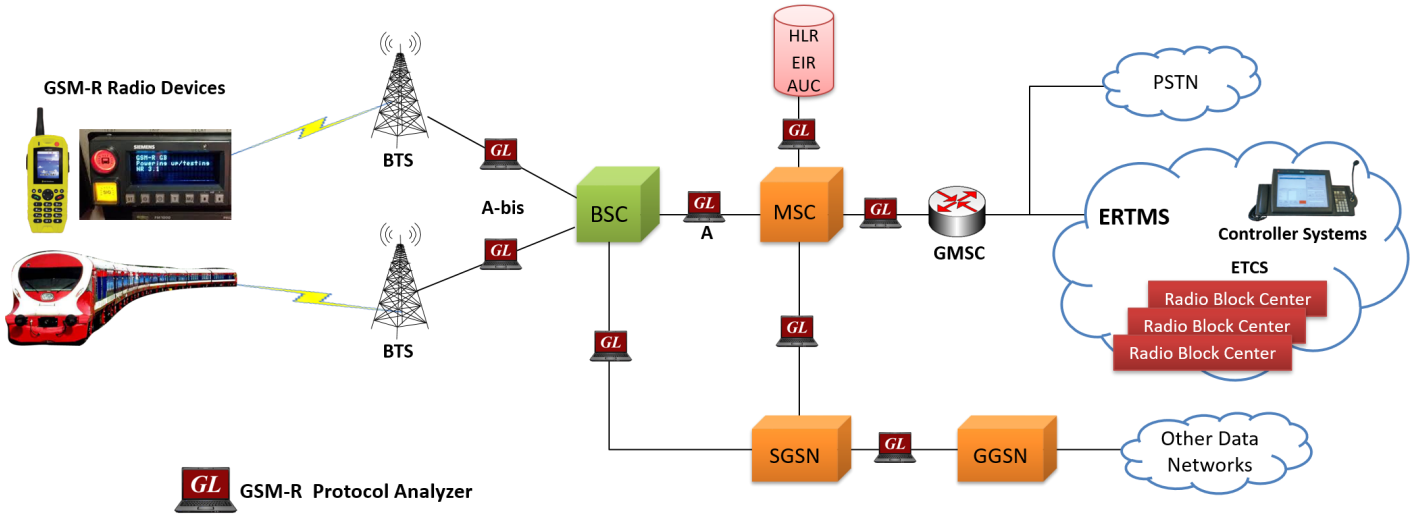
GSM-R Protocol Analyzer



Overview

GSM-R is a proven mobile communications standard of ERTMS (European Rail Traffic Management System), the European standard for railway operations. It is used to carry railway-specific voice and data services. It is an extension of the standard GSM signaling protocol and uses frequencies specifically reserved for railway operations.

GL's **GSM Protocol Analyzer** supports complete analysis, decode and monitoring of **GSM-R (GSM-Railway)** - an international wireless communications standard for railway communication and applications. The analyzer adds GSM-R features to capture, decode, and troubleshoot GSM-R signaling messages such as VGCS, VBS, eMLPP, Emergency and Functional numbering etc.

The GSM Protocol Analyzer also supports decoding and identifying the User to User Information IE on CC, BCC and GCC layers to support GSM-R features decode according to EIRENE specification (H 22 T 0001 2) and ETSI TS 102 610. A GSM-SS layer decode is also added to existing GSM protocol stack to support all the Supplementary Services.

GL Communications supports the following types of GSM analyzers:

- Real-time GSM Analyzer (Pre-requisites: GL's field proven T1 E1 internal cards or USB T1 E1 external units, required licenses and Windows® Operating System)
- Offline GSM Analyzers (Pre-requisites: Hardware Dongles and Windows® Operating System)

For more details, refer GSM Protocol Analysis webpage.

