
GL Insight™



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GL Insight™ - An Overview

- Decodes and Analyzes Data, Fax, Modem over PSTN and IP networks
- Zero integration effort
- Operates without any interference to transmission
- Device-independent communications analysis
- Offline analysis of TDM and IP captured files
- Real-Time analysis (future)
- High-level “insights”, based on expertise and field-hardened experience
- Windows-based solution and user-friendly GUI

Who Benefits from GL Insight™?

- Equipment Developers
 - Media Gateways
 - CTI Applications
 - Messaging
 - IVR
 - Recording
 - Fax Servers
 - RAS Servers
- Service Providers
 - Carriers and Operators
 - ISP (VoIP)
 - Mobile Operators and Service Providers

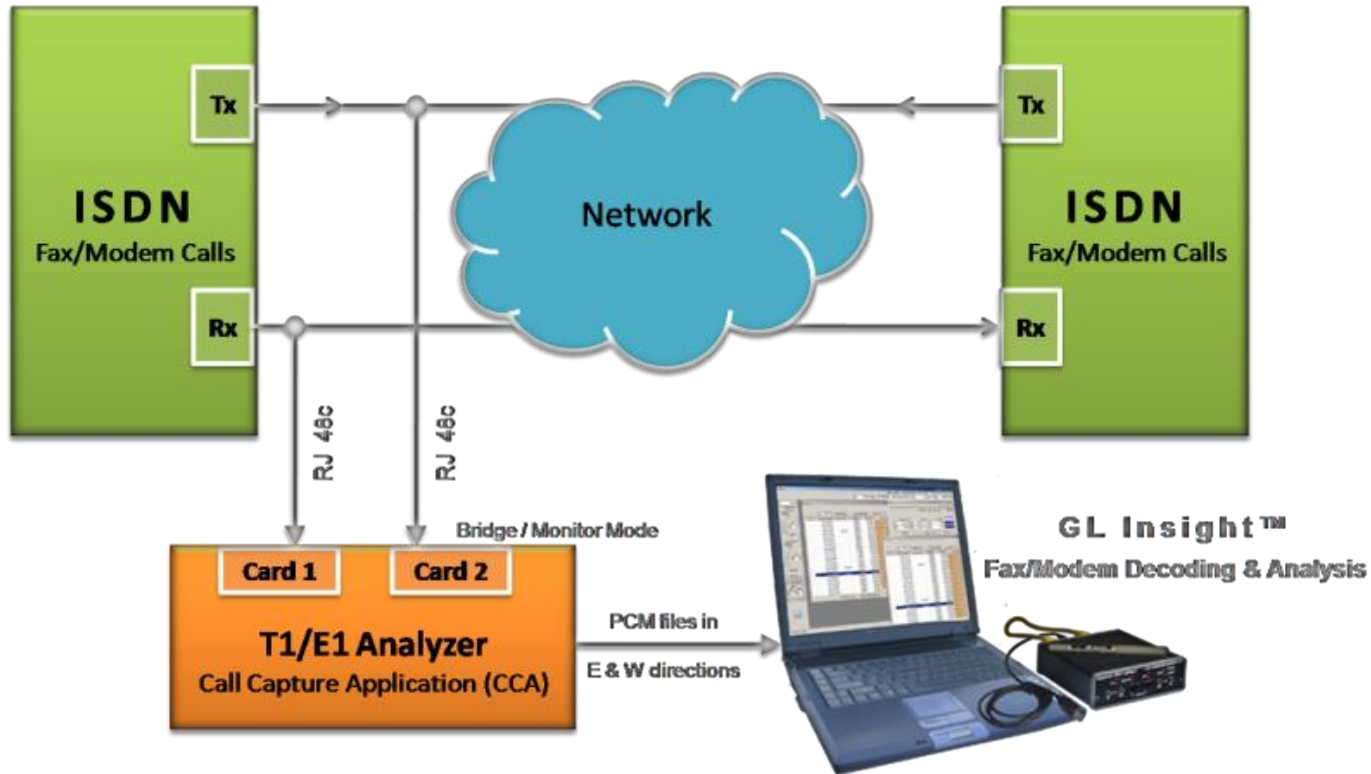
Solution for Equipment Developers

- Provides bottom-up deep diagnosis of the call
 - e.g. (fax): provides information from data pump layer up to tiff picture
- Helps solve interoperability issues
- Diagnoses physical layer problems
- Diagnoses network layer problems

