

## High Speed Fax Transmission

Data Signaling Rate of 4800bps with 8 Phases

## Transmit and Receiving Fax Sessions

## Simulation of Fax with DCOSS

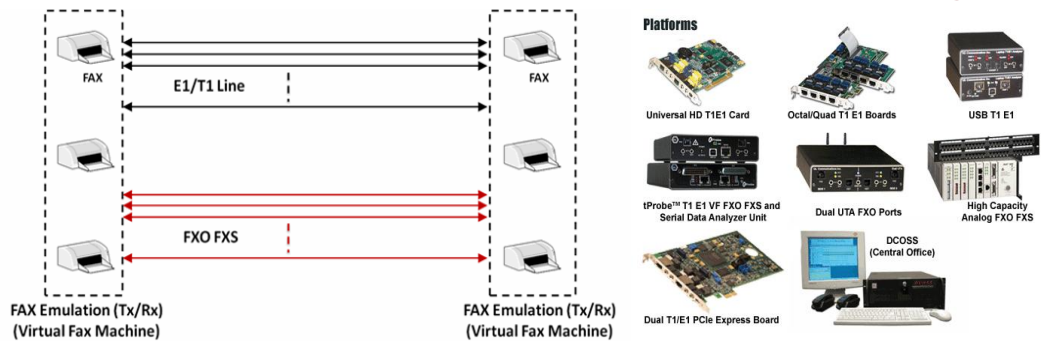
## Simulation of Fax over Analog Lines with Dual UTA

## Analyze and Decode PCM Files in GLInsight™

## TIFF Output Image

## Supports V.29 Modem Types

# WCS based Fax Simulation over T1, E1, or Analog



## Overview

A fax (short for facsimile), is the transmission of scanned printed material (text or images) via voice grade telephone lines. High speed rates as high as 33.4 kbps (V.34 or Super Group 3) can be achieved over conventional telephone lines. When combined with compression schemes, many pages of print can be transmitted in minutes. When transmitted over regular telephone lines, a simple protocol called T.30 is used by both fax machines to negotiate transmission parameters and provide reliable transfer of scanned documents. Recently fax transmission is also possible over voice circuits that are packet based. This form of transmission usually demodulates the modulated signal back to the original scanned bits and then transmits them via packets to the distant end where they are remodulated to be sent to the destination fax machine. This scheme is called T.38.

GL has recently introduced single and bulk (100's) call **Fax Simulator**. This software is capable of transmitting and receiving over many T1 E1 timeslots or through two-wire FXO and FXS lines. The software can emulate many "virtual fax machines" - transmitter as well as receiver. All variations are supported.

Fax Simulator can be used with any GL Protocol Emulation tools such as [MAPS™ CAS](#) emulator, [MAPS™ ISDN](#) emulator, and [MAPS™ SS7](#) emulator to simulate complete real time Fax calls.

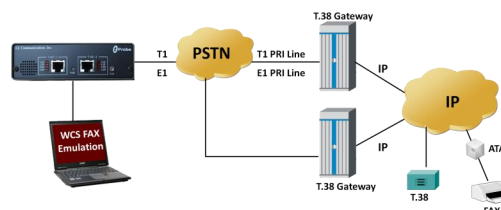
GL also supports [FaxDD™](#) (fax decoder/demodulator) software that processes 2-Wire or 4-Wire captures and analyzes voice band traffic files for fax traffic. The application operates either stand-alone from a batch file or as part of the GL's [Voice Band Analysis](#) application to produce decoded fax image TIFF files and other transmission information.