Typical Users

- Railway operators
- Railway system integrators

Typical Applications

- Complete end-to-end surveillance of the GSM-R Network
- Surveillance of specific tracks and high speed lines
- Roll-out, and verification railway specific applications

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Main Features

Display Features

- Displays Summary, Detail, Hex-dump, and Statistics Views
- Detail View:
  - Displays decodes of a user-selected frame from the summary view
  - Provides options to display or hide the required protocol layers
  - Contents of this view can also be copied to clipboard
  - Provides option to toggle detail view vertically or horizontally as feasible for the user
- Summary View displays MTP2, MTP3 information, GSM Message types, information about various channels used during the call, and so on in a tabular format
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Option to combine data from multiple columns under one column

Supported Protocols

- A, A-bis, Mobis, Gs, Up, Ls, Lb, and Lp

Filtering / Search

- Advanced filtering and search based on any user selected protocol fields

Capturing Streams

- Streams can be captured on the selected time slots (contiguous or non-contiguous), sub-channels or full bandwidth
- Frames can be transmitted/captured in either 64 kbps, 56 kbps, n x 64 kbps, or n x 56 kbps data channels (hyper-channels)
- Multiple streams of GSM traffic on various T1 E1 channels can be simultaneously decoded with different GUI instances

Export Options

- Exports Summary View information to a comma delimited file for subsequent import into a database or spreadsheet
- Capability to export detailed decode information to an ASCII file

Remote Monitoring

- Remote monitoring capability using GL's Network Surveillance System

Additional Features

- Supports protocol stack extension of the standard GSM signaling protocol and frequencies specifically reserved for GSM Railway operations
- Decoding of many RR layer non-transparent messages such as “System Information”, “Measurement Result”, “Immediate Assignment” and others
- User to User Information IE is added to GSM CC, BCC and GCC protocols to support GSM-R features according to EIRENE specification (H 22 T 0001 2) and ETSI TS 102 610
- Decodes many GSM-SS layer to identify all the Supplementary Services such as Register, Facility, Release Complete

Main Features (*Contd.*)

Call Detail Recording

- Call Detail Recording feature includes data link groups that help in defining the direction of the calls in a given network and form logical groups comprised of unidirectional (either 'Forward' or 'Backward') data links

Centralized and Remote Monitoring (Requires additional licenses)

- GL's GSM Network Surveillance system is widely used for identifying, segregating, and analyzing different types of GSM Mobile calls over TDM and IP transport networks
- Both GSM-R and TRAU analyzer probes deployed at strategic locations in world wide network, captures and collects voice, data, signaling, statistics, and performance information, and relay these information to a centrally distributed Network Management System (NMS) – NetSurveyorWeb™
- GSM IP probes (within PacketScan™) are also available for capturing GSM signaling as well as RTP traffic data over IP networks to the same GSM Network Surveillance

Supported Protocols for GSM-R

GL's GSM-R analyzer supports capture, decode and analysis of protocols listed below.

- GCC (Group Call Control) protocol according to 3GPP TS 44.068 V9.0.0 to support Voice Group Call Service (VGCS)
- BCC (Broadcast Call Control) protocol according to 3GPP TS 44.069 V9.0.0 to support Voice Broadcast Service (VBS)
- GSM Supplementary Services protocol according to 3GPP TS 04.08 V7.17.0 to support required supplementary services such as: notifySS, processUnstructuredSS-Data, lcs-LocationNotification, callDeflection, forwardCUG-Info, holdMPTY etc.
- GSM Call Control protocol according to 3GPP TS 24.008 including analysis of User-to-User Information for GSM-R (Railway). This includes analysis of Information Elements such as:
  - Confirmation of High Priority Calls
  - Functional Number
  - Enhanced Location Dependent Addressing
  - Alerting Dispatcher Notification
  - DSD Alarm Notification

