APIs for Test Automation and Remote Access PacketExpert™ 1G

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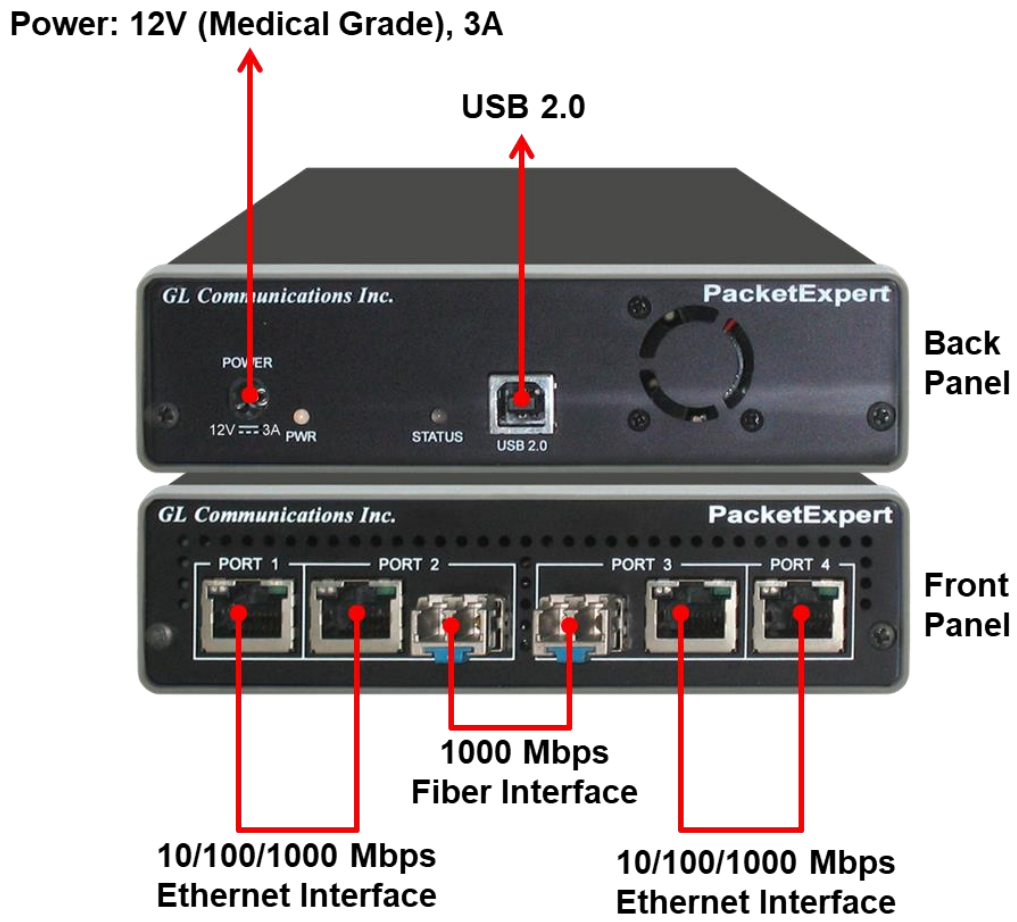
PacketExpert™ 1G Portable Unit - (PXE100)

Interface	• 2 x 10/100/1000 Base-T Electrical only • 2 x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical • Single Mode or Multi Mode Fiber SFP support with LC connector • Optional 4-Port SMA Jack Trigger Board (TTL Input/Output)
Power Supply	• +12 Volts (Medical Grade), 3 Amps
BUS Interface	• USB 2.0
Protocols	• RFC 2544 compliance • ITU-T Y.1564 (ExpertSAM™)