Solution for Service Providers

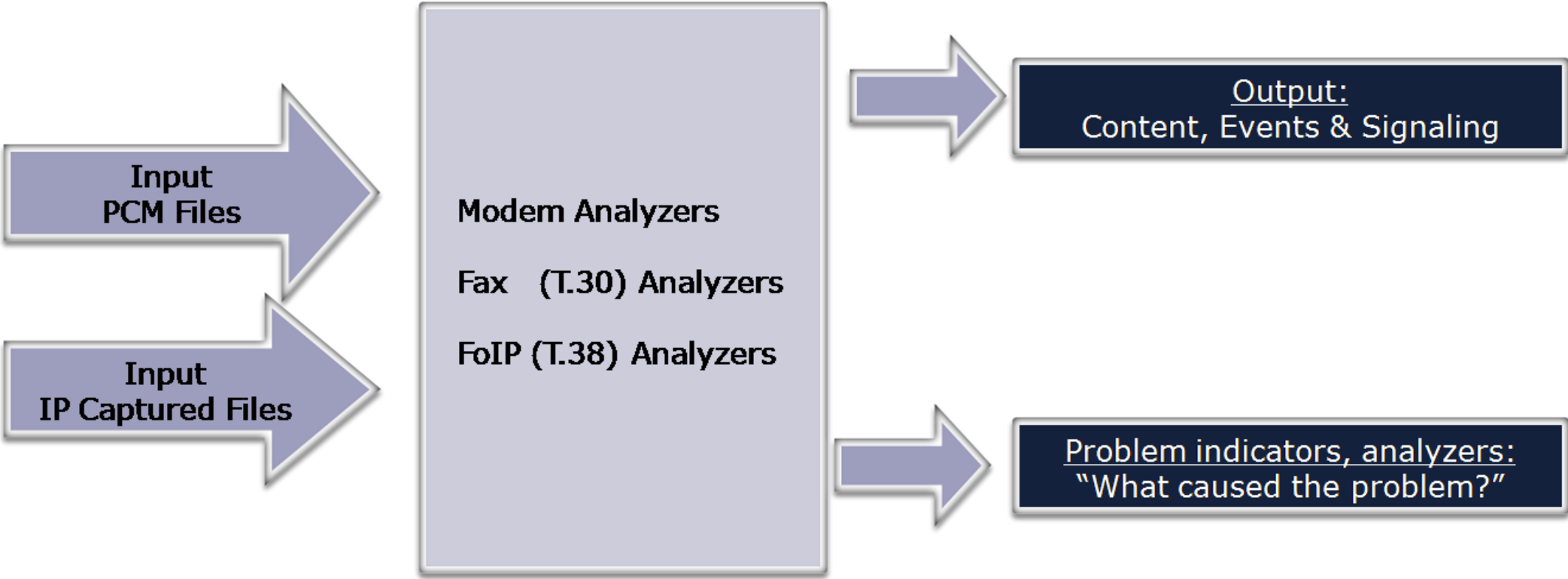
- Non-intrusive IP network diagnosis
 - High packet loss rate
 - High jitter
- Non-intrusive TDM network diagnosis
 - Echo path
 - Echo canceller performance
- Indicates possible location of problems
 - TDM
 - IP

