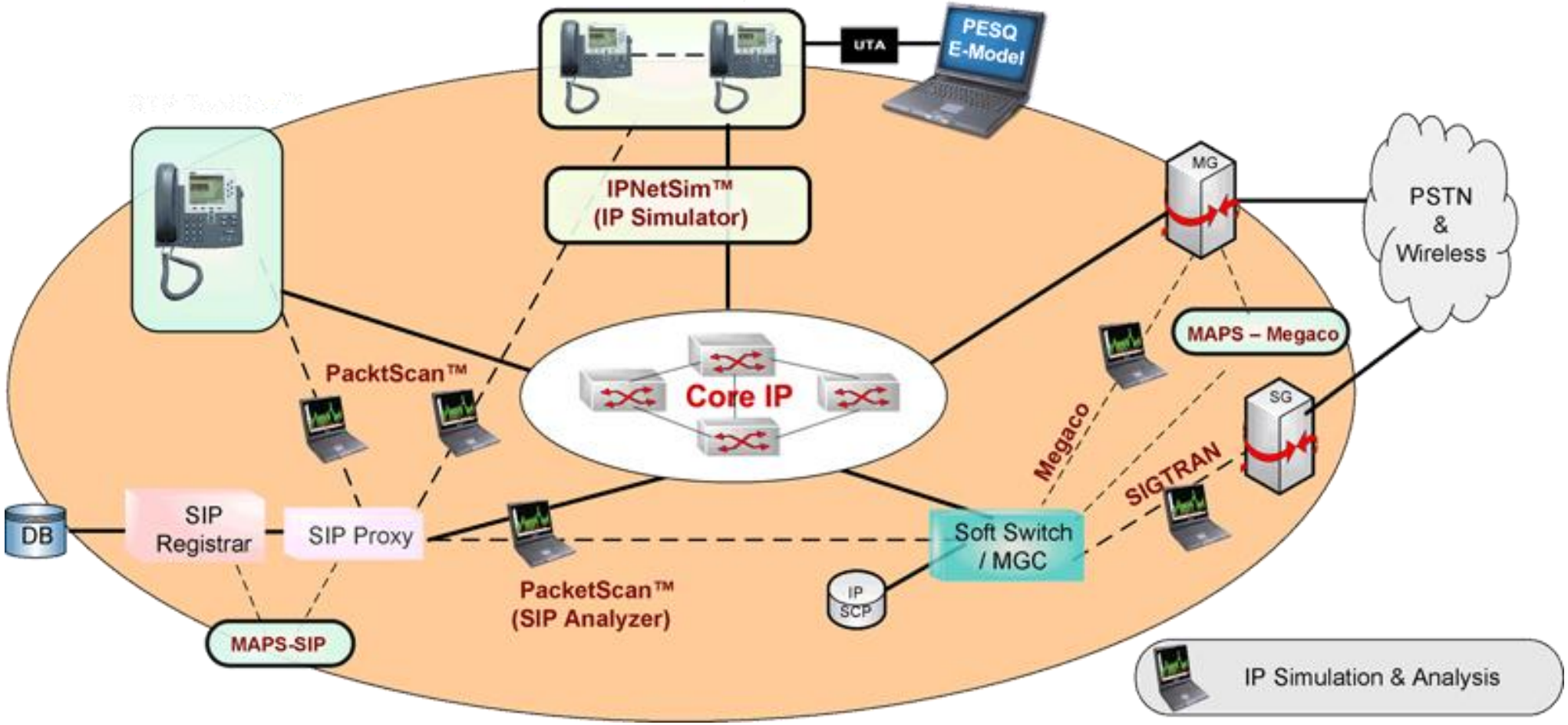
Introducing GL's VoIP Products

GL Communications Inc.
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: https://www.gl.com

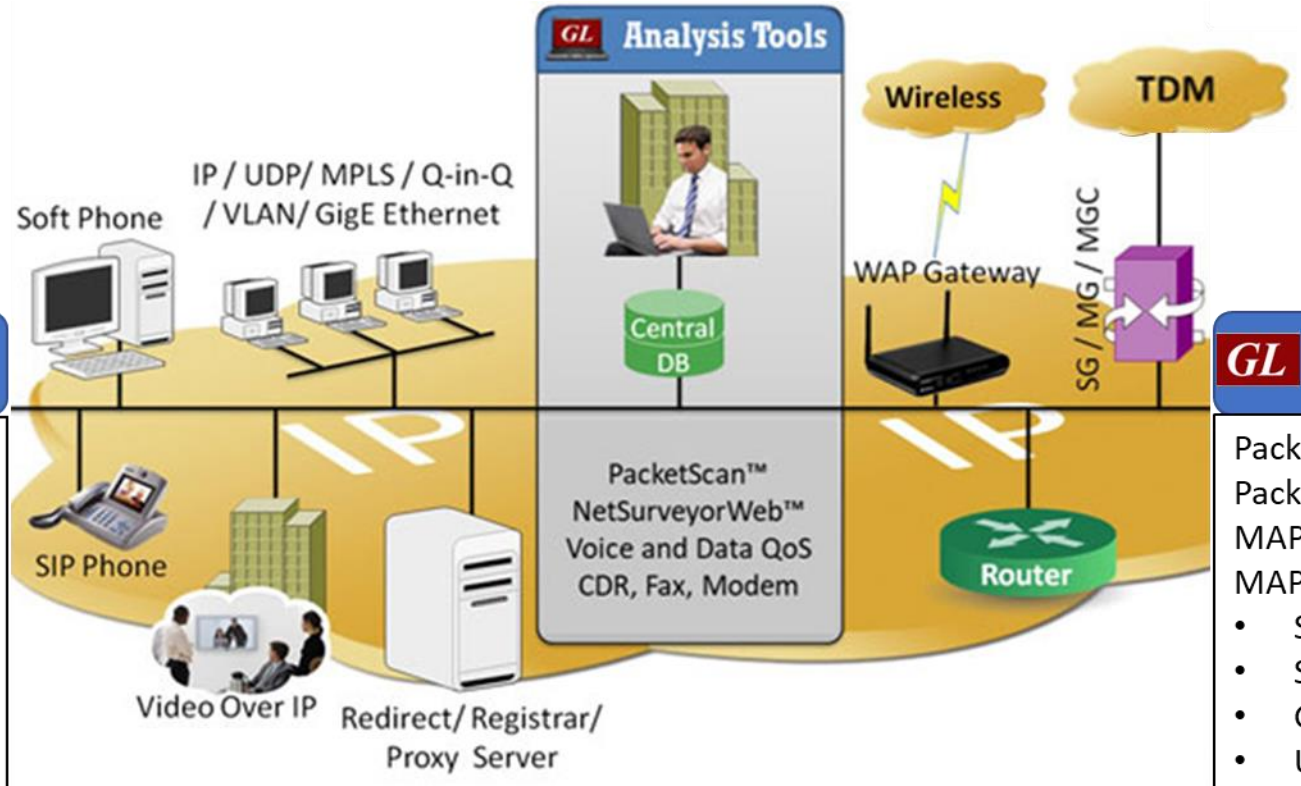
Introduction

- VoIP Traffic Analysis – SIP, RTP, RTCP, MGCP, MEGACO, SIGTRAN
- VoIP Traffic Generation/Simulation– SIP, RTP, RTCP, H.323
- VoIP Network Analysis & Simulation
- Test VoIP Elements – Gateways, ATAs & Signal Processing Devices
- Echo Cancellation Testing & Compliance
- Network Monitoring Solutions
- Remote Access using Client-Server Technology
- Voice Quality Analysis

VoIP Traffic Generation and Analysis



VoIP Network Analysis & Simulation



GL IP Network Emulator

IPNetSim™

GL Simulation Tools

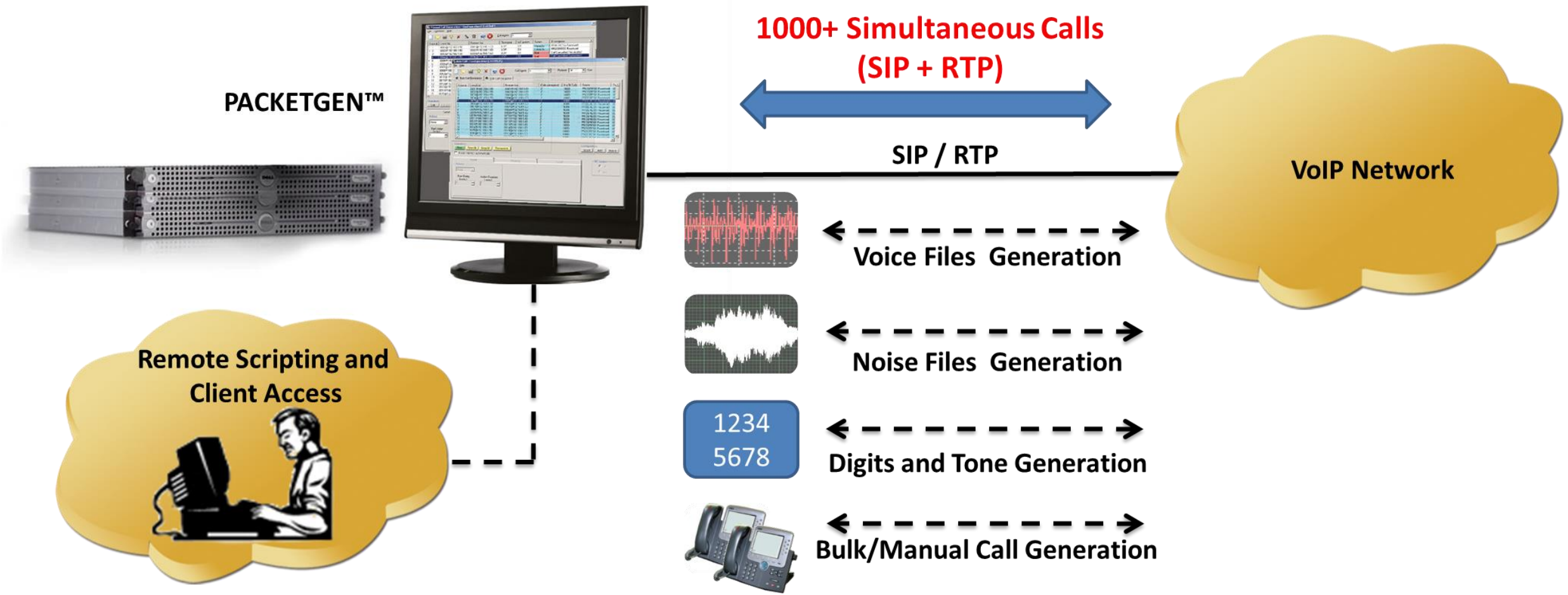
PacketExpert™ 10GX
PacketCheck™
MAPS™ HD,VQuad ™ VOIP,
MAPS™ Protocol Simulation