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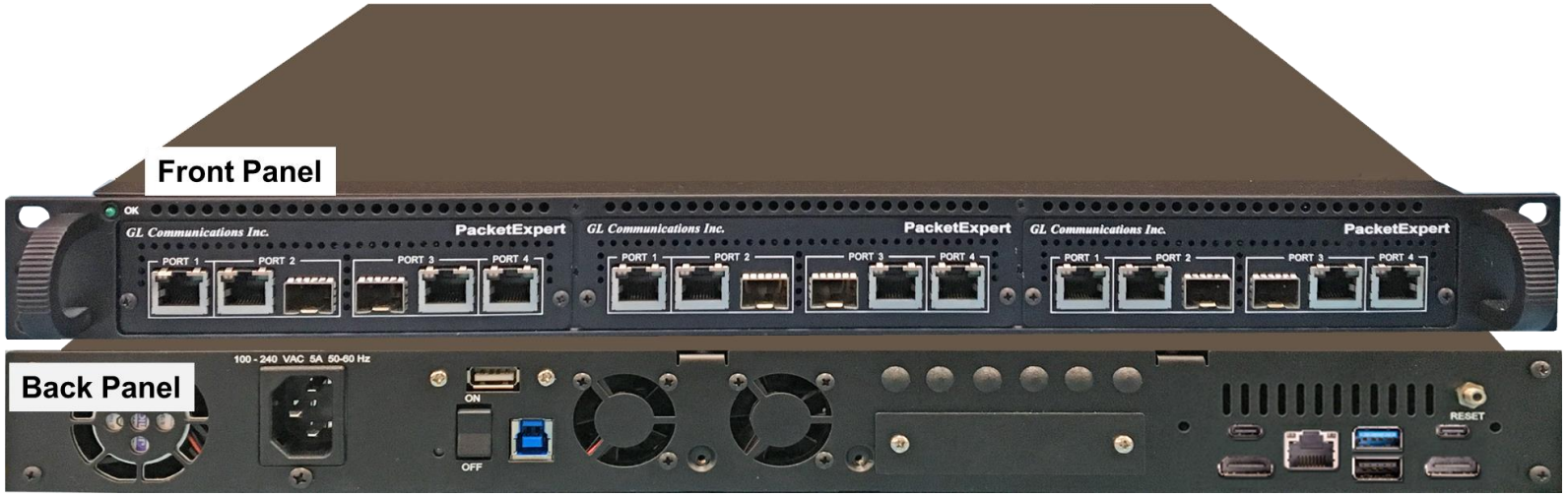
1U mTOP™ Rack-Mount Enclosure



- 19” rack option, w/ Embedded Single Board Computer (SBC)
- **SBC Specification**:
  - Intel Core i3 or optional i7 NUC Equivalent,
  - Windows® 11 64-bit Pro Operating System
  - USB 3.0 and USB 2.0 Ports, ATX Power Supply
  - USB Type C Ports, Ethernet 2.5GigE port
  - 256 GB Hard drive, 8G Memory (Min)
  - Two HDMI ports

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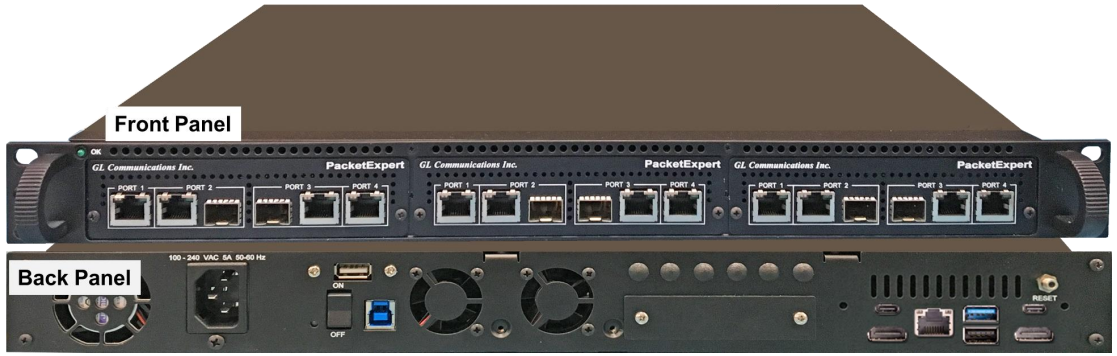
PacketExpert™ 1G High-Density 12/24 GigE Ports mTOP™ Rack

- **PacketExpert™ SA (PXE112)** is a 12-Port PacketExpert™ w/ Embedded Single Board Computer (SBC)

- **SBC Specs**: Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, ATX Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

- 19" 1U Rackmount Enclosure (If options, then x 3)



PacketExpert™ SA (PXE112)

- **PacketExpert™ SA (PXE124)** is a 24-Port PacketExpert™ w/ Embedded Single Board Computer (SBC)

- **SBC Specs**: Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, ATX Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

- 19" stacked 1U Rackmount Enclosure (If options, then x 6)

PacketExpert™ SA (PXE124)

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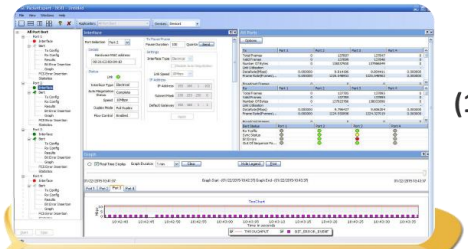
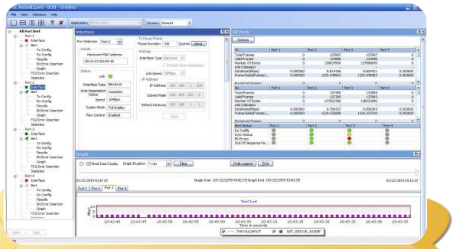
Different Applications loaded on same Platform