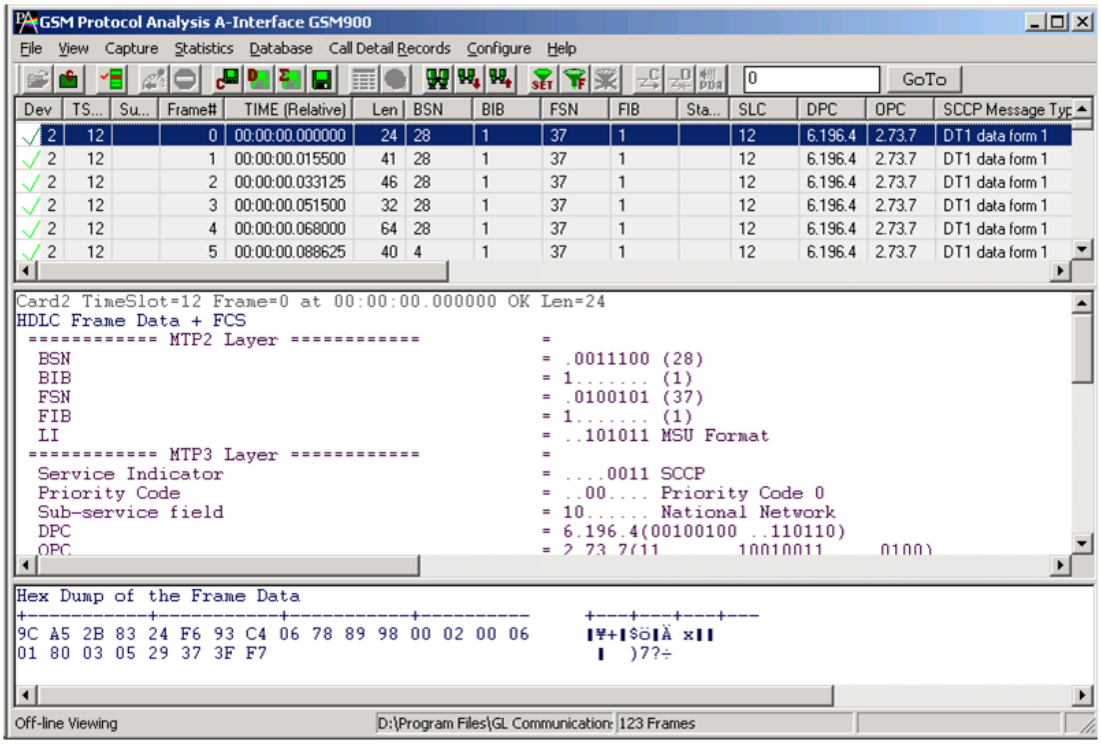
Additional GSM-R Services

Decode and analysis support for more GSM-R services as listed below:

- Presentation of a Functional Number – UUS
- Shunting – MPTY, SCD, VGCS, FA
- Functional Addressing – Follow Me
- Railway Emergency Calls – MPTY
- Enhanced Multi-Level Precedence & Pre-emption (eMLPP)
- Line identification services like CLIP, CLIR etc
- Closed User Group
- Advice of Charge
- User-to-user signaling
- Follow Me (Based on USSD and CF)

Summary, Detail, and Hex dump Views

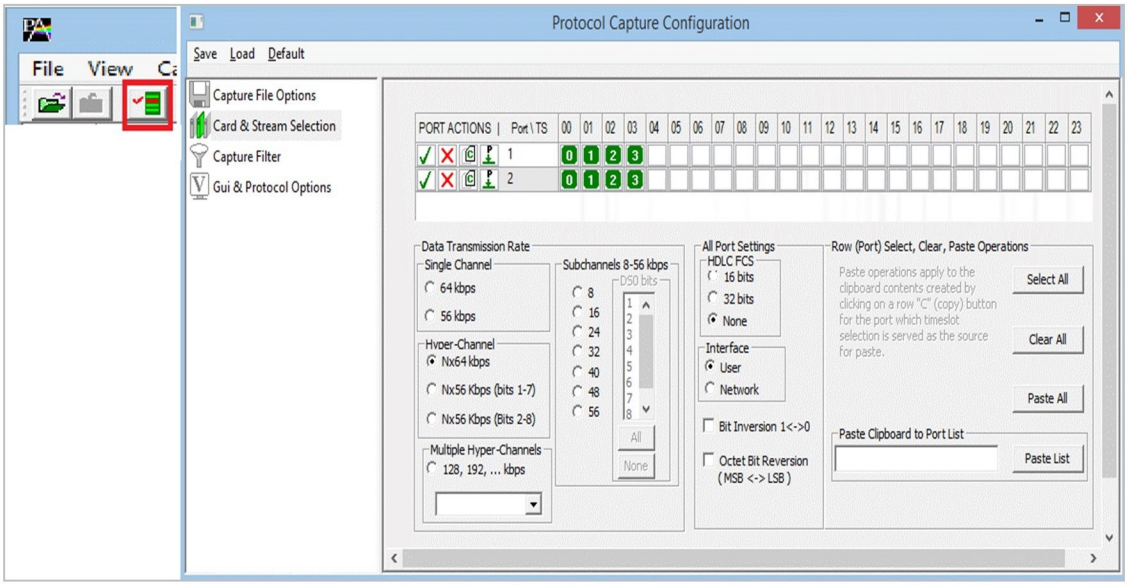
The analyzer displays Summary, Detail, and Hex Dump Views in different panes. Summary View displays Dev#, Time Slot, Frame#, Time, Length, Error, BSN, BIB, FSN, FIB, Status Field, SLC, DPC, OPC, SCCP Message, and so on. User can select a frame in Summary View to analyze and decode each frame in the Detail View. The Hex dump View displays the frame information in HEX and ASCII format. The contents of detail and hex dump view can also be copied to clipboard.



