

Simulates TRAU over Abis and Ater Interfaces



Tests Backhaul Network



Multiple TRAU Sessions of 8 or 16kbps



Payload Traffic Generation and Verification



Delay/Advance the TRAU Frames



Introduce Impairments



Supports FR, EFR, AMR, AMR-WB(16 kbps) and HR Codecs

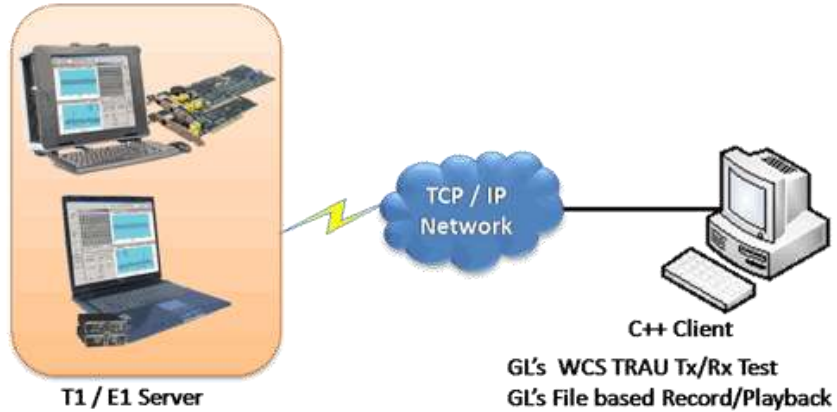


Easy to use GUI based as well as Command Line Script



## WCS TRAU Traffic Emulation and Analysis

(WCS TRAU Tx/Rx Test & WCS TRAU Record / Playback)



- Portable USB Based T1/E1 Analyzer
- Universal T1/E1 Analyzer Cards

### Overview

GL provides client-server based TRAU Record/Playback, and TRAU Emulation & Analysis modules.

The WCS TRAU Tx/Rx Test (TrauTerr) module is a GUI based client as well as command-line based client application, which can simulate & analyze TRAU/CCU (BTS or BSC end) on GL's T1/E1 cards. The application is capable of generating and receiving TRAU traffic (with or without impairments) based on the codec type, and time alignment (if specified). The frames are transmitted through the 16 or 8 kbps channels. Traffic source can be sequence number, HDL files (containing trau frames), flat binary file, and user-defined frames (ASCII HEX string/file). This application can be used to test the correctness of the received data, by comparing with predefined patterns.

The File based TRAU Record /Playback is a command-line based client module that allows transmission / reception of TRAU frames in \*.hdl file format.

GL's Windows Client/Server software allows the user of T1/E1 analysis cards, the capability of remote operation, automation, and multi-site connectivity. Server software can run multiple tasks simultaneously at the request of the client software.

### Main Features:

- Simulates TRAU traffic over Abis and Ater interfaces.
- Can be used to test the backhaul network. (Backhaul network is the traffic generated by BTS which is transported to the corresponding BSC across a network).
- Ideal solution for remote access & automated testing using command line scripts.
- Can create multiple sessions of uplink or downlink in 8/16 Kbps.
- Supports speech codec for verification of correct data transmission which includes GSM codecs such as GSM 6.10(FR), Half Rate (HR), Enhanced full rate (EFR), Adaptive multi Rate (AMR - Rates 4.75, 5.15, 5.90, 6.70, 7.4, 7.95, 10.2, & 12.2 kbps) and Adaptive Multi Rate-Wide Band (AMR-WB - Rates 6,.60, 8,.85, 12,.65 kbps).
- Payload traffic generation and verification using Sequence number, HDL file (containing packets/frames), Flat binary file, and User-defined frame (ASCII HEX file) for each session independently.
- Time Alignment can be applied in the TRAU frames.
- Supports various impairments - CRC error, frame duplication, and more.
- Provides detailed test (Tx/Rx) results for each TRAU session.

For more details, please visit our web page <http://www.gl.com/trauterr.html> and <http://www.gl.com/trautrxinwcs.html>.



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## Adding TRAU Sessions

Various TRAU session of 8 or 16 Kbps transmission rate can be added by specifying the device number, channel, and sub-channel. The sessions can be of various codecs and uplink or downlink directions.

For 8kbps rate, HR, AMR Lower Codec (4.75kbps, 5.15kbps, 5.90kbps), AMR6.4kbps and AMR7.4kbps are supported, while for 16kbps transmission rate, FR (GSM 610), EFR, AMR, AMR-WB, and HR codecs are supported.