Fax and Modem Data Capture in T1E1



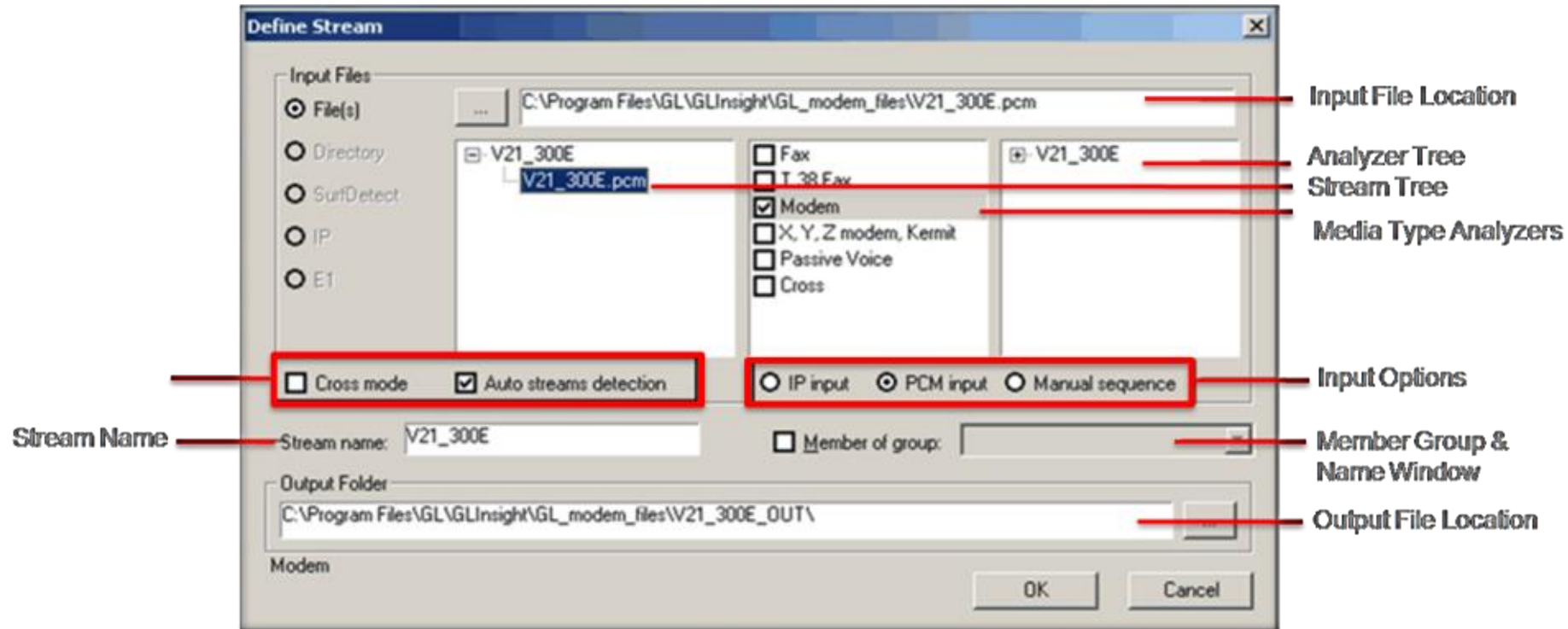
- Fax or Modem calls are captured through CCA in T1/E1 analyzer
- Captured PCM files are fed to GL Insight software for analysis and decoding

Workflow



Stream Input window

- Import the file (PCM, IP, Manual)
- Select the media type analyzer
- Start Analysis
- Analyze the output files



Analyzing Recordings

The screenshot displays the SurfInsight software interface for analyzing a recording. The main window is titled "SurfInsight - [V17_14400 Fax Analyze Results 0]".

Stream Name: V17_14400

Workspace: The workspace tree on the left shows a hierarchy: V17_14400 > Input > Output > Fax [100% done]. The Fax folder contains various files including sym_err.pcm, symbols.pcm, equalizer.pcm, symbols_timestamp.pcm, org_rx_pdsnr_lo.pcm, hs_bits.bin, ans_rx_pdsnr_lo.pcm, a_ls_bits.bin, t30_bytes.bin, b_ls_bits.bin, ans_level.pcm, org_level.pcm, jitter.bin, log_file.txt, image1.bin, and image1.tif.

Input File Format: The "Input Samples Format" section at the bottom left shows options: Auto, A-law, **μ-law** (selected), and Linear 16-bit.