All Port BERT



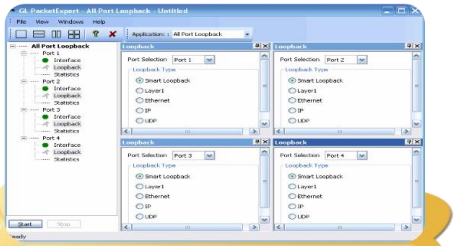
(12 ports, 4 ports per device)

BERT/Loopback



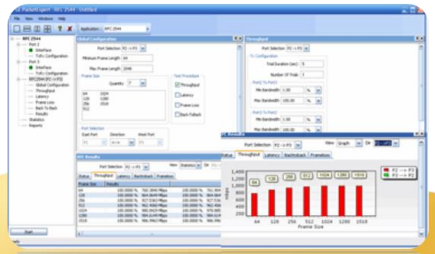
(12 ports, 2 ports BERT & 2 ports Loopback per device)

All Port Loopback



(12 ports, 4 ports per device)

RFC 2544

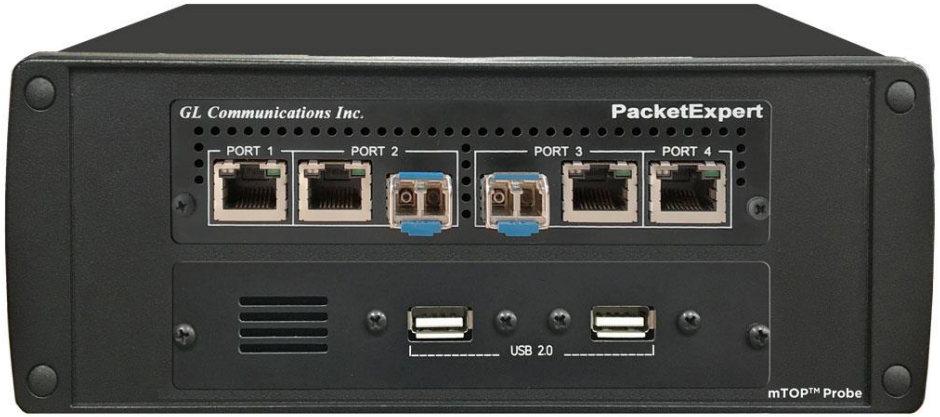


(6 Ports, 2 ports per device - Ports 2 & 3)

Note: Only one application can run at a time

PacketExpert™ 1G mTOP™ Probe

Front Panel View



Rear Panel View

- Portable Quad Port Ethernet/VLAN/MPLS/IP/UDP Tester with 4 Electrical Ethernet Ports (10/100/1000 Mbps) and 2 Optical Ports (100/1000 Mbps). Embedded with Single Board Computer (SBC)
- **SBC Specs**: Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, ATX Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports
- Each GigE port provides independent Ethernet/VLAN/MPLS/IP/UDP testing at wire speed for applications such as BERT, RFC 2544, and Loopback. BERT is implemented for all layers
- RFC 2544 is applicable for Layers 2, 2.5, and 3, and Loopback is applicable for Layers 2, 3, and 4

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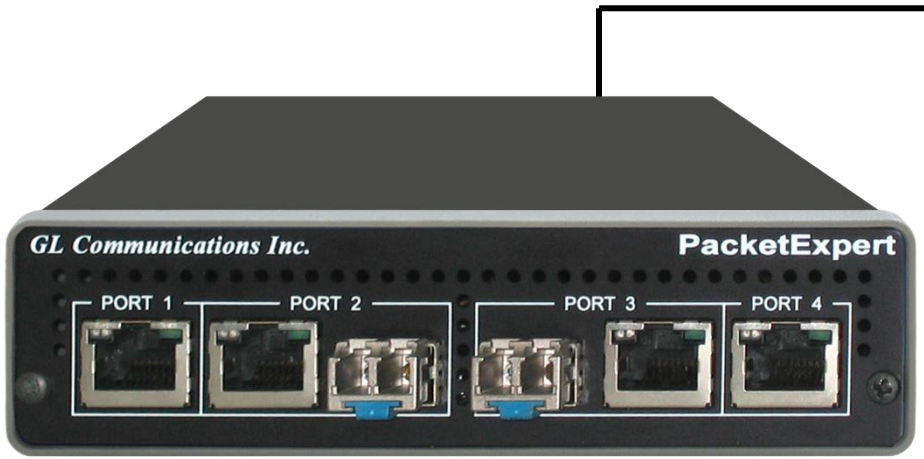
Applications



PacketExpert™ 1G

USB 2.0

- Bit Error Rate Testing
- RFC 2544
- Loopback
- ITU-T Y.1564

- Multi-Stream Traffic Generator
- RFC 6349
- Record and Playback Traffic
- Wirespeed Network Tap