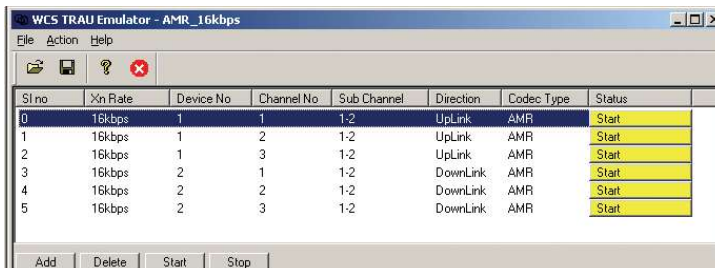


Figure: WCS TRAU Emulator

## Traffic Generation and Reception

The traffic is generated and received on the individual TRAU session. The Tx parameters are used to generate traffic and Rx parameters are used as reference to verify the received frames. Payload data can be sequence numbers, frames from HDL file, raw data from flat binary file, and user-defined frame from ACSII based HEX file.

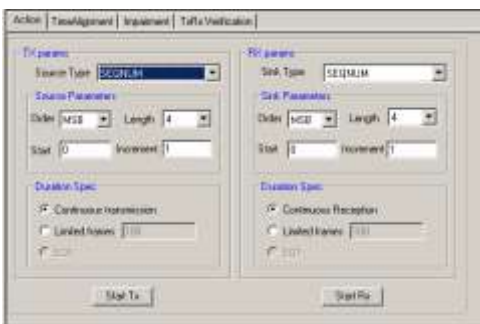


Figure: Traffic Generation and Verification

## WCS TRAU TxRx Test – Command Line Based

All the actions performed in GUI can also be executed through command line interface. The command-line module displays the command syntax, sends and receives TRAU frames (with or without impairments) based on the codec type, and time alignment, and logs the data.

### Example

```
run task "TRAUTerrE1:TxRx";
inform task 1 "SC #1:1:1..2 RATE 16K DIRECTION UPLINK CODEC EFR";
inform task 1 "SC #2:1:1..2 RATE 16K DIRECTION DOWNLINK CODEC EFR";
inform task 1 "START RX #2:1:1..2 FRAMES 1000 SEQNUM MSB1 log c:/TRAUTerr.log EXIT TASK";
inform task 1 "START TX #1:1:1..2 FRAMES 1000 SEQNUM MSB1 EXIT TASK";
inform task 1 "ERROR REP 8 SKIP 5 #1:1:1..2 DUP 10";
inform task 1 "TA CONT INTERVAL 10 #1:1:1..2 CMD -1";
```

## Impairment and Time Alignment

Various impairments can be introduced before frames are transmitted or during traffic generation. The frames can be impaired by applying impairment to a particular TRAU session. One can specify a limited number of impairments or continuous impairments.

**Time alignment** can be applied to the specified TRAU frames with specified interval once the transmission is started. The TRAU frames can be delayed or advanced by specified value in msec/uSec.

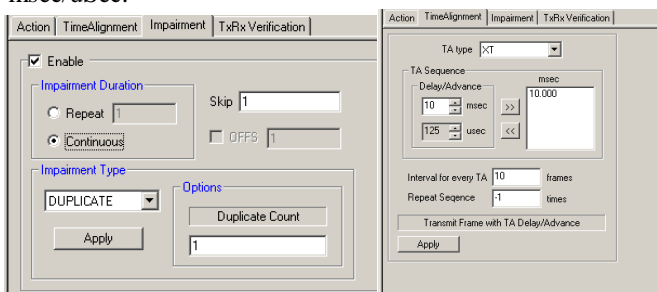


Figure: Impairments and Time Alignment

## Data Verification using Statistics

Traffic verification results provide the overall statistics for all TRAU sessions. The statistics include number of Transmitted, Received, Matched, Modified, and Inserted frames.

Link Name	Transmitted Frame Cnt	Received Frame Cnt	Matched Frame Cnt	Modified Frame Cnt	Inserted Frame Cnt	Deleted Frame Cnt
#1:1-2	1218	0	0	0	0	0
#1:2-2	218	0	0	0	0	0
#2:1-2	0	1207	1206	0	0	3
#2:2-2	0	297	296	0	0	2
Total	1436	1416	1415	0	0	5

Figure: TxRx Verification

## File based TRAU Record/Playback (Command Line Based)

The File based TRAU Record/Playback (Traufunc) module is a command-line based client application used to capture / playback TRAU frames in \*.hdl file format.

### Example

```
run task "TrauFuncT(E)1:help" #*;
run task "TrauFuncE1:TxFile" using "file.hdl CONT 8K SC:80" #1:10;
run task "TrauFuncE1:RxFile" using "trau.hdl 10000000 CONT 16K SC:FF UPLINK" #1:23;
```

## Buyers Guide:

[XX600](#) - Basic Client/Server Scripted Control Software

[XX645](#) - w/TRAU Engine (GSM – Abis)

[XX646](#) - w/TRAU Tx/Rx Test

[XX153](#) – T1/E1 Real-time TRAU Protocol Analyzer, TRAU

Traffic Playback, TRAU Toolbox™

[XX150](#) - GSM Protocol Analyzer

[XX155](#) - GPRS Protocol Analyzer

## Related Hardware

[UTE001](#) - Portable USB based Dual T1 or E1 Laptop Analyzer

[HTE001](#) - Universal HD T1 or E1 PCI Cards