Summary, Detail, and Hex dump Views

Real-time and Offline Analysis

Users can capture and analyze GSM-R frames in real-time and record all or filtered traffic into a trace file. The recorded trace file can be used for offline analysis or exported to a comma-delimited file, or ASCII file. Real-time capturing requires user to specify timeslots, bit inversion, octet bit reversion, user/network side, FCS, and data transmission rate. Recorded trace file can be played back using the HDLC Playback application.

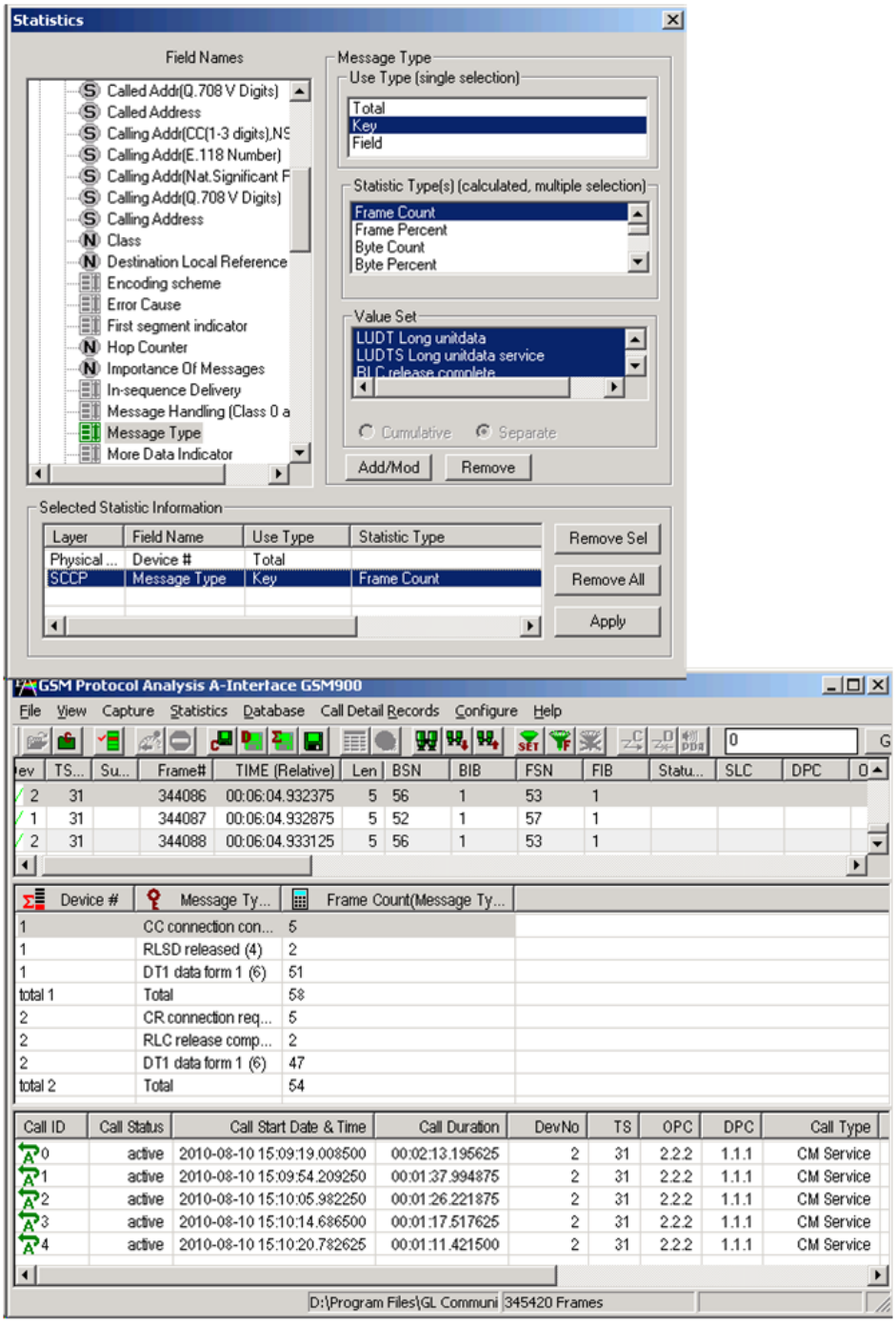


Stream / Interface Selection

Call Detail Record & Statistics View

Important call specific parameters like Call ID, Call disposition, Call duration, OPC/DPC, Call type (point-to-point/point-to-multipoint etc) are calculated based on signaling messages, and displayed in Call Detail View. Additionally, users are provided with the option to search a particular call detail record from the captured traces.