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Applications

- Test and verify QoS Parameters of network devices like Switches/Routers etc.
- End to end testing of network paths for QoS parameters
- In-depth troubleshooting of the Carrier network in the event of network failures or impairments
- QoS testing of Triple-play services to ensure that they fully qualify SLA parameters
- Terrestrial wireless, satellite, and other WAN technologies network validations
- Test VoIP network in real-time conditions to verify if it meets the quality requirements before you deploy
- Testing video on IP networks by emulating the loss and congestion characteristics
- SPF support can be used for Broadband aggregation applications, Metro edge switching, Metro and access multi-service platforms, and are suitable for Fast Ethernet applications

PacketExpert™ 1G APIs for Test Automation and Remote Access

- Overview
- Features
- Working principle
- MAPS™ CLI Server – API Clients
- Typical Test Systems
- IPLinkSim
- ITU-T Y.1564 (ExpertSAM™)
- Wire-Speed Record / Playback
- PacketBroker
- Multi-Stream Traffic Generator Analyzer
- RFC-6349 based TCP Throughput Testing (ExpertTCP™)

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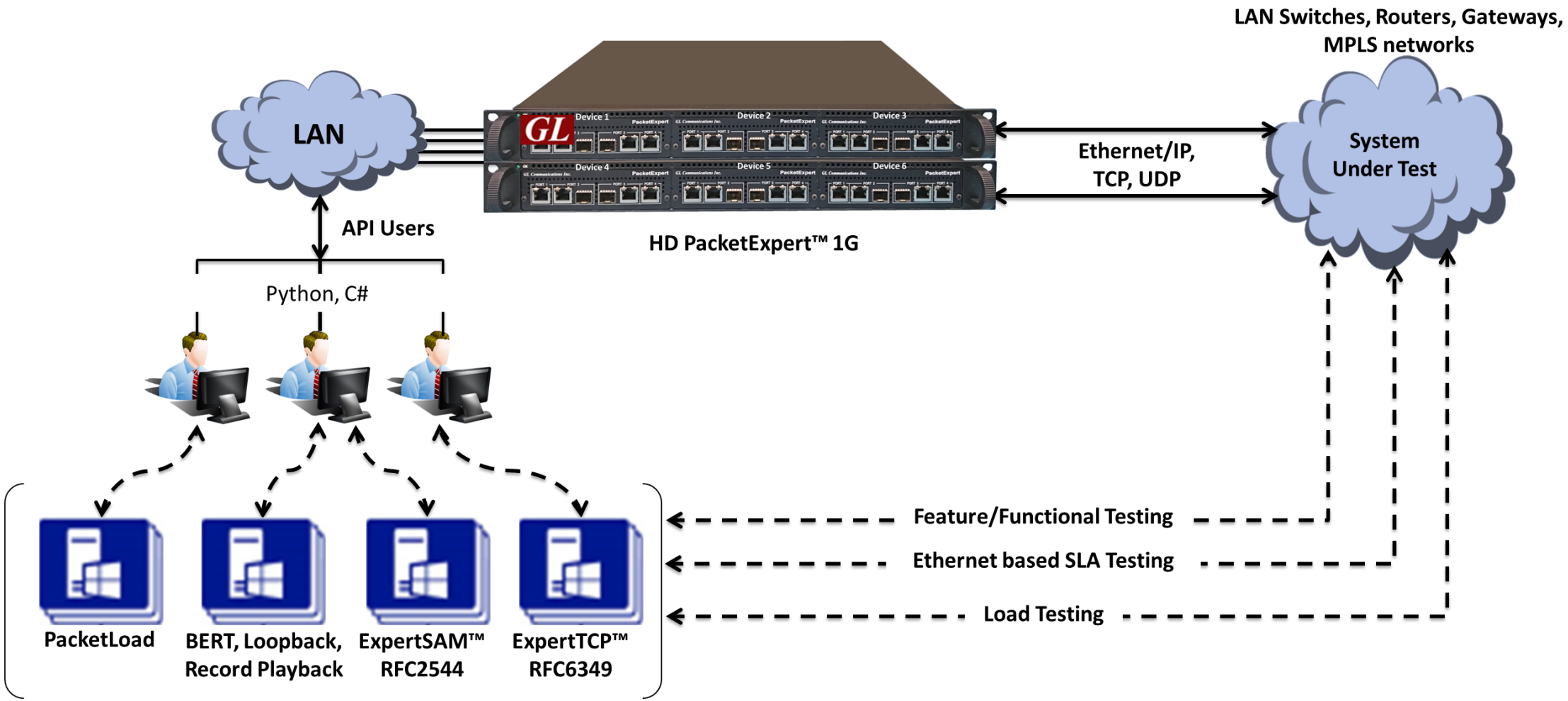
Overview


LAN Switches, Routers, Gateways,
MPLS networks
LAN
Device 1
Device 2
Device 3
Device 4
Device 5
Device 6
HD PacketExpert™ 1G
Ethernet/IP,
TCP, UDP
System
Under Test
API Users
Python, C#
Feature/Functional Testing
Ethernet based SLA Testing
Load Testing
PacketLoad
BERT, Loopback,
Record Playback
ExpertSAM™
RFC2544
ExpertTCP™
RFC6349