Results Area: The "Whole List" table in the center shows a list of events:

Time (Min.Sr)	Description
00:00.030	Fax decoding started at Tue Jun 12 18:46:42.575 2007
00:02.640	CNG tone detected
00:02.850	ANS detected
00:03.150	CNG tone ended
00:05.640	ANS/ANSam tone ended
00:05.880	Fax datapump phases: V21 flags start detected
00:05.880	DEMODULATOR_STANDARD_V21_CHANNEL_2
00:05.880	DEMODULATOR_SPEED_300
00:06.870	Fax datapump phases: T30 Frame start detected
00:07.530	T30 Frame Name: CSI was transmitted in ANS -> ORG direction
00:07.530	CSI
00:07.530	FF C0 02 04 04 04 04 04 04 04 04 04 04 04 04 04 04
00:07.530	04 04 04 04 04 04 04 04

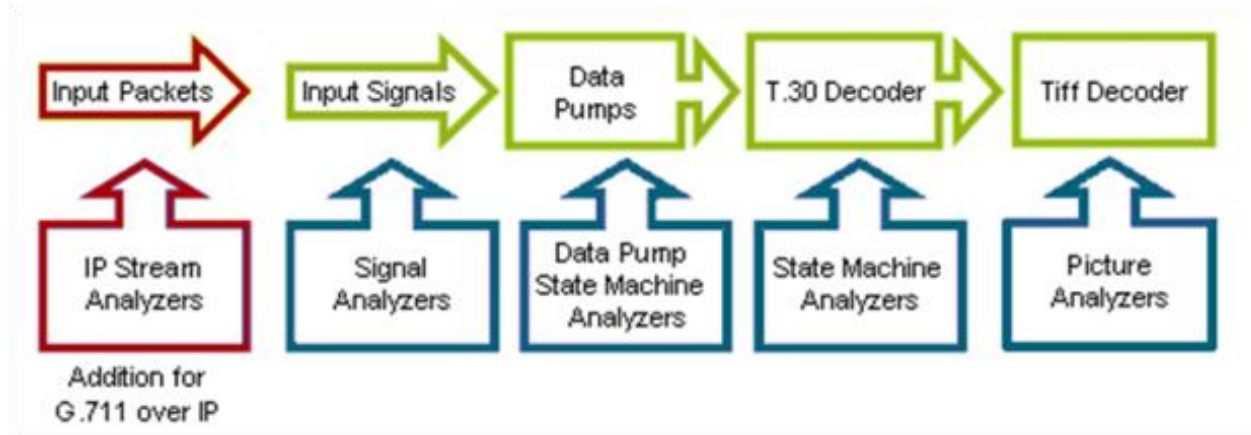
Filtering: The right-hand panel shows a list of filters with checkboxes: DataPump, T30, TIFF, Timing, IWF, T38, T.30 Decoder Analyzer, Signal Analyzers, Graph visibility, and Errors.

Call Time Line: The bottom section shows a call time line with various events marked: ANS,2100Hz, V21,CSI,DIS, V21,TSI,DCS, T30,DCS, V17,14400, V21,CFR, and CFR. The time axis ranges from 0:2.46 to 0:20.970.

Fax Transmission Phases

Phase	Description
Phase A - Establishing a Voice Call	The calling party picks up a handset or prepares a fax and then dials a destination phone or fax machine.
Phase B - Identifying Facilities and Capabilities	Facilities and capabilities are identified and negotiated between the calling and called parties.
Phase C - Transmitting Content	The message or page is sent.
Phase D - Signaling End of Transmission and Confirmation	The end of transmission and confirmation are signaled between the calling and called parties.
Phase E - Releasing the Call	The call is released when a phone or fax machine hangs up.

Fax Decoding and Analysis Information



Signal Analyzers

- Unstable signal detector
- Signal overflow detector
- No-signal on single-sided indication

Data Pump State Machine Analyzers

- Fax phase changes, data rates, symbol rate
- Structure's interchange (rate sequences, MP, Info) and complete connection parameters
- PDSNR (post detection signal quality measurement) improper quality drop detector
- V.8 incompatibility indication

T.30 Decoder Analyzers

- T.30 raw data
- T.30 frames and information
- T.4/T.6-page coding information
- CRC error detector in V.21
- Repetitive T.30 frames detector
- T.4/T.6 bad-line statistics
- ECM failure to correct error frames indication
- Unexpected end of Fax indication
- Improper T.30 protocol flow indication

Fax Decoded files

a_ls_bits.bin
b_ls_bits.bin

Contain all the low-speed bits decoded in the fax call
(It is like the hs_bits file which contains the High-Speed bits)

ans_rx_pdsnr_lo.pcm
org_rx_pdsnr_lo.pcm

Post Detection Signal to Noise Ratio) files should be opened as 8000samples/sec, mono, 16 bit linear. Lo is low resolution (133.3 measurements per second) and Shows the value in dB (/100) of the Signal-to-Noise ratio of the answer side training data signal respectively

ans_level.pcm
org_level.pcm

The ans_level and org_level files are similar to the PDSNR files. Each provides the value of the signal power of the direction denoted by the name of the file.

