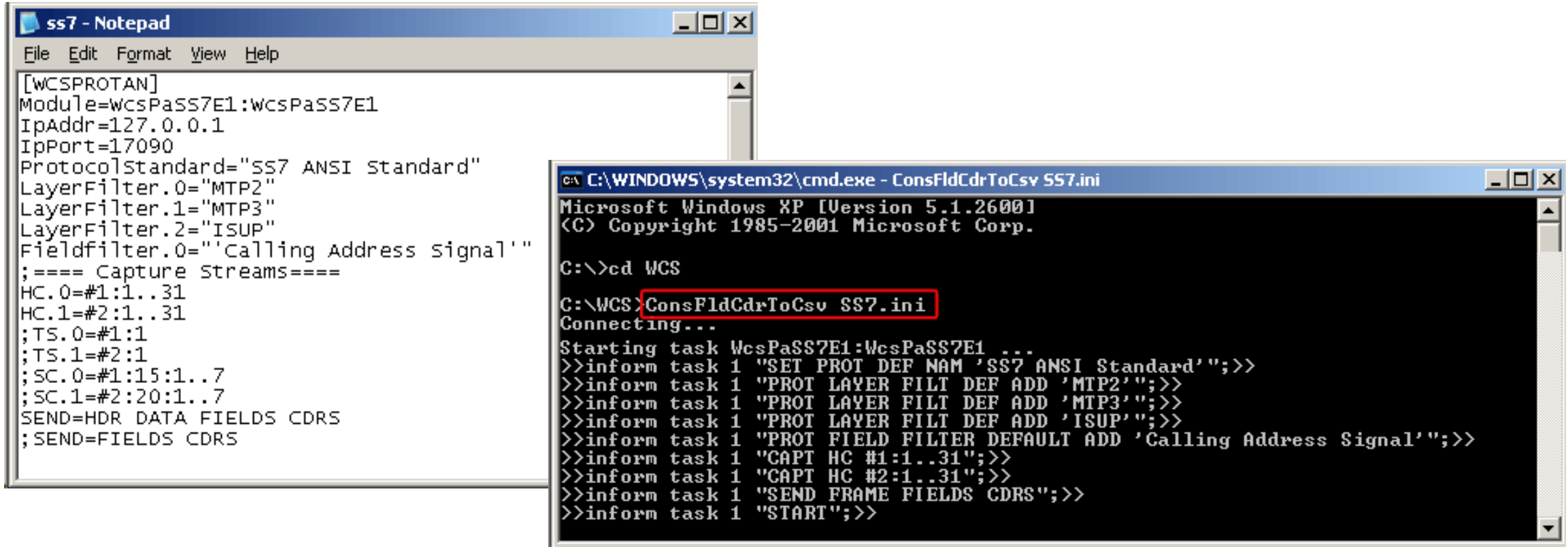
- Remote performance monitoring - SS7/ISDN messages with call trace for Remote Protocol Analysis

SS7 and ISDN Decode Agents (Console Based Clients)

- Allows applying filters based on protocol layers and fields to limit the amount of data sent to client
- Allows capturing on specified timeslots, Nx64 hyper-channels, or sub-channels
- Builds CDRs, and streams over TCP/IP to remote site
- Allows the following types of information to be sent to the remote client
  - Frame header information (HDR)
  - Frame raw data (DATA)
  - Frame protocol decode field names and values (FIELDS)
  - CDR field names and values (CDRS) in *.csv format

SS7 Decode Agent
(Module license # - XX690)

Sample Script of SS7 INI File



- Remote performance monitoring - SS7/ISDN messages with call trace for Remote Protocol Analysis

Thank you