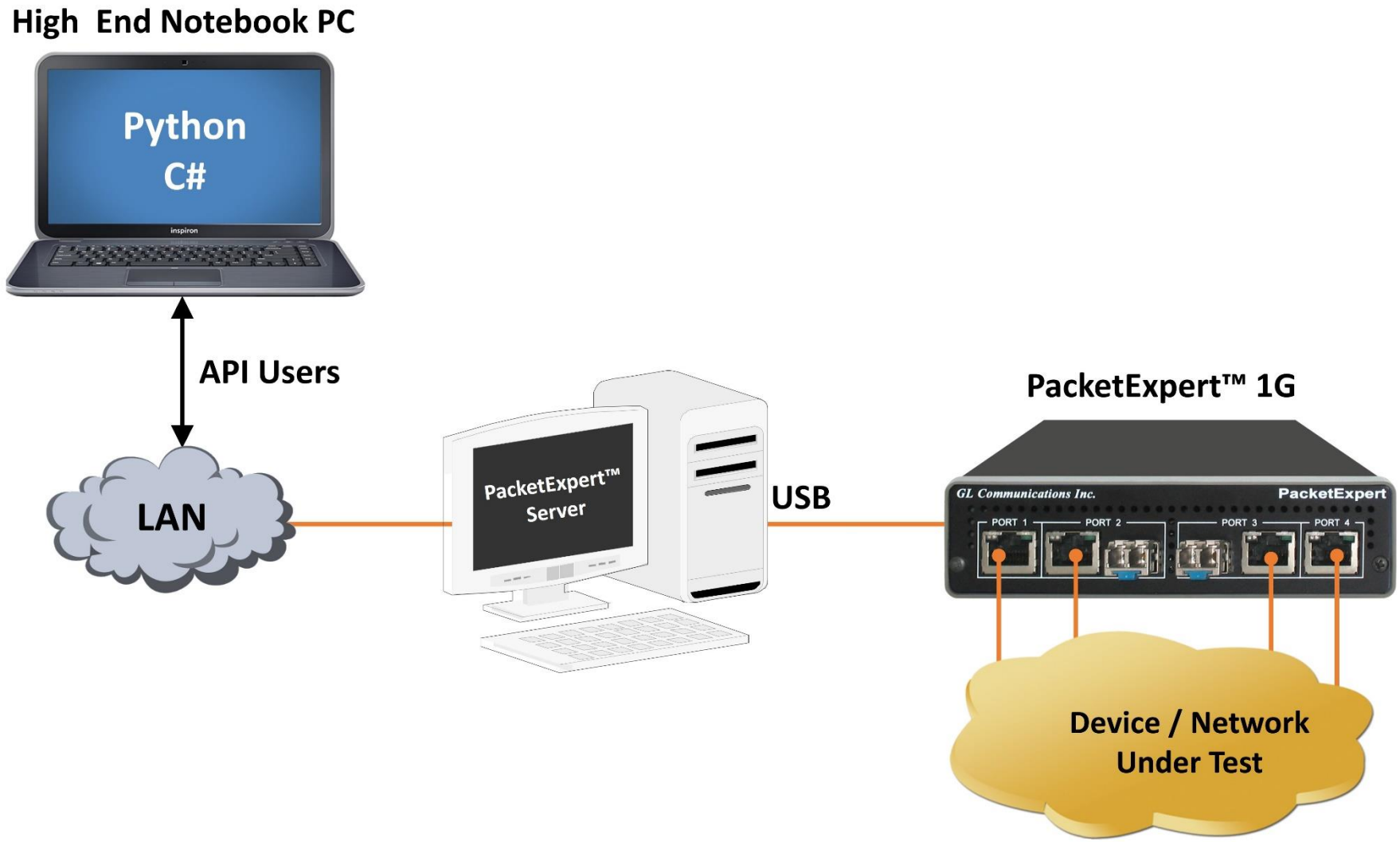
Overview

- With additional licensing, PacketExpert™ 1G supports Command line Interface (CLI) to access all the functionalities remotely such as Bert, Loopback, RFC 2544, Record Playback, IPNetSim™, ExpertSAM™, PacketBroker™, and Multi Stream Traffic Generator and Analyzer using Python, C# client APIs and MAPS™ CLI Client/Server architecture
- PacketExpert™ 1G can be configured as server-side application using the GL's MAPS™ Client-Server architecture, to provide the capability of remote operation, automation, and multi-site connectivity, using any client-side scripting tools such as the Python, C#
- On the client side, the packaged library file is provided which allows the client interface to communicate with the MAPS™ CLI Server to perform PacketExpert™ specific functionalities