- SIP, SIP-I, MGCP, MEGACO
- SIGTRAN, H.323, Skinny
- GSM, CAP, MAP, BICC, INAP
- UMTS, LTE, Diameter, IMS
- 5G NAS, NGAP, PFCP, HTTP/2

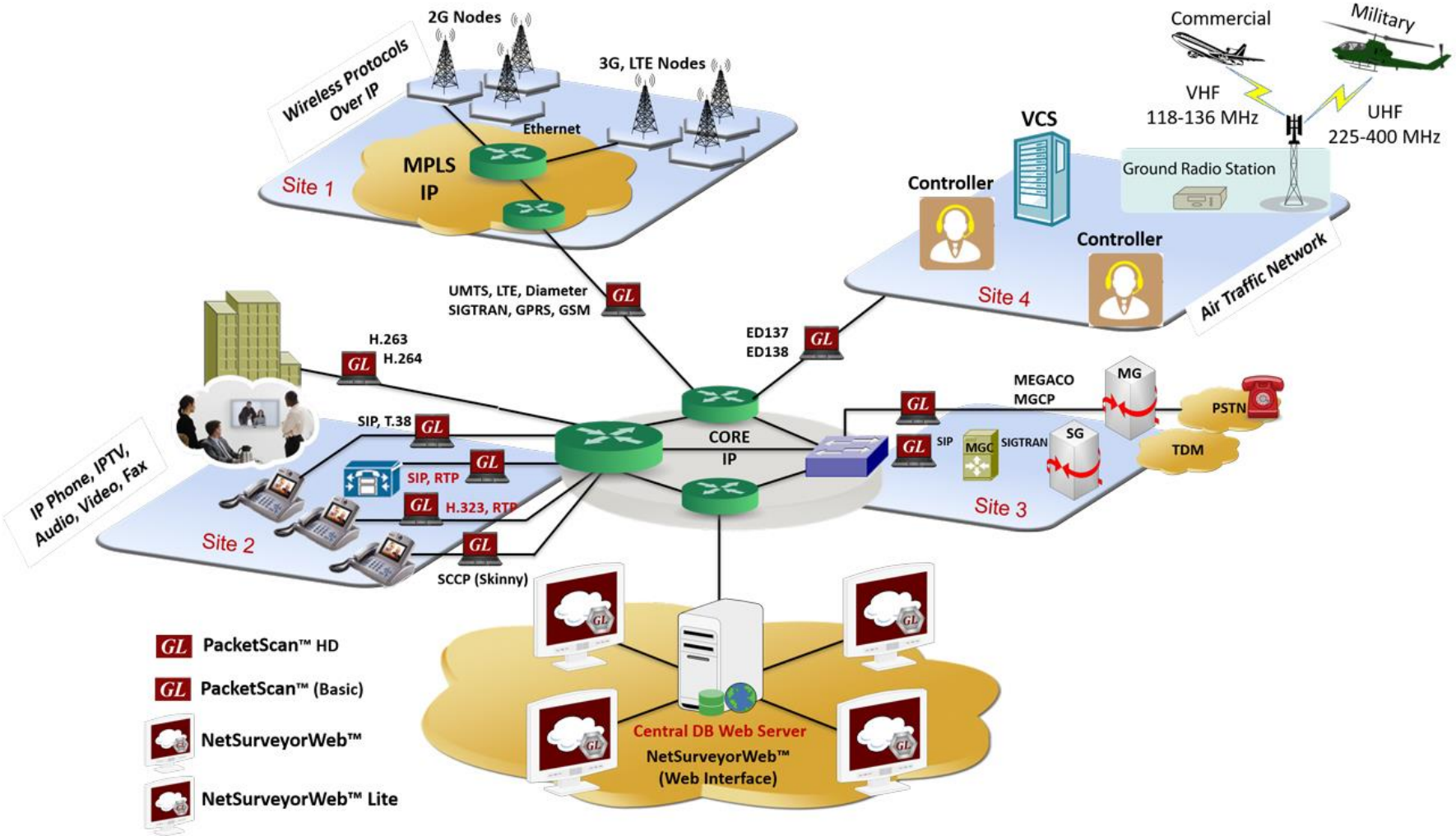
- **SIP / MEGACO / MGCP / RTP / RTCP / Video Generation and Analysis**
  - PacketScan™ - VoIP Bulk Call Analyzer
  - Message Automation and Protocol Simulator (MAPS) for SIP, MEGACO, and MGCP Conformance Testing
- **IP Analysis & Simulation**
  - IPNetSim™
- **SIGTRAN Analysis**
  - SIGTRAN Analyzer
- **PacketCheck™**

- **Network Monitoring and Voice Quality Testing Solutions**
  - Packetscan™ - VoIP Bulk Call Analyzer
  - NetSurveyourWeb™
  - VQuad™ with SIP Call Control
  - VBA
- **Echo Canceller Testing**
  - T1/E1 Analyzer
  - Client-Server
  - AutoEC Test
- **Fax & Modem Call Analysis**
  - GLInsight™

PacketGen™
SIP Bulk Call Generator



PacketScan™
VoIP Traffic Analysis



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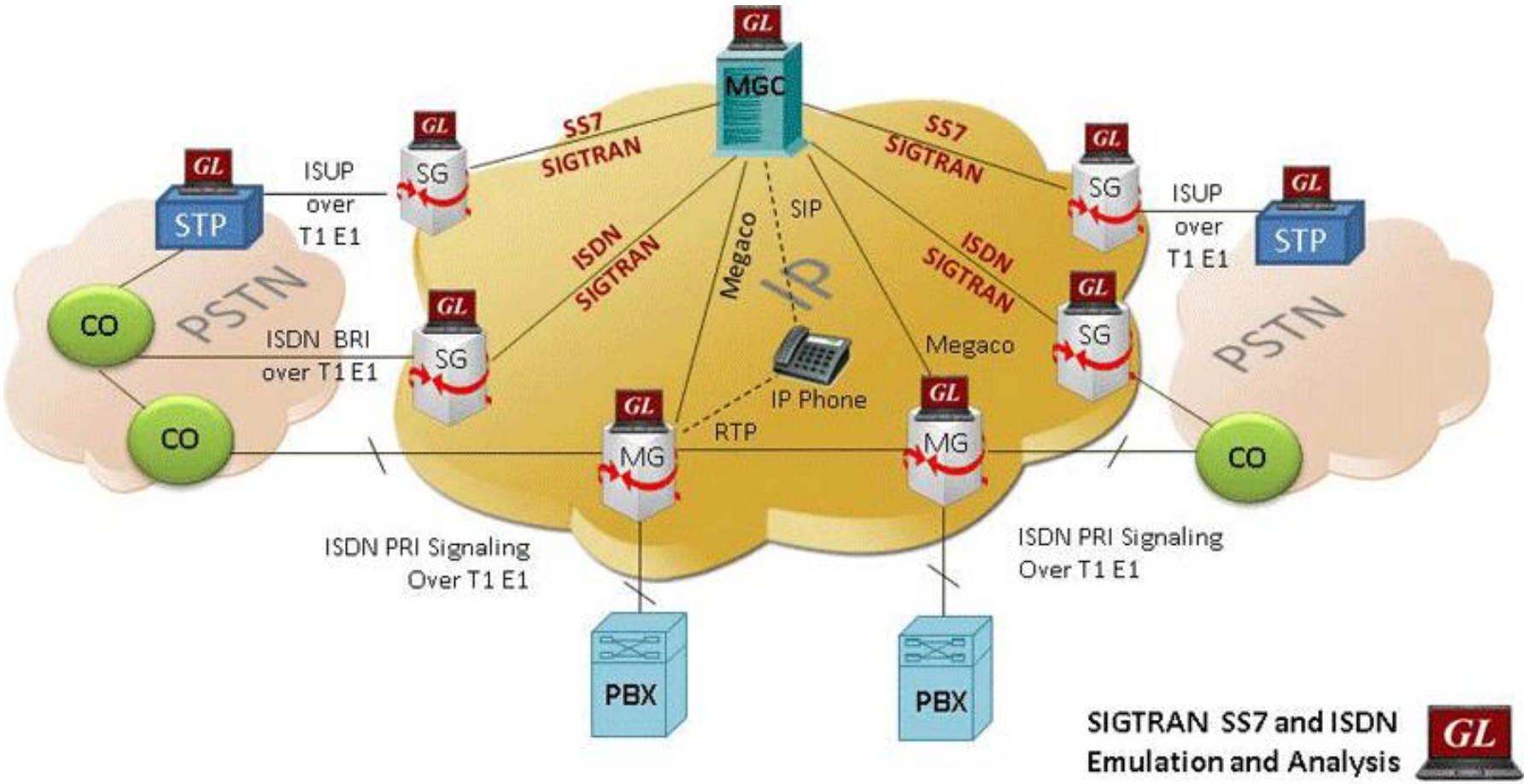
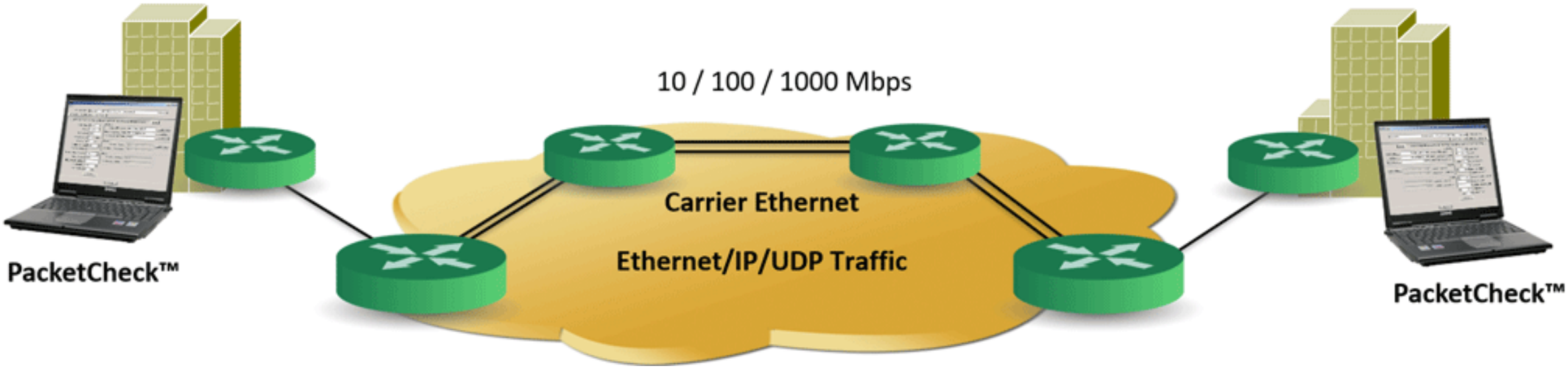
SIGTRAN Protocol Analyzer