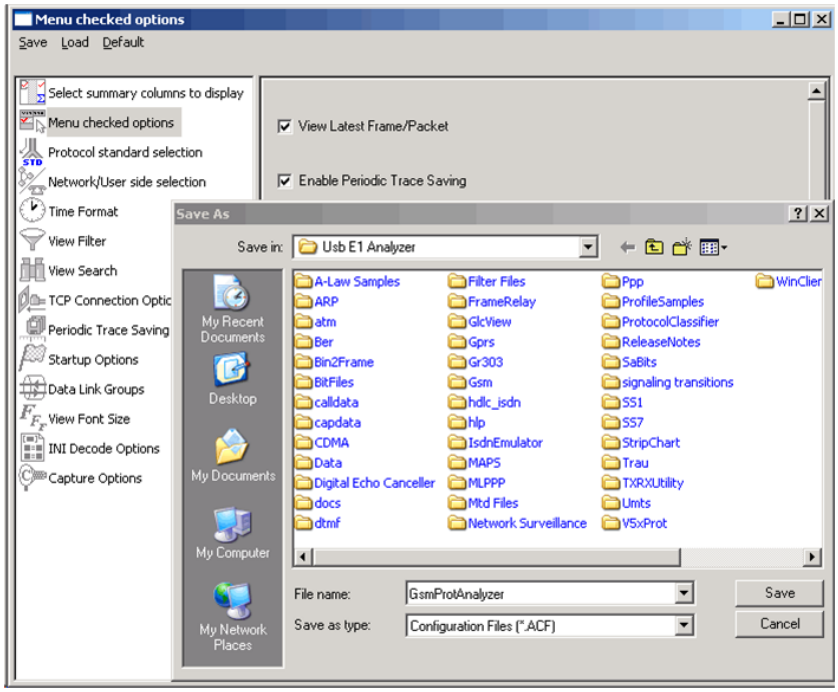
Various statistics can be obtained in statistics view to study the performance and trend in the GSM network based on protocol fields and parameters.



Statistics and Call Detail Record View

Save / Load All Configuration Settings

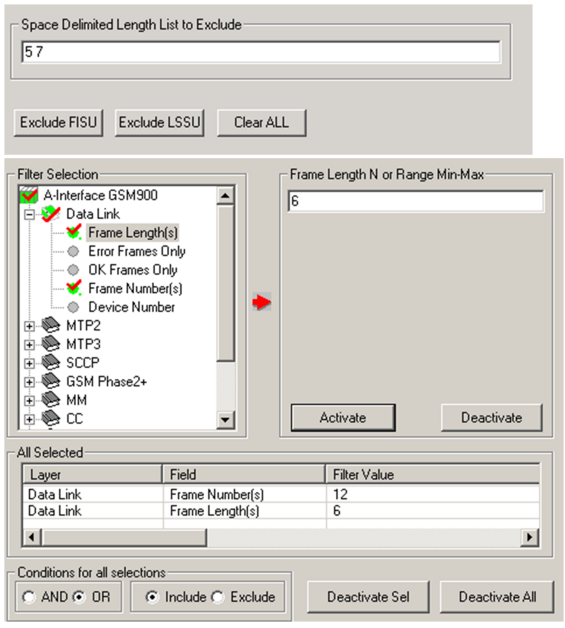
Protocol Configuration window provides a consolidated interface for all the important settings required in the analyzer. This includes various options such as protocol selection, startup options, stream/interface selection, filter/search criteria and so on. All the configuration settings can be saved to a file and then loaded for future operations, or user may just revert to the default values using the default option.