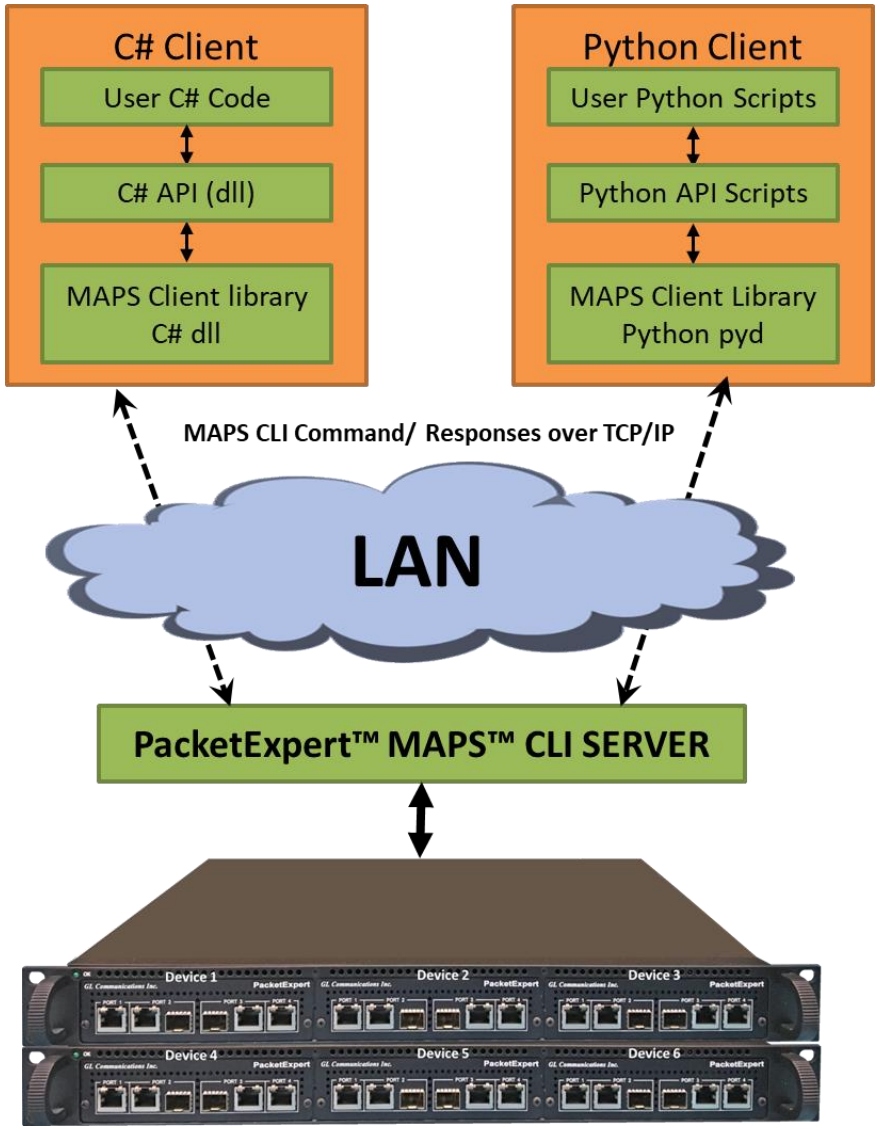
Features

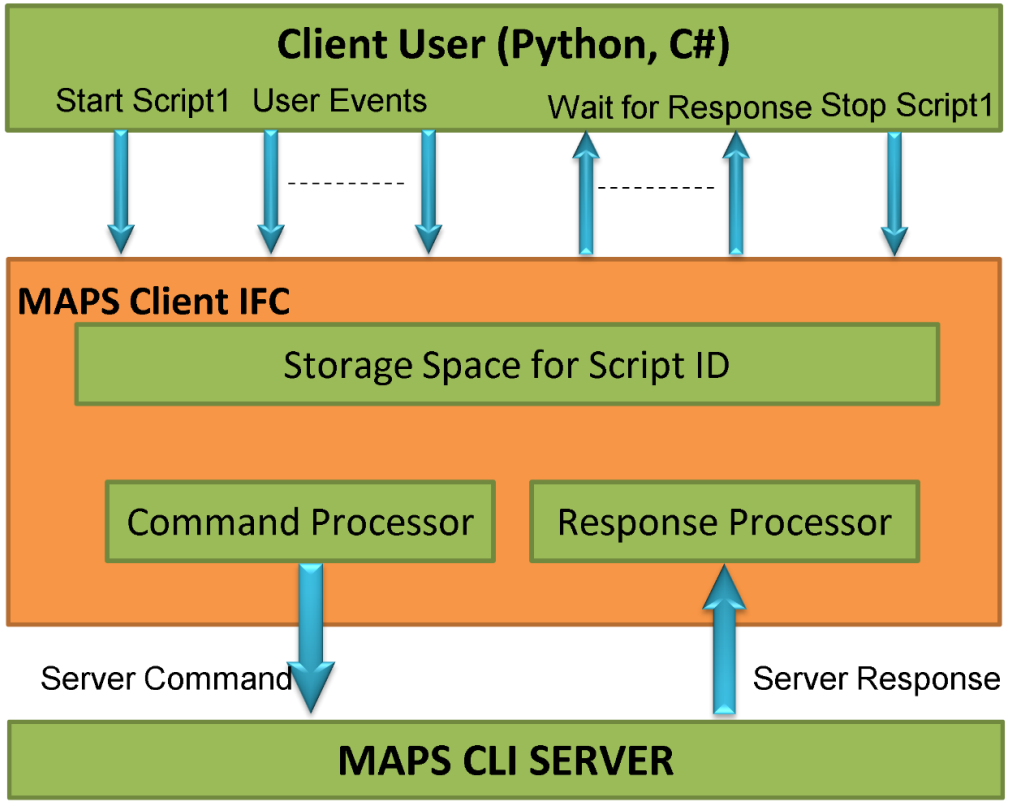
- Capability of remote operation, automation and multi-site connectivity using Python/C# client and MAPS™ CLI server
- Scripts for MAC, VLAN, MPLS, IP and UDP layers testing
- Multiple PacketExpert™ can be controlled remotely from single client application via MAPS™ CLI server
- Scripts for Bert, Loopback, RFC 2544, Record Playback, IPLinkSim™, PacketBroker™, WAN Link Emulation, Multi-stream Traffic Generation and Analysis, and ExpertSAM™ testing