PacketCheck™



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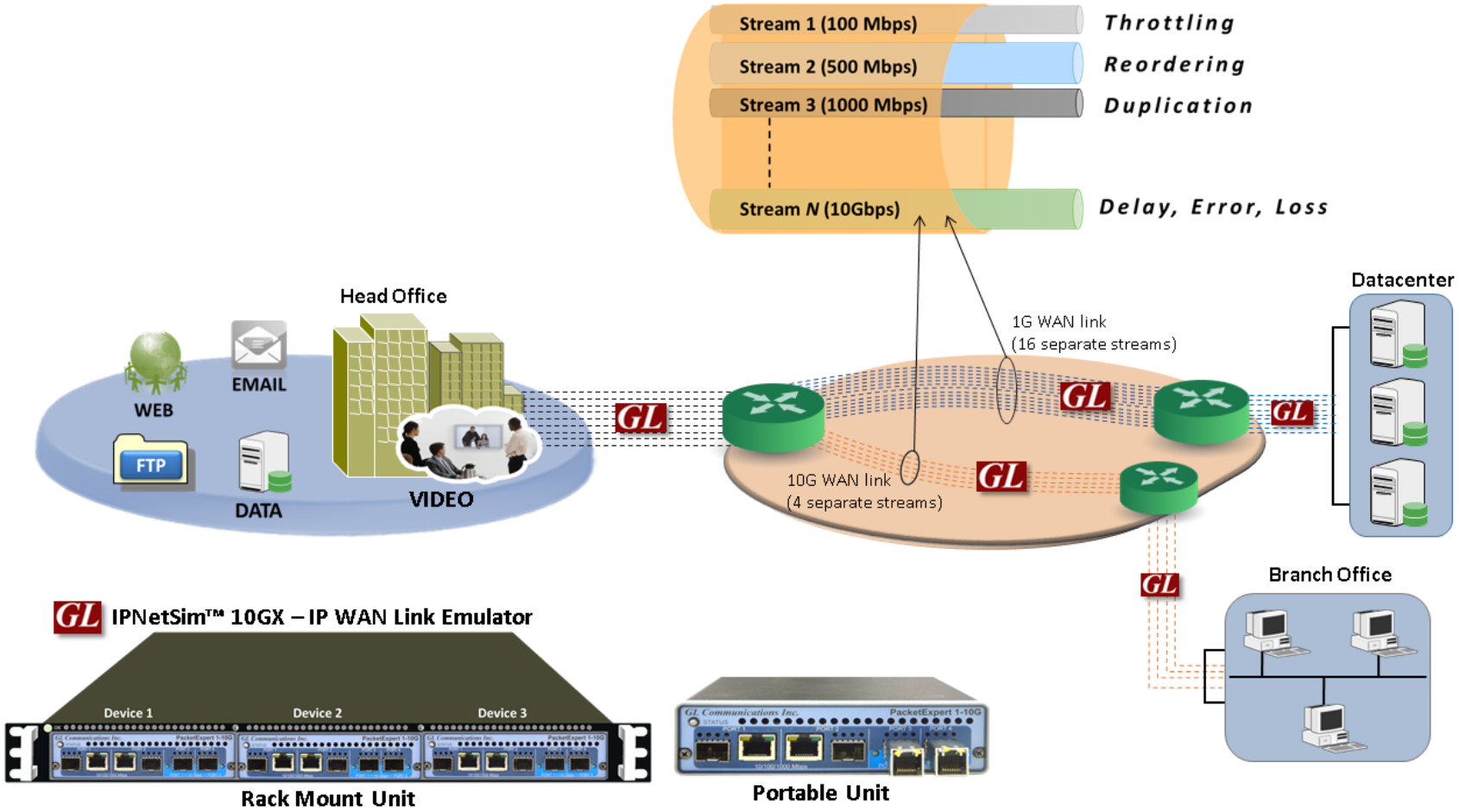
IPNetSim™ 10GX



Message Automation and Protocol Simulator (MAPS™)

- SIP Protocol Conformance Testing
- MEGACO Protocol Conformance Testing
- MGCP Protocol Conformance Testing

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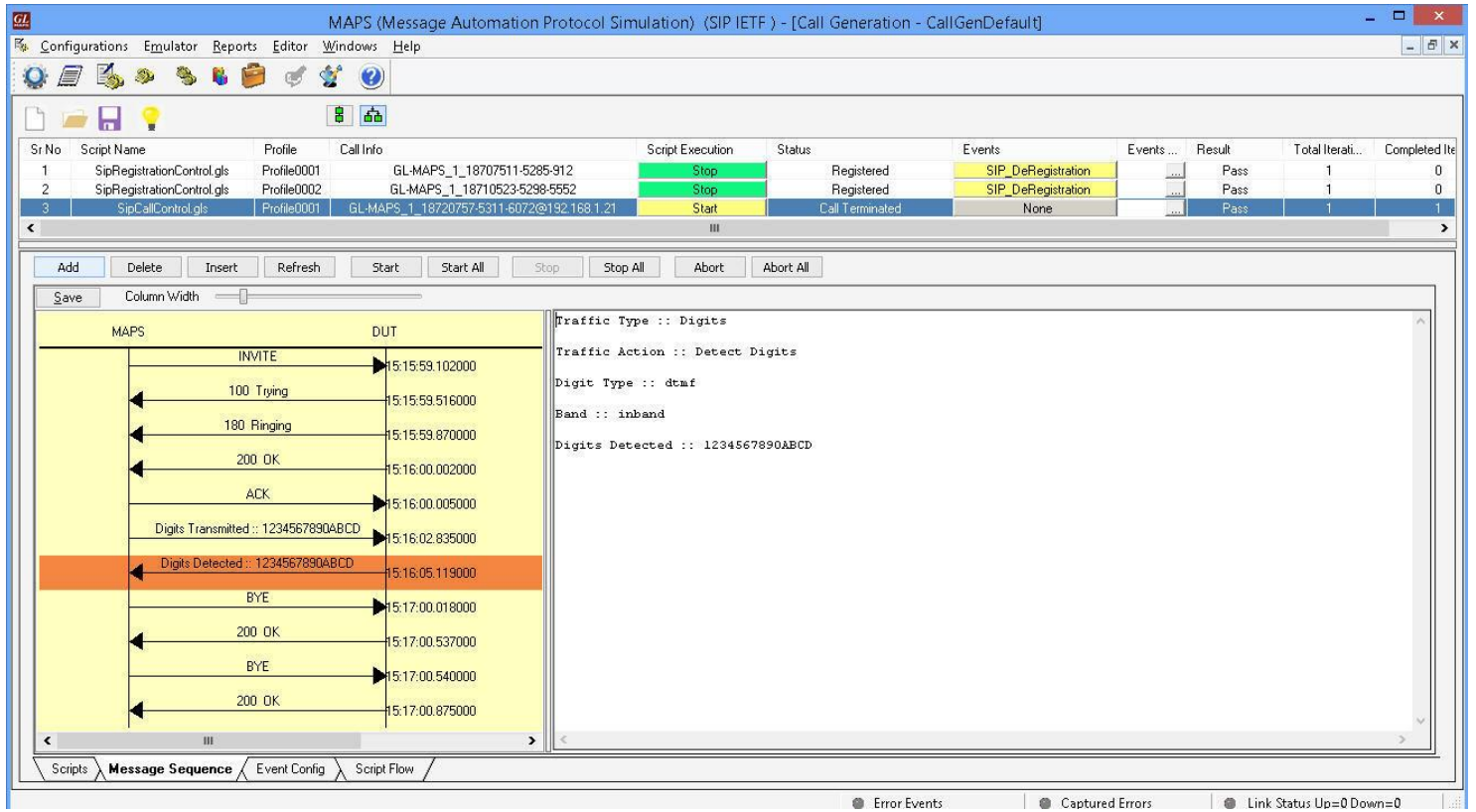
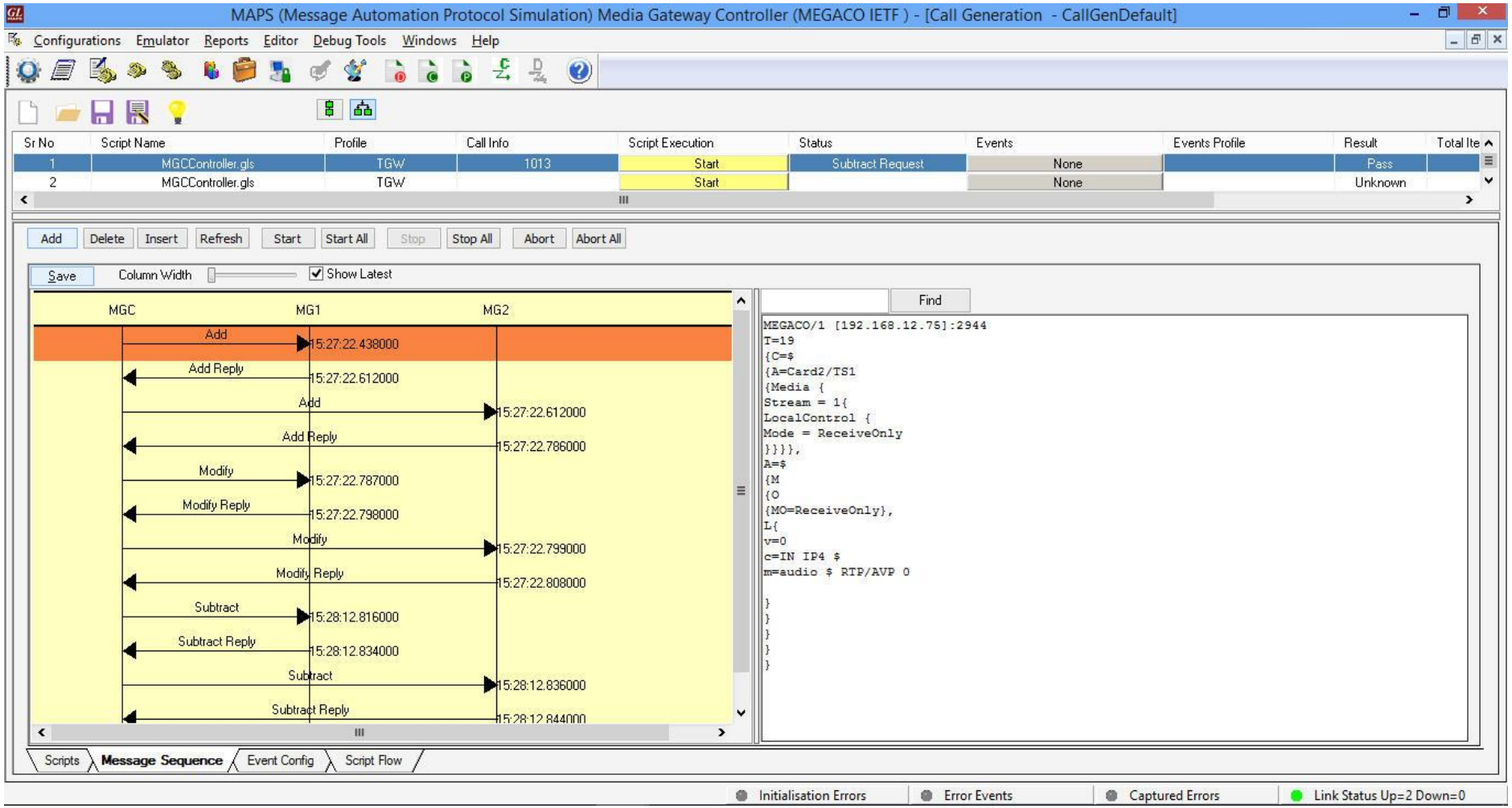
MAPS™ for SIP Testing