For more information on FAX Simulator, refer to <http://www.gl.com/wcs-fax-simulation-and-analysis-over-t1-e1.html>

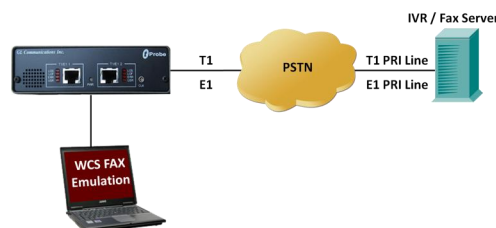
## Fax Emulation Applications

- Load Testing
- V.34 Testing
- High Speed / Low Speed
- Multiple Pages
- With or without ECM
- Alaw and ulaw
- Over T1/E1, PSTN, IP
- Output Tiff Image

### Testing Fax /IVR /T.38 Gateways over IP



### Testing Fax / IVR Servers over T1 /E1 Lines



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## Typical Fax Sessions

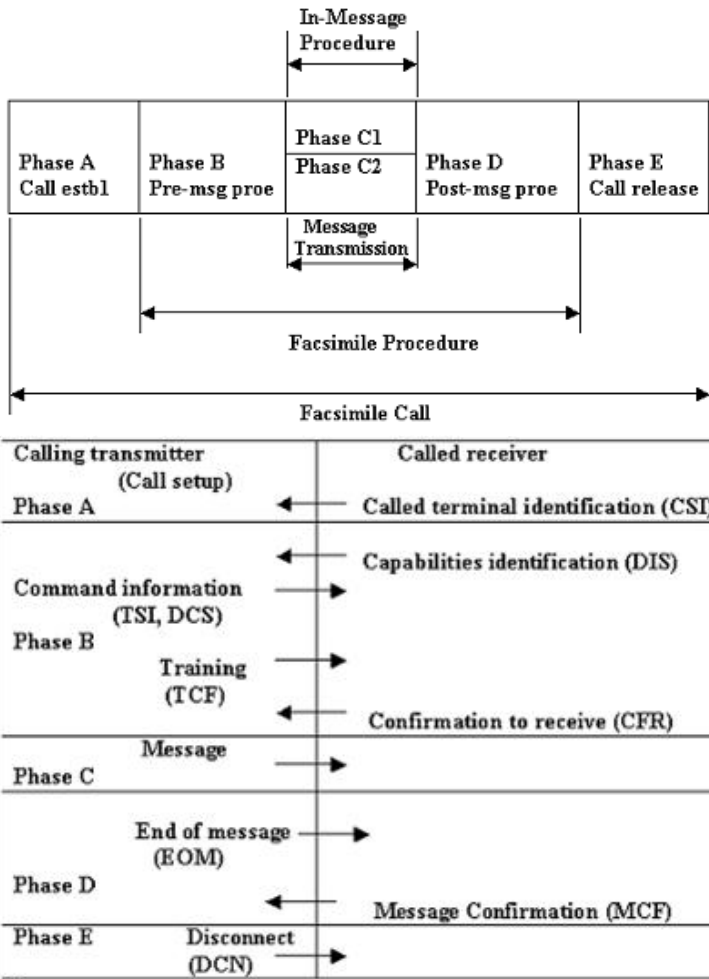


Figure: Typical Fax Phases



Figure: Spectrogram of Fax Sessions

## Tx Fax Session

```
inform task 1 "TXFAX #1:1 TIFF_FILE 'C:\tiff
File\transmit.tif' CODEC_TYPE ALAW MIN_RATE_TYPE
2400 MAX_RATE_TYPE 4800 PAGESIZE_TYPE 1
RESOLUTION_TYPE 64 ECMENABLED 1 RECORD_PCM TRUE ;
```

The above command transmits a multi-page file named 'transmit.tif' into timeslot 1 of port #1, with Alaw codec, V.27 modem, min data rate 2400 bps, max data rate of 4800 bps, A4 page-size and resolution type 200x200 with ECM and record PCM option enabled to record the signals being exchanged during the FAX transmission to a PCM file.

If user wanted to transmit 30 such faxes of differing pages of images, then users can simply invoke many such commands simultaneously with the proper timeslot #. The fax can also be transmitted over multiple ports.