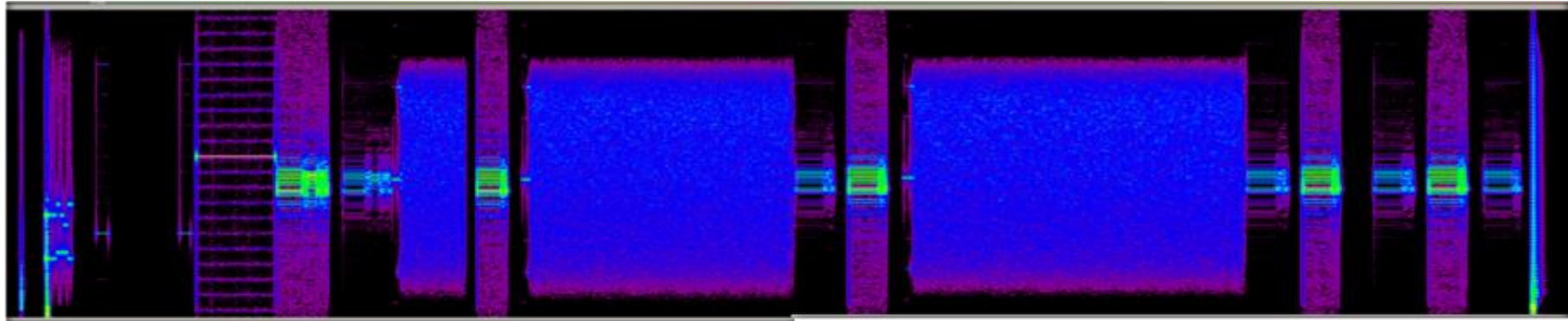
Divide the value by a 100 to get the signal power in the recording.

Fax Decoded files (*contd.*)

jitter.bin	The Jitter.bin file is relevant in T.38 files and contains the network jitter of the recorded analyzed packets.
equalizer.pcm	The equalizer file describes the equalizer values used when entering the data in the hs portion. They serve as to distinguish between the high speed sections
t30_bytes.bin	Contains T.30 signal bits
hs_bits.bin	High speed (page transmitting side) bits decoded in the fax call
symbols.pcm	Demodulated 2-dimensional symbols
sym_err.pcm	Estimated demodulated 2-dimensional symbol errors (noise)