- UAC Conformance Testing
- UAS & Redirect Server Conformance Testing
- Redirect Conformance Testing
- Proxy Conformance Testing
- Registrant Conformance Testing
- Registrar Conformance Testing



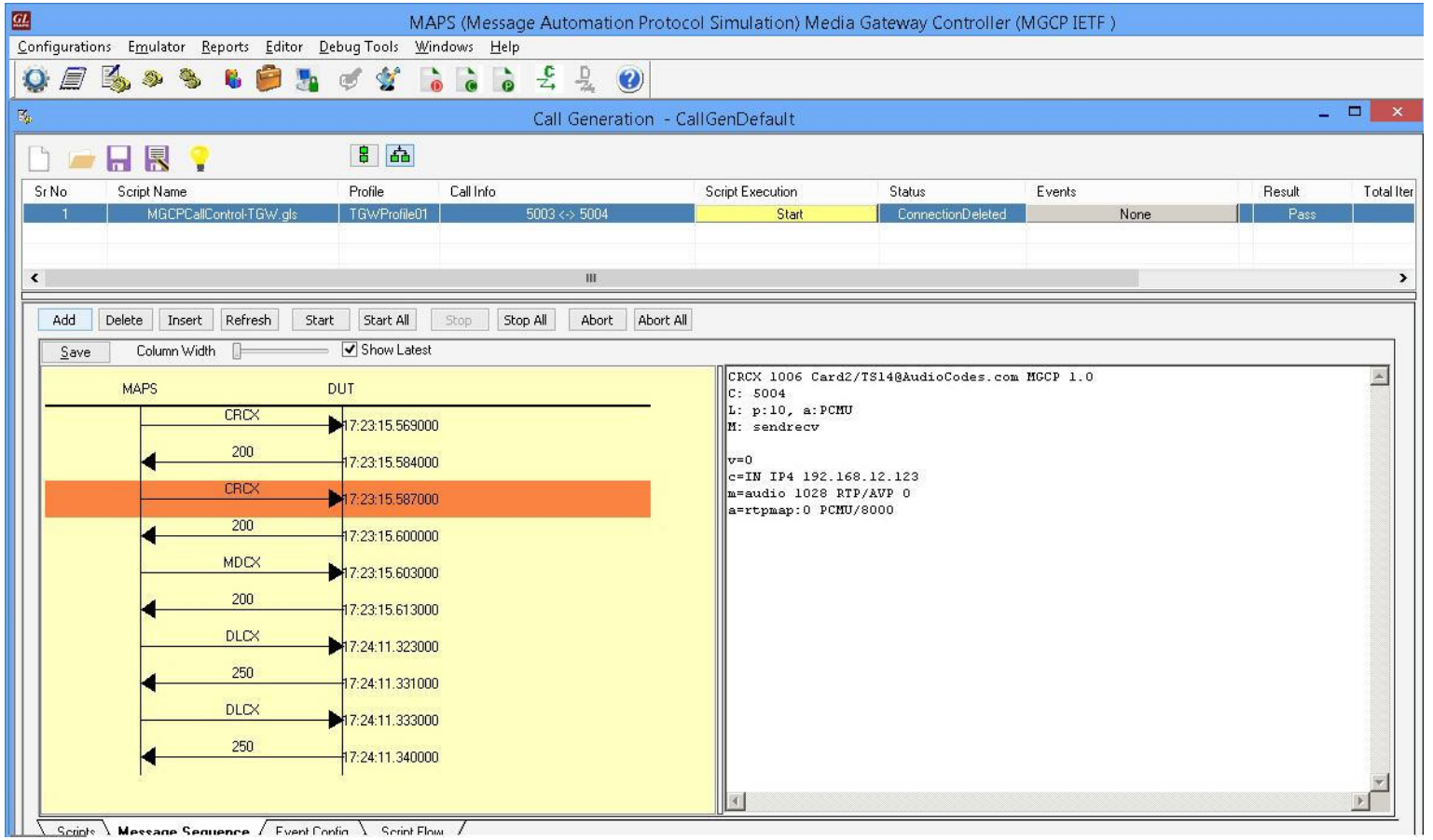
MAPS™ for MEGACO Testing

- MGC Conformance Testing
- MG Conformance Testing



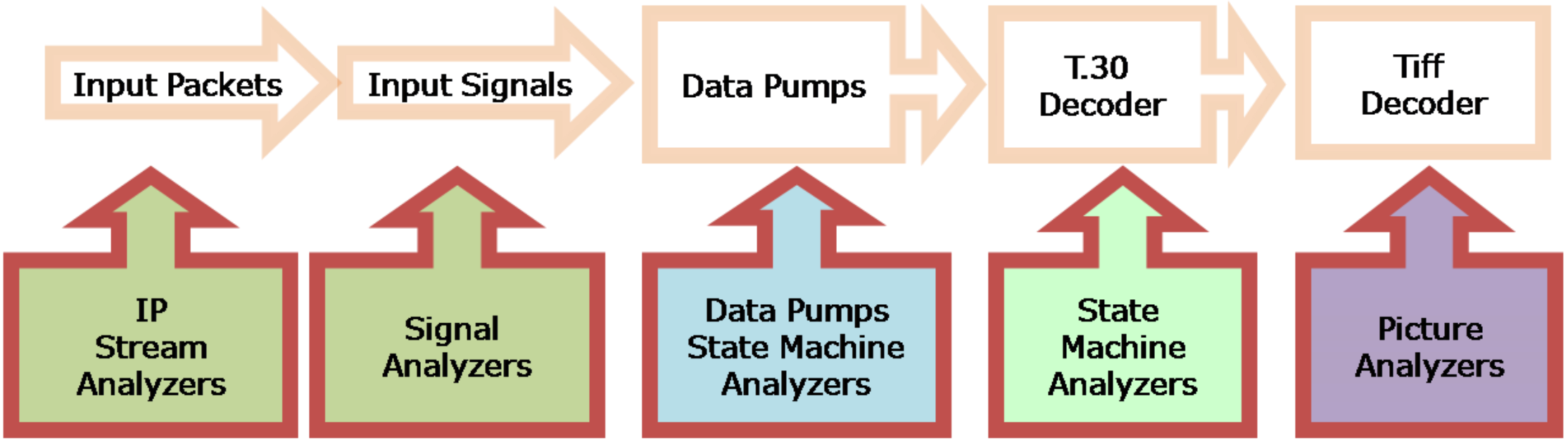
MAPS™ for MGCP Testing

- MGC Conformance Testing
- MG Conformance Testing



IP Fax Capture and Analysis using GLInsight™

- Analyzes pre-recorded IP fax calls
- Handles both IP G.711 fax calls and IP T.38 fax calls
- In IP T.38 calls, complete decoding and anlaysis of T.38 packets, T.30 frames, T.4 / T.6, and ECM is performed
- Complete Tiff image reconstruction is provided



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IP Fax Capture and Analysis

- IP Analysis Information
- Packet loss
- Jitter histogram
- SID (Silence Descriptor) detector to detect improper use of Voice Activity Detector while transferring data
- Fax Analysis Information
- V.34HD, V.17, V.33, V.29, V.27, V.21, T.30, T4/T6