## Rx Fax Session

```
inform task 1 "RXFAX #2:1 TIFF_FILE 'C:\tiff
File\receive.tif' CODEC_TYPE ALAW MIN_RATE_TYPE
2400 MAX_RATE_TYPE 4800 PAGESIZE_TYPE 1
RESOLUTION_TYPE 64 ECMENABLED 1 RECORD_PCM TRUE";
```

The above command receives a fax on E1 Port 2 timeslot 1, and saves the *tiff* image as 'receive.tif' file with Alaw codec, modem V.27, min data rate 2400 bps, A4 page-size and resolution type 200x200 with ECM and record PCM option enabled to record the signals being exchanged during the FAX reception to a PCM file

If user wanted to receive 30 such faxes of differing pages of images, then users can simply invoke many such commands simultaneously with the proper timeslot #. The fax can also be received over multiple ports.

## Examples

```
run task "FaxSimulatorE1:StartFaxSim";
```

```
inform task 1 "START";
```

```
inform task 1 "TXFAX #1:1 TIFF_FILE 'C:\tiff
File\transmit.tif' CODEC_TYPE ALAW MIN_RATE_TYPE
2400 MAX_RATE_TYPE 4800 PAGESIZE_TYPE 1
RESOLUTION_TYPE 64 ECMENABLED 1";
```

```
inform task 1 "RXFAX #2:1 TIFF_FILE 'C:\tiff
File\receive.tif' CODEC_TYPE ALAW MIN_RATE_TYPE
2400 MAX_RATE_TYPE 4800 PAGESIZE_TYPE 1
RESOLUTION_TYPE 64 ECMENABLED 1";
```

```
inform task 1 "STOPFAX #1:1";
```

```
inform task 1 "STOPFAX #2:1";
```

```
end task*;
```

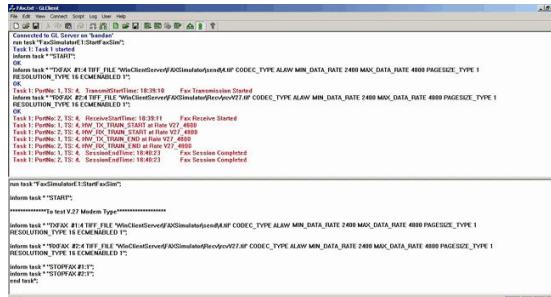


Figure: Fax Simulator Examples



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### Test Scenarios for Fax Simulator

#### Fax Simulation between tProbe™ and DCOSS (Over T1/E1)

```
run task "FaxSimulatorE1:StartFaxSim";
inform task 1 "START";
inform task 1 "TXFAX #1:1 TIFF_FILE
'winClientServer\FAX Simulator\send\3.tif'
CODEC_TYPE ALAW MIN_RATE_TYPE 2400 MAX_RATE_TYPE
4800 PAGESIZE_TYPE 1 RESOLUTION_TYPE 16
ECMENABLED 1";
```

This command will transmit 3.tif file on the port 1 timeslot 1 with the minimum and maximum data rate set to 2400 and 4800.