Spectrogram View of Fax File

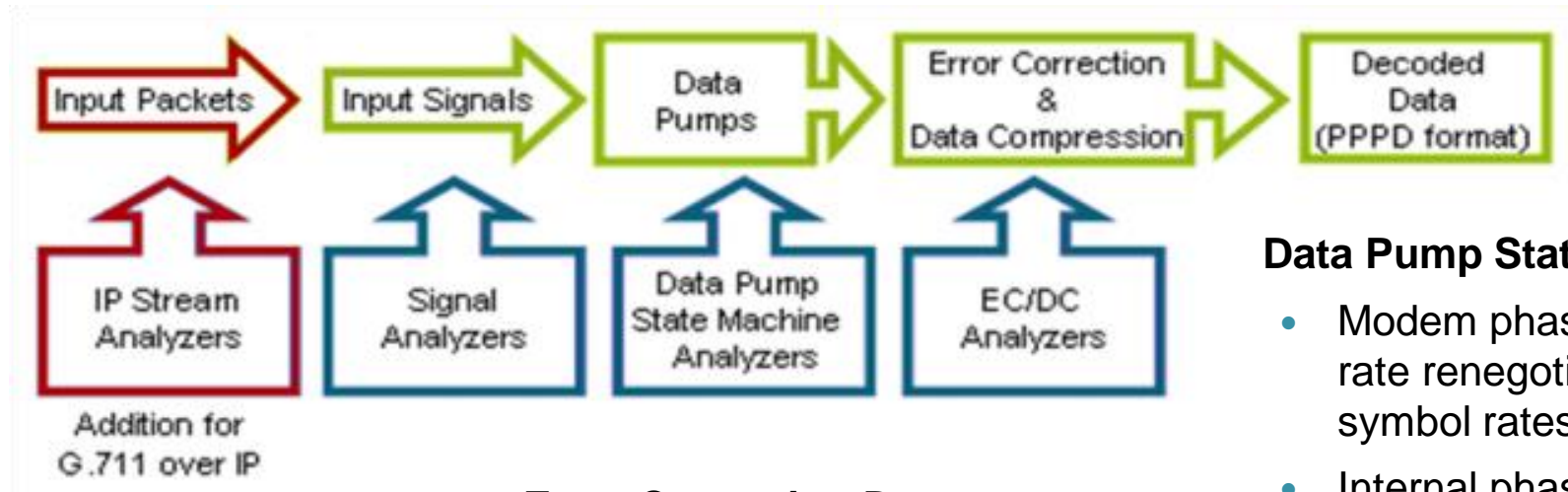
ECM_V.17_14400_ans.pcm



Modem Transmission Phases

Phase 1	Network Interaction
Phase 2	Probing /Ranging
Phase 3	Equalizer and Echo canceller training
Phase 4	Final training

Modem Decoding and Analysis Information



Data Pump State Machine Analyzers

- Modem phase changes, retrains, rate renegotiations, data rates, symbol rates
- Internal phase states such as S detections and all the phase 2 sub-states
- Structure's interchange (MP, CP, Info) and complete connection parameters
- Data-pump improper flow detector such as inconsistency of the signal with the standard
- PDSNR (post detection signal quality monitoring) improper quality drop detector
- Improper phase reversal detector

Error Correction Data Compression Analyzers

- Error-correction and data compression setup
- Information including XID info
- Error-correction frame statistics
- Data compression negotiation
- Error-Correction improper flow detector

Signal Analyzers

- Discriminator information
- Improper Auto-mode signal flow detector
- Improper V.8 signal flow detector
- Unstable Signal level detector
- Signal overflow detector