IP Fax Capture and Analysis

Fax Decoding Categories & Sub-categories

- Signal Analyzers

  Discriminator information

  Unstable signal detector and more

- Data Pump State Machine Analyzers

  Fax phase changes, data rates, symbol rate

  Structures 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 and more

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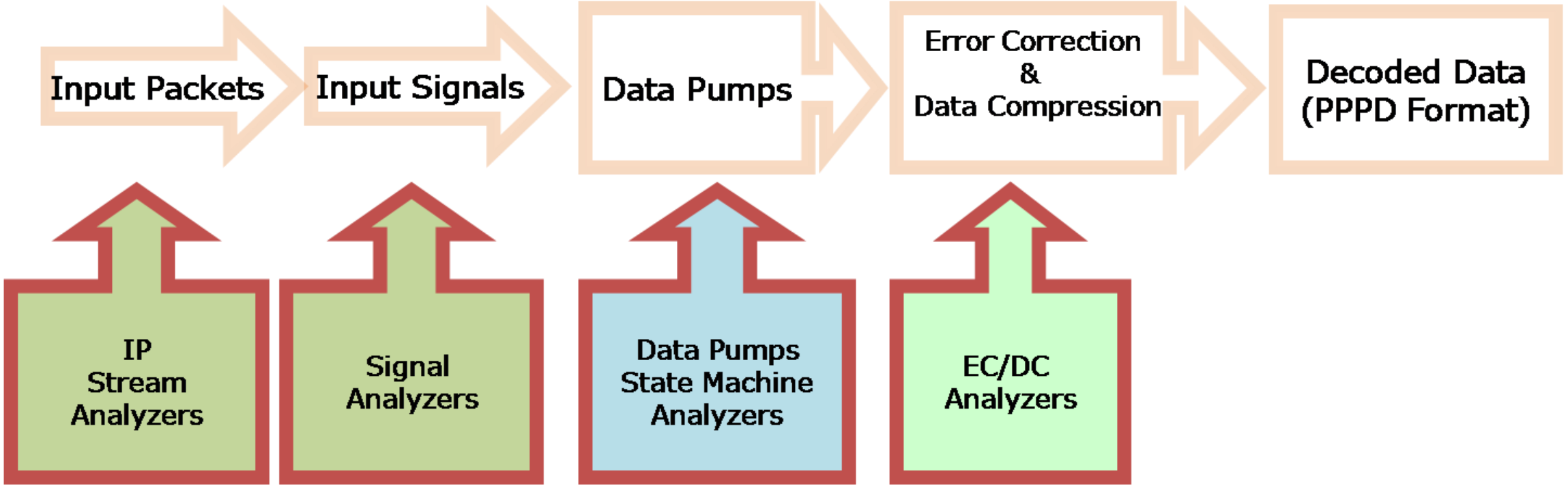
IP Modem Capture and Analysis using GLInsight™

- Analyzes pre-recorded modem traffic recordings within IP
- Supports startup protocols V.8, V.8bis, and V.8 short
- Supports Modulations V.92, V.90, V.34, V.32bis/V.32, V22bis/V.22, V.21, V.23, and Bell 103/ Bell 212
- Supports V.42, V.42bis, V.44, MNP2-4, MNP5, and V.14 error correction and data compression protocols



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IP Modem Capture and Analysis

- Supported Protocols
  - V.92 (Quick Connect and Modem-on-Hold supported. PCM-upstream not supported)
  - V.90 , V.34
  - V.32bis/V.32, V.22bis/V.22
  - V.21 , V.23
  - Bell 103 / Bell 212
- Start-up Protocols
  - V.8 , V.8bis
- Supported Error Correction & Data Compression Protocols
  - V.42, V.42bis
  - V.44 , MNP2-4
  - MNP5, V.14
  - V.8 short

IP Modem Capture and Analysis

Fax Decoding Categories and Sub-categories

- Signal Analyzers

  Discriminator information

  Unstable signal detector and more

- Data Pump State Machine Analyzers

  Modem phase changes, data rates, symbol rate

  Structures interchange (rate sequences, MP, Info) and complete connection parameters

  PDSNR (post detection signal quality measurement) improper quality drop detector and more

- Error Correction Data Compression Analyzers

  Error-correction and data compression setup information including XID info and more

Network Monitoring and Voice Quality Testing Solutions

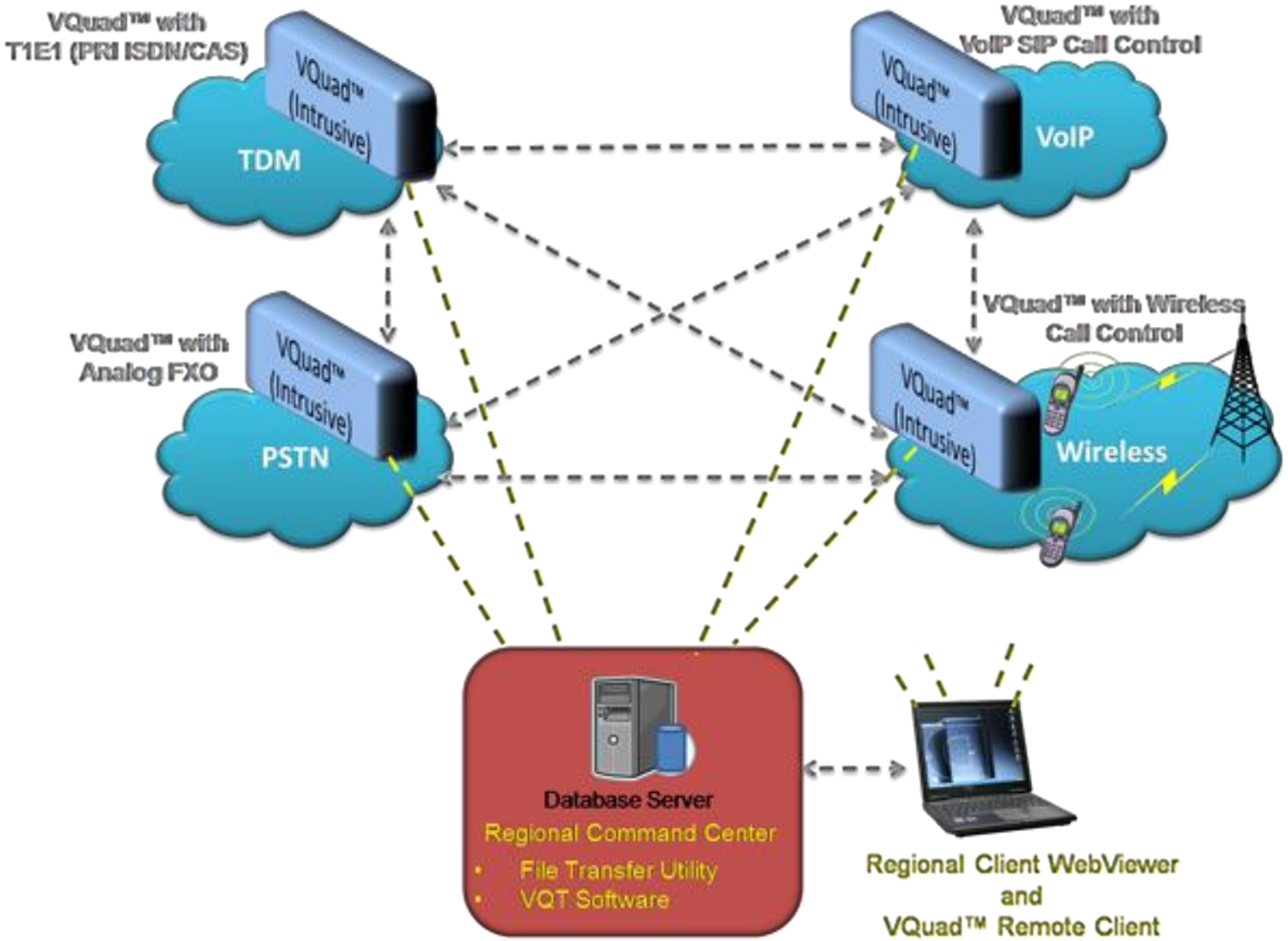
GL's NMS VoIP solutions include –

- Wireless, Wireline, and VoIP Voice Quality Monitoring System (intrusive)
- Packet and VoIP Monitoring and Surveillance System (non-intrusive)

Active/Intrusive Network VQT System

- Intrusive VoIP Probes - Use GL's VQuad™, or PacketGen™ to establish calls and send / receive voice files in real-time in an end-to-end manner
- Voice Quality Testing (VQT) - Compares the two files ('reference' and 'degraded') and provides an ITU-standard score (PESQ, PESQ WB)
- Regional Command Center (RCC) - Controls, schedules, and analyzes the degraded voice traffic received by the nodes
- Remote Client VQT NetViewer™ - Remotely controls the RCC, individual VQuad™ node sites and the VQT Measurement process

Active / Intrusive Network VQT System



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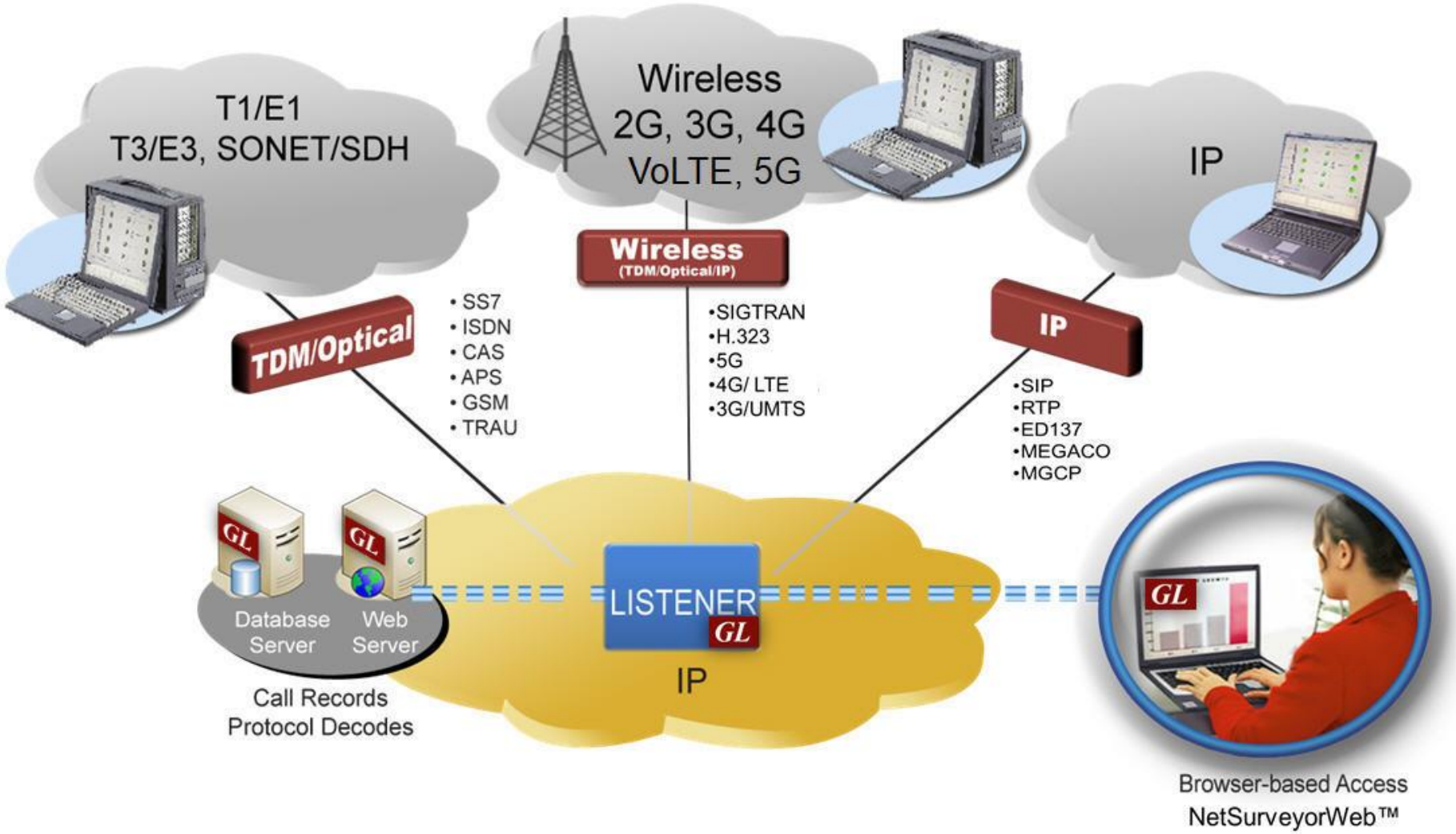
Passive / Non-Intrusive Voice-band Monitoring System