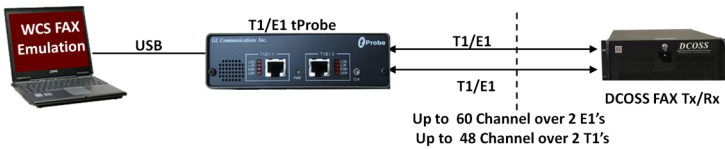


Figure: Fax Simulator Examples

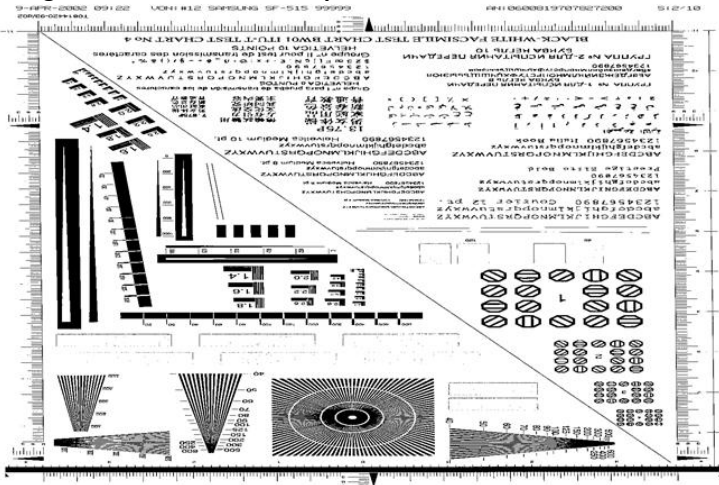


Figure: TIFF Output

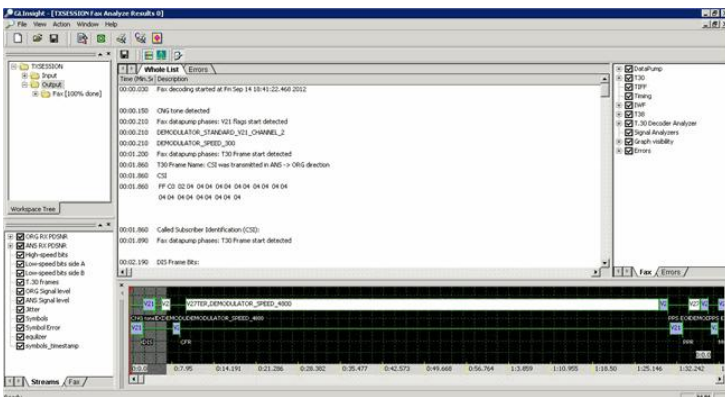


Figure: Analysis of PCM Files in GL Insight

### Test Scenarios for Fax Simulator (Contd)

#### Fax Simulator over T1/E1 to Analog Interface on Dual UTA (via DCOSS)

```
inform task * "TXFAX #1:1 TIFF_FILE
'winClientServer\FAX Simulator\send\1.tif'
CODEC_TYPE ALAW MIN_DATA_RATE 7200 MAX_DATA_RATE
9600 PAGESIZE_TYPE 1 RESOLUTION_TYPE 16
ECMENABLED 1";
```

This command will transmit 1.tif file on the port 1 timeslot 1 with the minimum and maximum data rate set to 7200 and 9600.

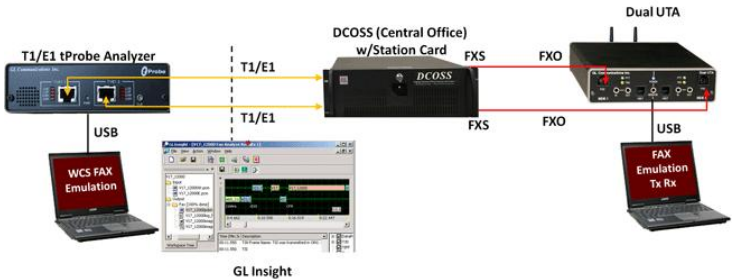


Figure: Fax Simulator over T1/E1 on Dual UTA (via DCOSS)

#### Fax Simulation over tProbe™ FXO

##### Scenario 1: Sending Fax from tProbe™ FXO Port to Fax Machine

```
run task "FaxSimulatorE1:StartFaxSim";
inform task * "START";
inform task * "TXFAX #2:1 TIFF_FILE
'winClientServer\FAX Simulator\send\4.tif'
CODEC_TYPE ALAW MIN_RATE_TYPE 2400 MAX_RATE_TYPE
4800 PAGESIZE_TYPE 1 RESOLUTION_TYPE 16
ECMENABLED 1";
```

This command will transmit 4.tif file on the port 2 timeslot 1 with the minimum and maximum data rate set to 2400 and 4800.

##### Scenario 2: Sending Fax from Fax Machine to tProbe™ FXO

```
run task "FaxSimulatorE1:StartFaxSim";
inform task * "START";
inform task * "RXFAX #2:1 TIFF_FILE
'winClientServer\FAX Simulator\Recv\RCV.tif'
CODEC_TYPE ALAW MIN_RATE_TYPE 2400 MAX_RATE_TYPE
4800 PAGESIZE_TYPE 1 RESOLUTION_TYPE 16 ECME-
NABLED 1";
```

This command will Receive the fax signal on port 2 timeslot 1 and save the image as RCV.tif.