Modem Decoded files

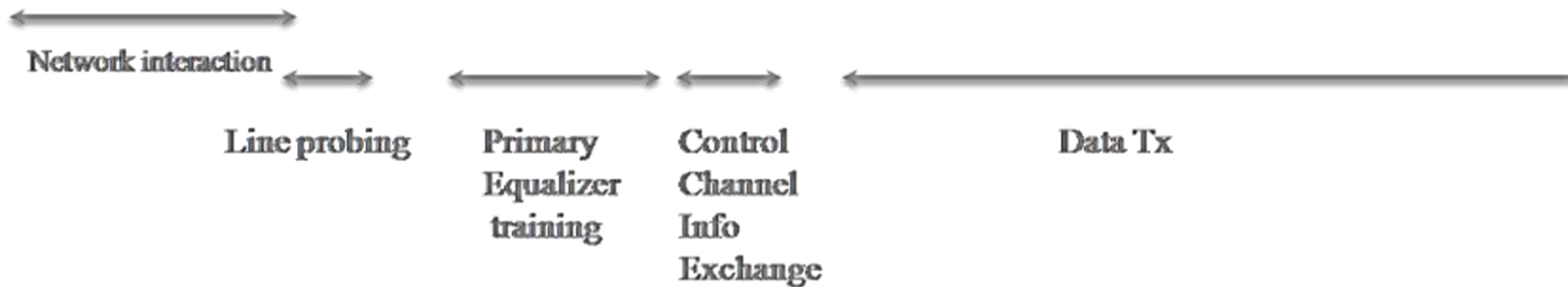
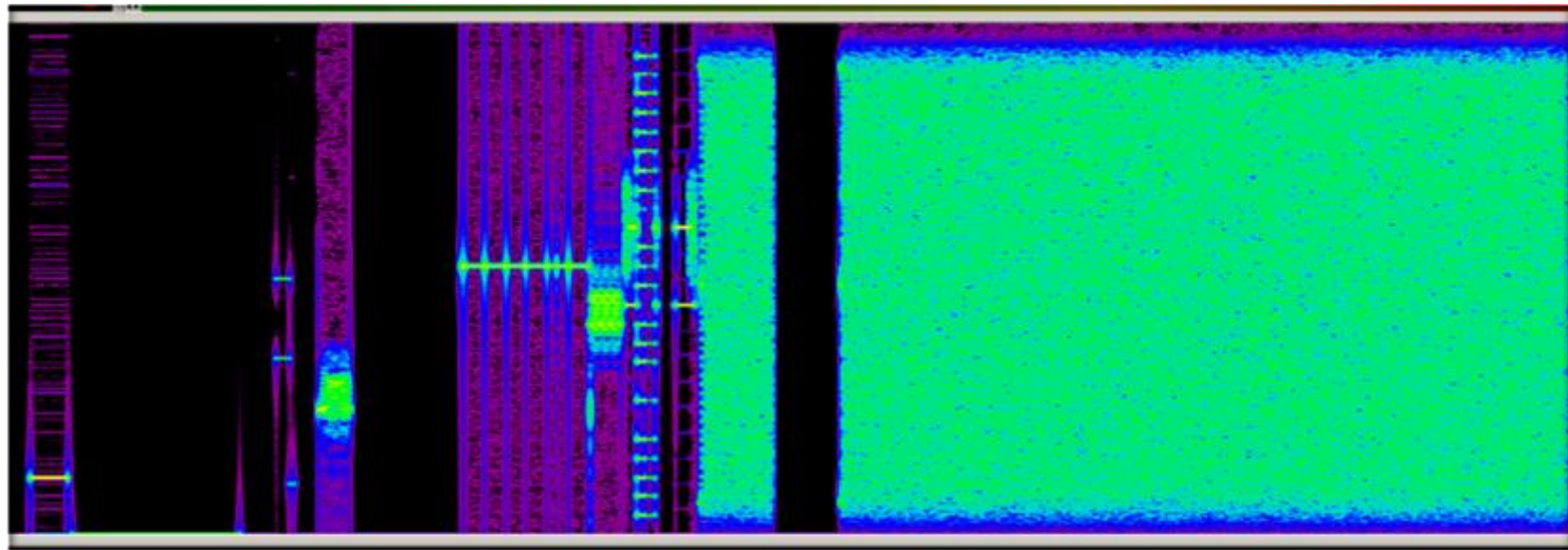
- V34_33600energy_ans_lo.pcm** It is Answer modem detected signal power
- V34_33600energy_org_lo.pcm** Shows the level of the signal level dBm of the answer side and origin of the connection. The energy files are in dBm(/100) units. Value of -1900 represent -19dBm. The energy files are generated only on V.34 and V.90 connections).
- V34_33600pdsnr_ans_lo.pcm** Post Detection Signal to Noise Ratio) files should be opened as 8000samples/sec, mono, 16 bit linear. Lo is low resolution (133.3 measurements per second) and Shows the value in dB (/100) of the Signal-to-Noise ratio of the answer side training data signal respectively
- V34_33600pdsnr_org_lo.pcm**

Modem Decoded files (*contd.*)

- V34_33600raw_out_bits1.pcm** This file contains the bits extracted by the data pump before the ECDC layer.
V34_33600raw_out_bits2.pcm For example, in start stop connection, the start and stop bits will be found in this file
- V34_33600output_chars.bin** This file contains the bits extracted after the ECDC layer in both directions in a PPPD format.
- V34_33600symbols1.pcm** The symbols received by the originate modem and shows the four-point TRN sequence (Phase 3), and the full constellation in the data stage (Phase 4).
V34_33600symbols2.pcm Demodulated symbols in the 2-dimensional symbol space, received by the Originate modem

Spectrogram View of Modem File

Modem _V.34_33600_ans.pcm



GL Insight™ Summary

- Accelerate development cycle of Data and Fax-related systems
- Simplify interoperability resolution
- Simplify and accelerate maintenance at customer sites
- Transparently produce diagnostics and “insights”

Thank You