- GL's Voice Band analyzer (VBA) works in conjunction with GL's PacketScan™ (VoIP Analysis Tool) to monitor the quality of voice band traffic over VoIP
- NetSurveyorWeb™ facilitates result display using a web interface

Passive / Non-Intrusive Voice-band Monitoring System

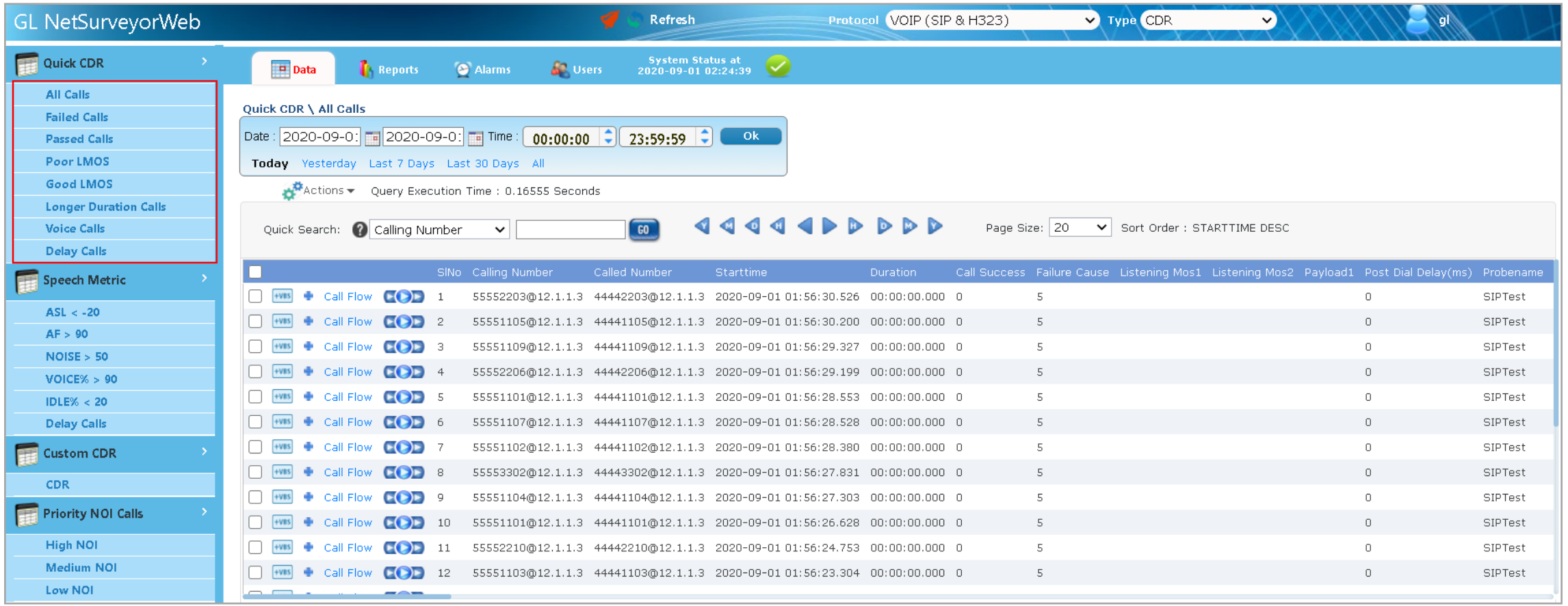


PacketScan and NetSurveyorWeb™

- GL's Ethernet probe called PacketScan™ is used to monitor packet flows in real-time within a VoIP network
- Supports all major VoIP protocols including SIP, H.323, MEGACO, and MGCP
- Performs detailed analysis of voice band streams to gather QOS statistics such as MOS (Mean Opinion Score), total packet count, reordered, duplicate and missing packet counts, and more
- A central database stores the real-time and historic data
- Facilitates various views using a web interface (NetSurveyorWeb™)

CDR View

- To view the calls, under Quick CDR, select All Calls or Passed Calls or Failed Calls



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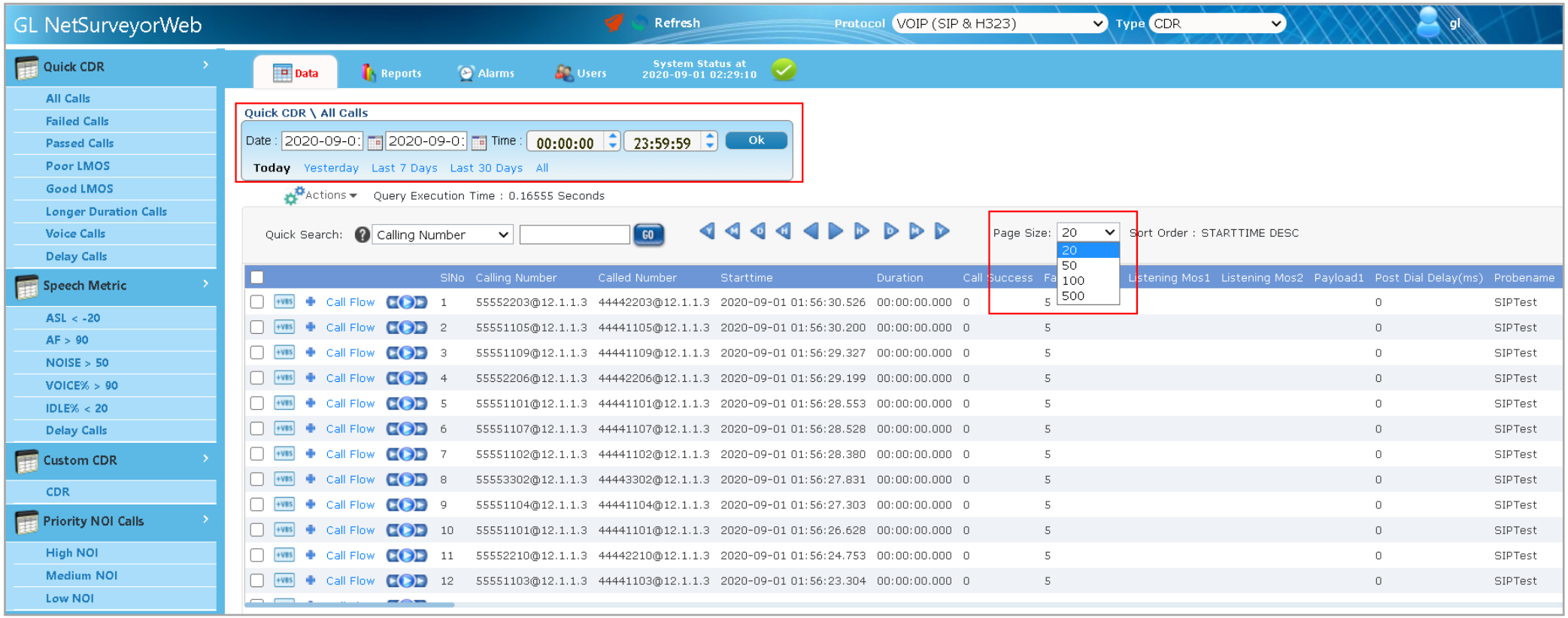
Date/Time Specific CDR View

- The Date and Time under Quick CDR\All Calls to view the calls of interest like Last 30 days, Last 7 days, Yesterday and Today's call. By default the results displayed per page is 20. Select the required page size (maximum results is 500) from Page Size menu as shown in the figure