Save / Load Configuration

Filtering and Search

Users can record all or filtered traffic into a trace file. Filter and search capabilities adds a powerful feature to the GSM analyzer. These features isolate required frames from captured frames in real-time, as well as offline.Users can specify custom values for frame length to filter frames during real-time capture. The frames can also be filtered after completion of capture based on Data Link, MTP2, MTP3, SCCP, BTSM, RR, MM and more. Similarly, search capability helps user to search for a particular frame based on specific search criteria.



Real-time and Offline Filter

Supported Protocol Standards

Supported Protocols	Specification Used
TCP, UDP, IP, MAC	RFC 793, RFC 768, RFC 791, IEEE 802.3
MTP2	Q.703, ITU-T Blue Book / ANSI T1.111-1996
MTP3	Q.704, ITU-T Blue Book / ANSI T1.111-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book / ANSI T1.112-1996
GSM Phase2 + BSSMAP / DTAP (BSSAP/ DTAP)	3GPP TS 48.008 10.0.0)
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998
Test & Network Management Messages (ITU / ANSI)	ITU-T Q.703, Q.704 / ANSI T1.111.4, ANSI T1.111.7
GSM-R	ETSI TS 102 610 EIRENE H 22 T 0001 2 FRS (Functional Requirements Specification) 7.1 SRS (System Requirements Specification) 15.1
MM	3GPP TS 04.08 V7.17
CC	3GPP TS 24.008
RR	3GPP TS 04.18 V8.13.0
GSM-SS	3GPP TS 04.08 V7.17
GCC	3GPP TS 44.068 V9.0.0
BCC	3GPP TS 44.069 V9.0.0
BTSM	3GPP TS 08.58 V8.6.0
BSSAP +	3GPP TS 29.018 V6.0.0
RRLP / LLP	3GPP TS 44.031 V 7.5.0 / 3GPP TS 44.071 V 6.0.0
SMLCPP / BSSLAP	3GPP TS 48.031 V 6.6.0 / 3GPP TS 48.071 V 7.2.0
BSSAP-LE (BSSMAP-LE/DTAP-LE)	3GPP TS 49.031 V7.3.0
Mobis Layer 3	BSC-BTS: Motorola GSM Base Station System BSC to BTS Interface Design Specification. Document ID: GSD-GSM_NRS-MULTI_FA-IDS-001. BSC-PCU: Motorola GSL External Interface Specification - GSR9. Document ID: GSD-GSR9-GSL-EIS-001.
UMA Protocols (Stage 3) R1.0.4	TS 24.008, Mobile radio interface layer 3 specification, Core Network Protocols - Stage 3 TS 25.331, RRC Protocol Specification TS 44.018, Mobile radio interface layer 3 specification TS 48.018, Serving GPRS Support Node (SGSN) TS 48.008, BSS GPRS Protocol (BSSGP) TS 45.008, Radio subsystem link control

Buyer's Guide

Item No	Product Description
XX150	Real-time GSM Protocol Analyzer (T1 or E1)
OLV150	Offline GSM Analyzer
XX151	GSM Motorola Mobis option (Optional license)

Item No	Related Hardware
PTE001	tProbe™ Dual T1 E1 Laptop Analyzer (Require Basic Software)
FTE001	QuadXpress T1 E1 Main Board (Quad Port)
ETE001	OctalXpress T1 E1 Daughter boards (Octal Port)
TTE001	tScan16™ T1 E1 Boards
XTE001	Dual Express (PCIe) T1 E1 Boards

Item No	Related Software
XX090	HDLC Capture and Playback Software (T1 or E1)
XX600	Basic Client/Server Scripted Control Software (Included with Basic Software)
XX693	GSM A-bis Interface Emulator
XX692	GSM A Interface Emulator
PKV170	NetsurveyorWeb™ (Perpetual License, Unlimited Users/Nodes) – Includes Oracle 11g Standard Edition One and Standard Server-Grade Computing Platform
PKV171	Network Surveillance Agent Toolkit

Note: PCs which include GL hardware/software require Intel or AMD processors for compliance.

*Specifications and features subject to change without notice.

For more details, refer GSM Protocol Analysis webpage.

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