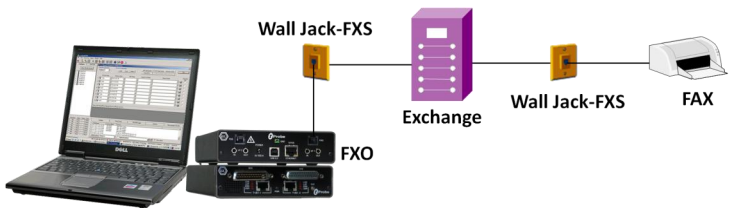


Figure: Tx/Rx Fax over tProbe FXO



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## Fax and Modem Standards

Standard	Description
V.17	a) Provision for half duplex operation at data signaling rates of: <ul style="list-style-type: none"> <li>– 14400 bps synchronous</li> <li>– 12000 bps synchronous</li> <li>– 9600 bps synchronous</li> <li>– 7200 bps synchronous</li> </ul> b) Quadrature amplitude modulation with synchronous line transmission at 2400 symbols per second c) Inclusion of data scramblers, adaptive equalizers and eight-state trellis coding d) Two sequences for training and synchronization: long train & resync
V.27	a) Use of data signaling rate of 4800 bits per second with 8-phase differentially encoded modulation as described in Recommendation V.27. b) Reduced rate capability at 2400 bits per second with 4-phase differentially encoded modulation as described in Recommendation V.26.
V.29	a) Fallback rates of 7200 and 4800 bits per second b) Combined amplitude and phase modulation with synchronous mode of operation c) Inclusion of an automatic adaptive equalizer
V.33	a) Fallback rate of 12000 bits per second b) Combined amplitude and phase modulation with synchronous mode of operation c) Inclusion of an eight state trellis coded modulation
V.34	a) half-duplex modes of operation are used for fax b) Quadrature Amplitude Modulation (QAM) for each channel with synchronous line transmission at selectable symbol rates including the mandatory rates of 2400, 3000, and 3200 symbols/s and the optional rates of 2743, 2800 and 3429 symbols/s c) Trellis coding for all data signaling rates d) Adaptive techniques that enable the modem to achieve close to the maximum data signaling rate the channel can support on each connection e) Exchange of rate sequences during start-up to establish the data signaling rate

### Buyer's guide

- [XXFT0](#) – WCS Fax Simulator. Requires one of the licenses below:
  - XXFT2 – 2 Fax ports licenses
  - XXFT3 – 8 Fax ports licenses
  - XXFT4 – 30 Fax ports licenses
  - XXFT5 – 60 Fax ports licenses
  - XXFT6 – 120 Fax ports licenses

#### Related Software

- [VQT022](#) – VQuad™ Fax Emulation (2 simultaneous ports)
- [VQT022a](#) – VQuad™ Fax Emulation (8 simultaneous ports)
- [FXT001](#) – GL Insight - Single Fax Analysis - TDM
- [FXT002](#) – GL Insight - Single Fax Analysis - IP
- [VBA038](#) – FaxDD™ – Fax decoder/demodulator
- [PKV104](#) – FaxDDT38™

- [XX651](#) – MAPS™ CAS Emulator
- [XX649](#) – MAPS™ SS7 Emulator
- [XX648](#) – MAPS™ ISDN Emulator

#### Related Hardware

- [VQT241](#) – Dual Universal Telephony Adapter (UTA)
- [FTE001](#) – QuadXpress T1E1 Main Board (Quad Port– requires additional licenses)
- [ETE001](#) – QuadXpress T1E1 Daughter Board (requires FTE001)
- [PTE001](#) – tProbe™ Dual T1 E1 Laptop Analyzer with Basic Analyzer Software
- [HTE001](#) – Universal T1 E1 PCI Card with Basic Analyzer Software
- [UTE001](#) – Portable USB based Dual T1 or E1 Laptop Analyzer with Basic Analyzer Software



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