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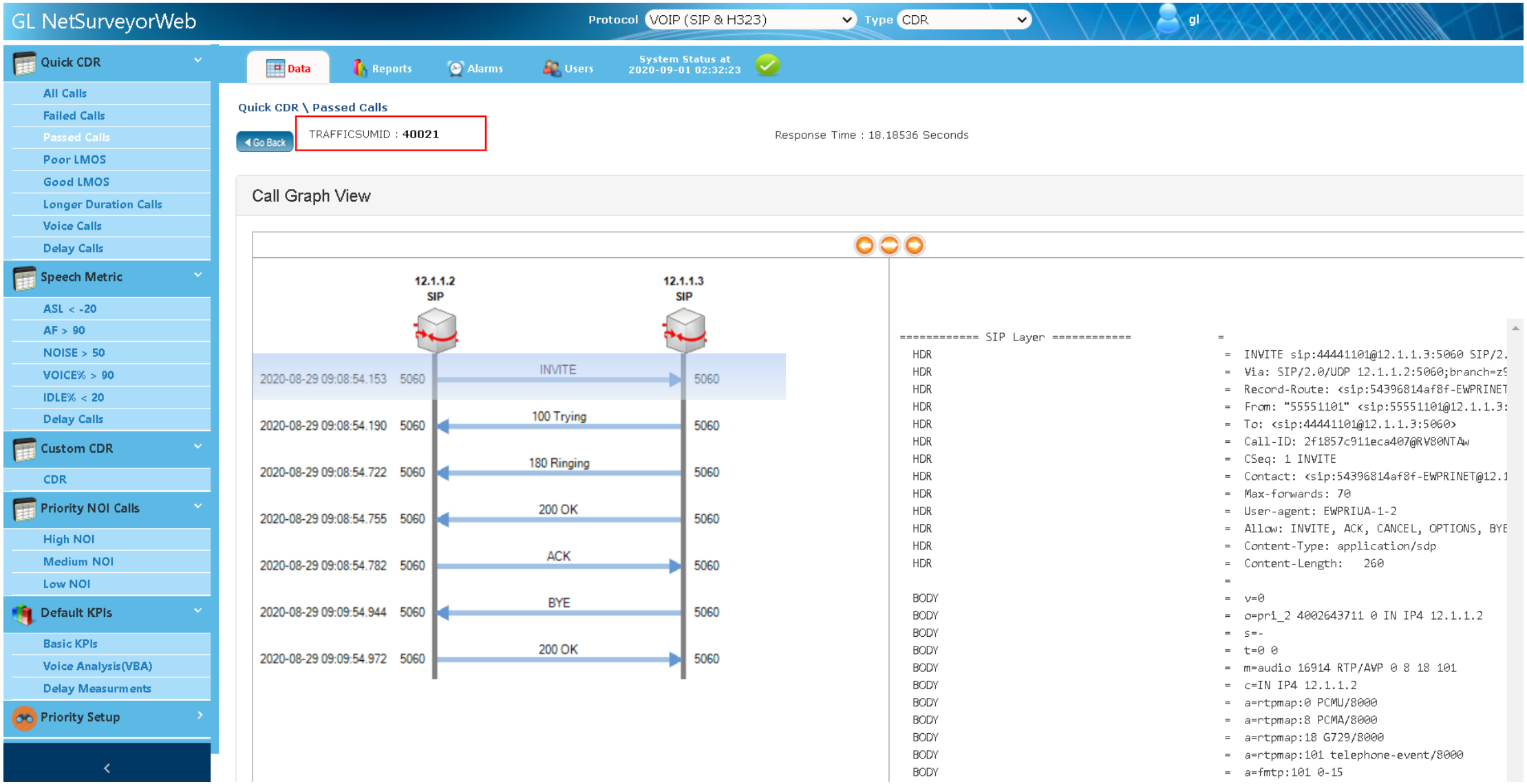
Call Graph



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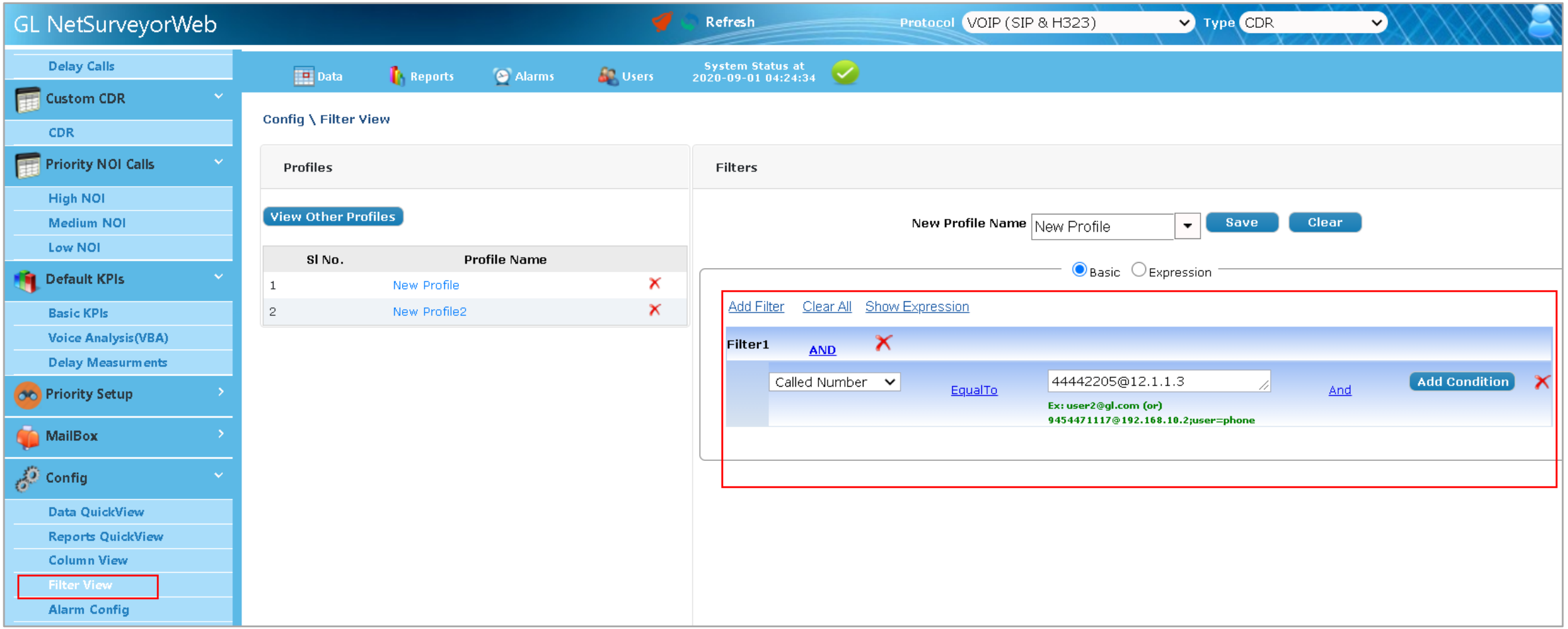
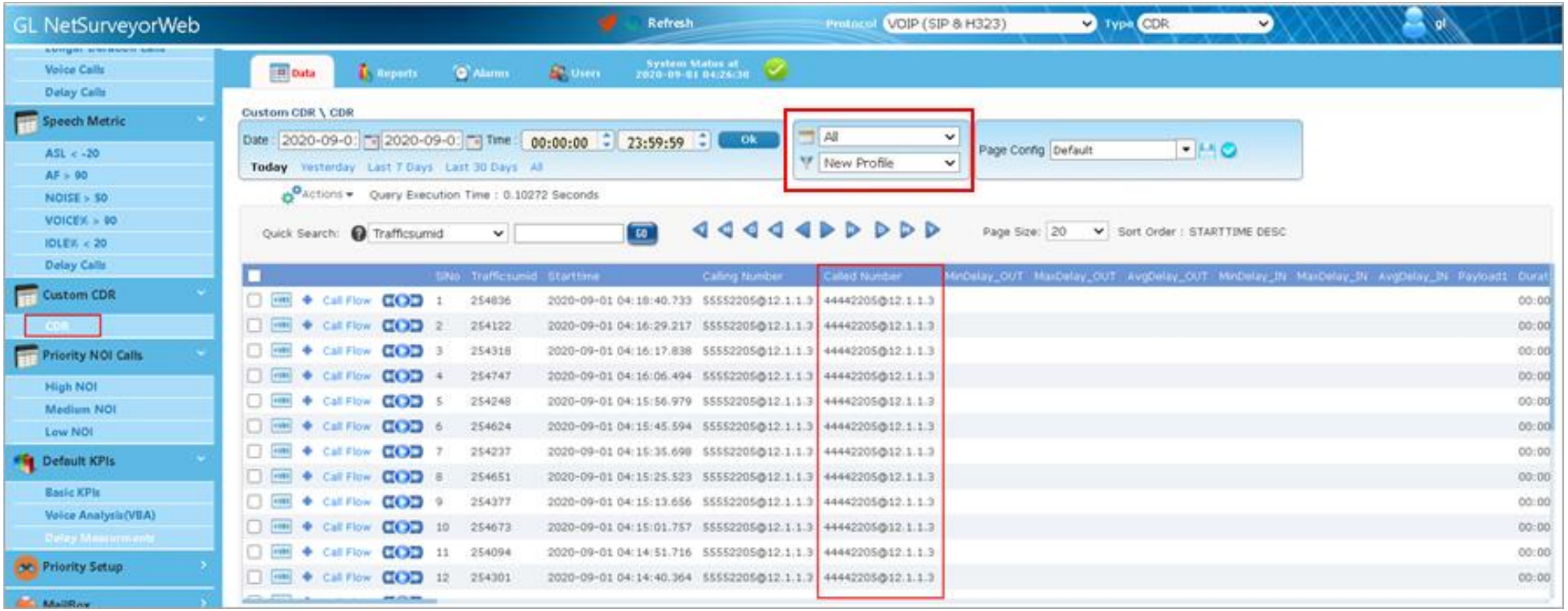
Filtered Calls

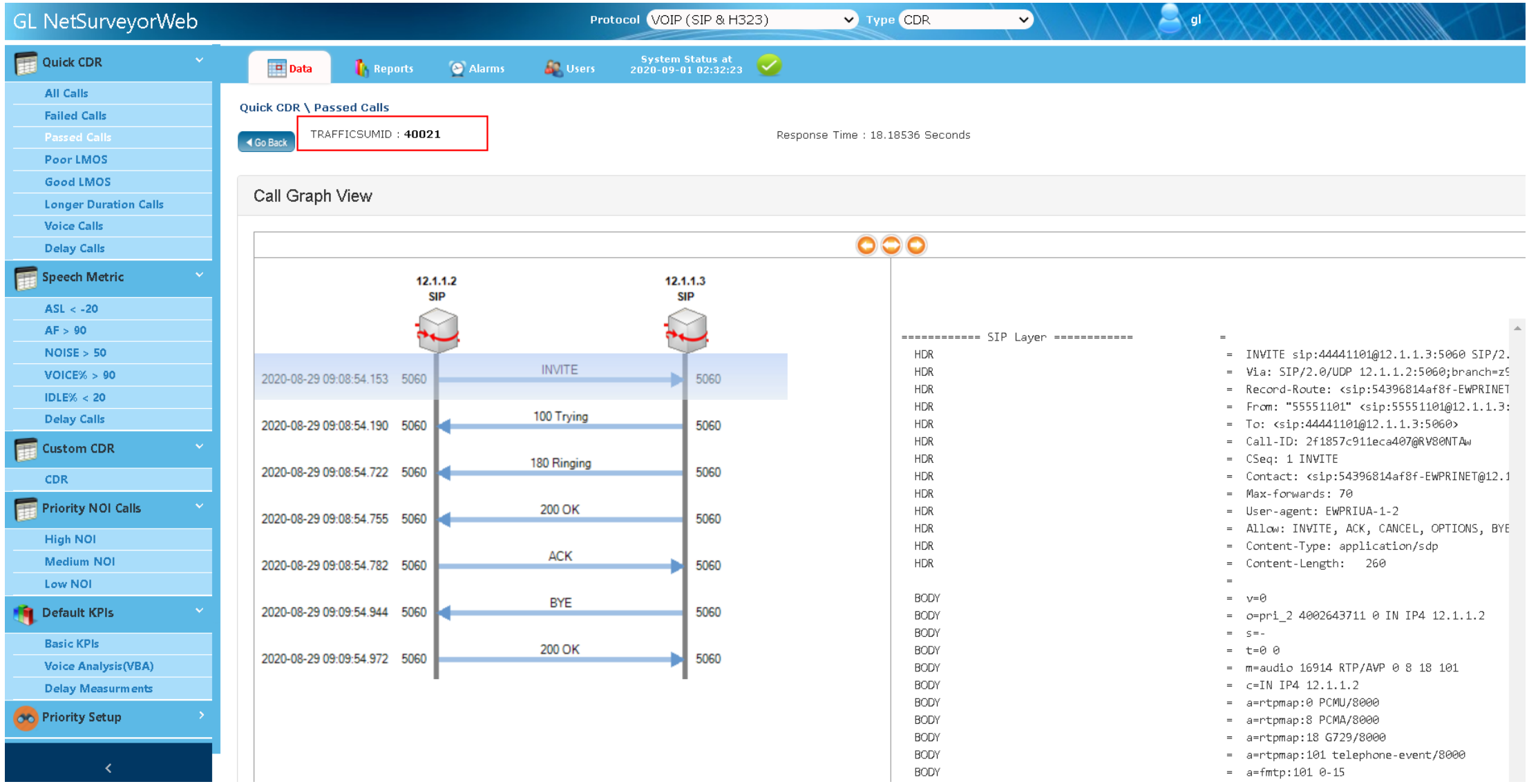


Filtered Call View

- Select **Custom CDR→CDR** on the left pane and select required filter to view the filtered calls. For example, select Call Number filter as shown in the below figure



Call Graph



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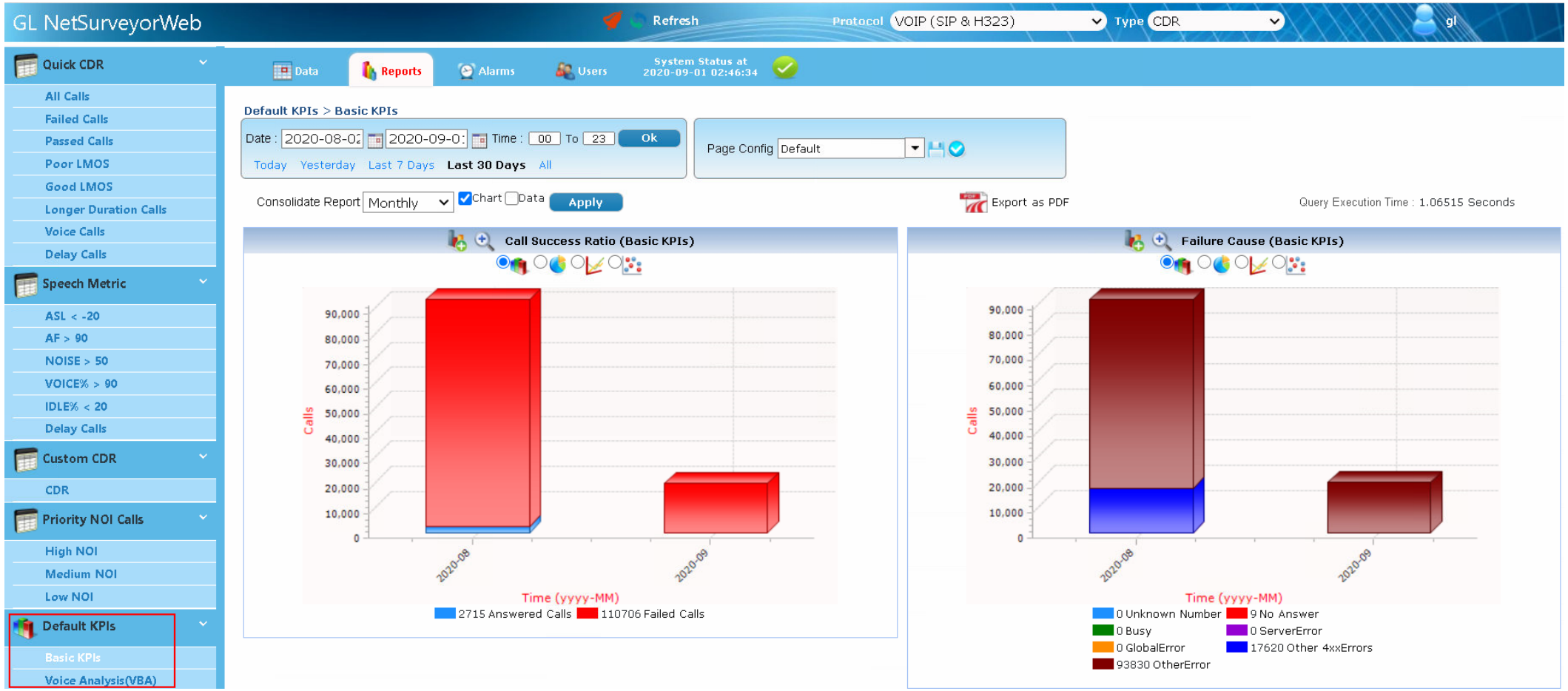
KPI's

- Select **Default KPIs→Basic KPIs** on the left pane to observe the performance of basic KPI's



Solutions and Techniques

- Manual G.168 EC Compliance Testing of ATAs & Gateways with Two-Wire Interfaces
- Manual G.168 EC Compliance Testing of ATAs & Gateways with T1 E1 Interfaces
- Automated G.168 EC Compliance Testing of ATAs & Gateways - All IP Solutions
- Automated G.168 EC Compliance Testing of Gateways - TDM / VoIP Interfaces
- Automated G.168 Compliance Testing of Gateways – Back-to-Back Gateway Solution

Components

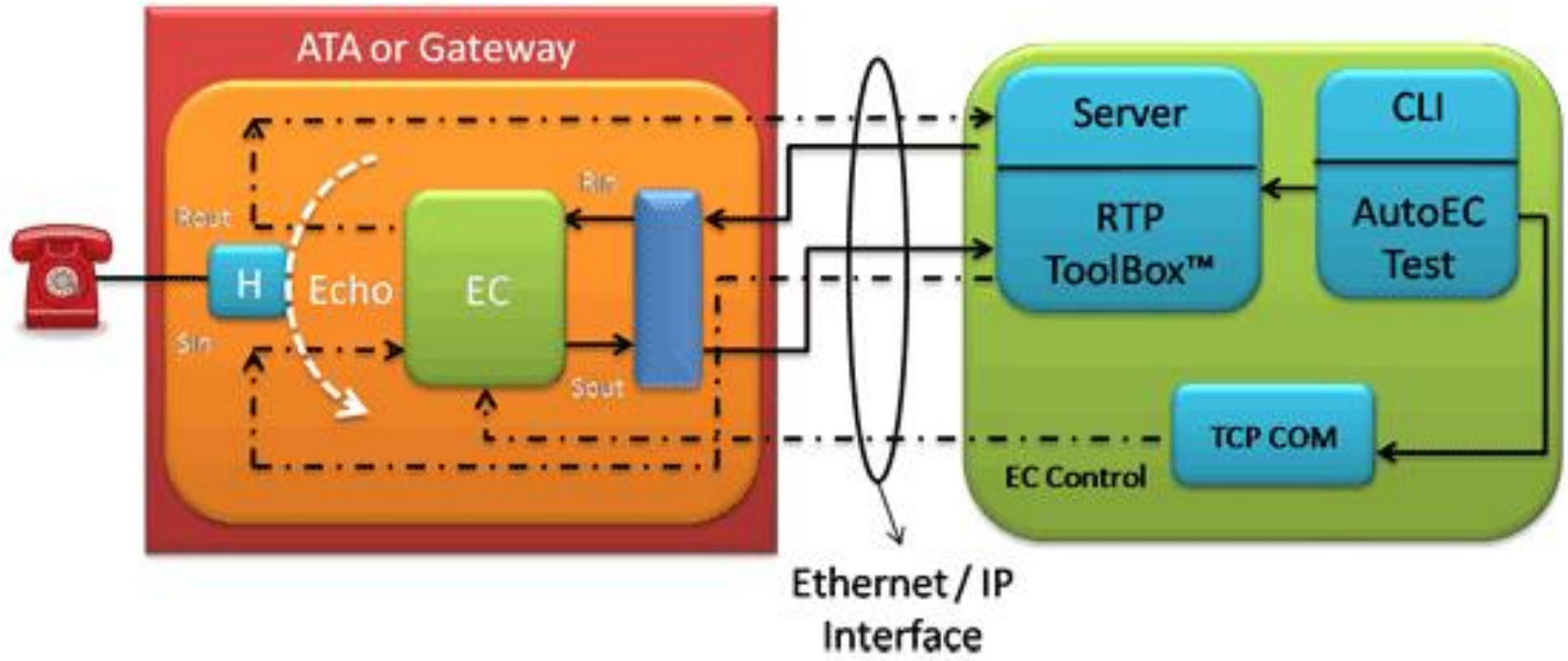
The following components are either required or recommended

- **IP**
  - Manual G.168 Compliance Test Suite with GLC View Software
  - AutoECTest - Automatic G.168 Compliance Test Suite with either Windows Client Server (WCS) software or Tx/Rx File Utility Software
- **TDM**
  - Dual T1 or E1 HD Card or USB T1 or E1 Units, Universal T1E1 Cards
  - Delay Attenuate, Record / Playback Software
  - Digital Echo Canceller Software (xx066)
  - Echo Path Measurement Software (xx063)

For more information, please refer to http://www.gl.com/echocan.html#VoIP

Automated EC Compliance Testing in all IP

- Back-to-back gateways with testing interface at T1 E1 side
- Full automation is available for all G.168 test cases
- Full manual & Semi-automated testing are also possible
- Quick performance testing is also possible



Thank you