PacketExpert™ 1G CLI with Hardware



Working Principle of MAPS™ CLI





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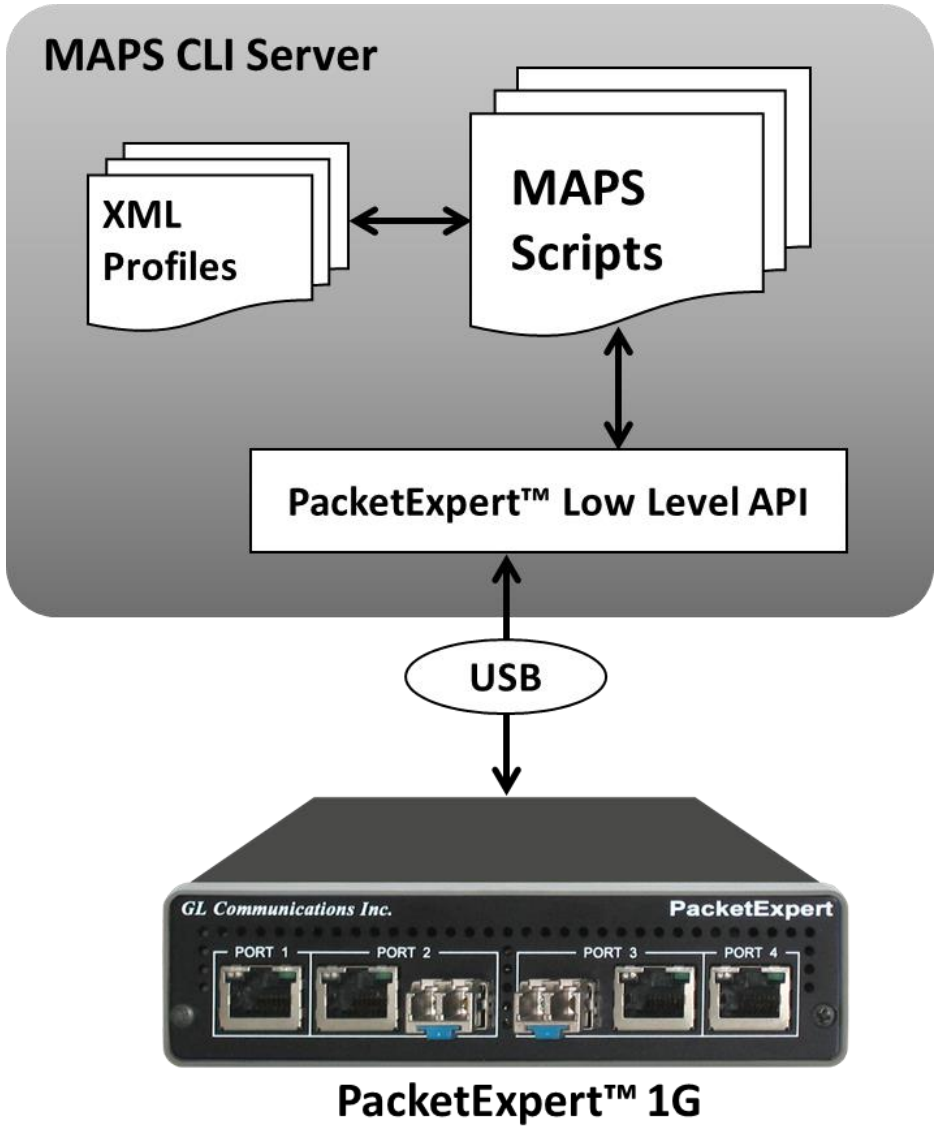
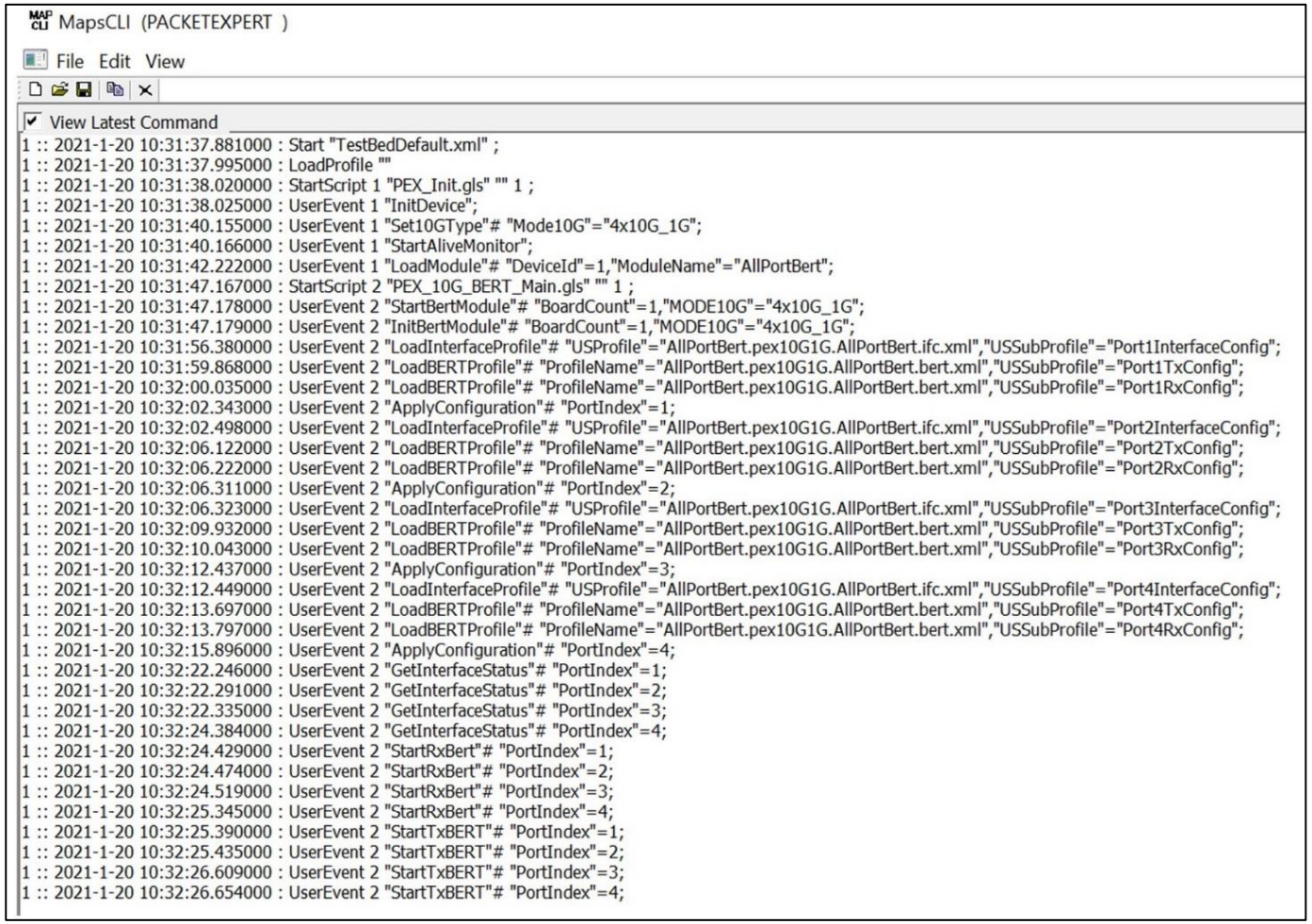
MAPS™ CLI Server

- GL's proprietary MAPS™ CLI Server scripts (*.gls files) developed specifically for PacketExpert™ implements various PacketExpert™ functionalities like BERT, RFC 2544, and others
- MAPS™ CLI Server interfaces internally with low level PacketExpert™ APIs to access PacketExpert™ hardware and to perform tasks



MAPS™ CLI Server (Contd.)



- CLI Server script execution is Event Driven, i.e., Server detects the Events such as InsertStatus, InterfaceStatus, IsRunning, LoadProfileStatus, RFC2544Init, RFC2544TestConfig, TestDirection and others

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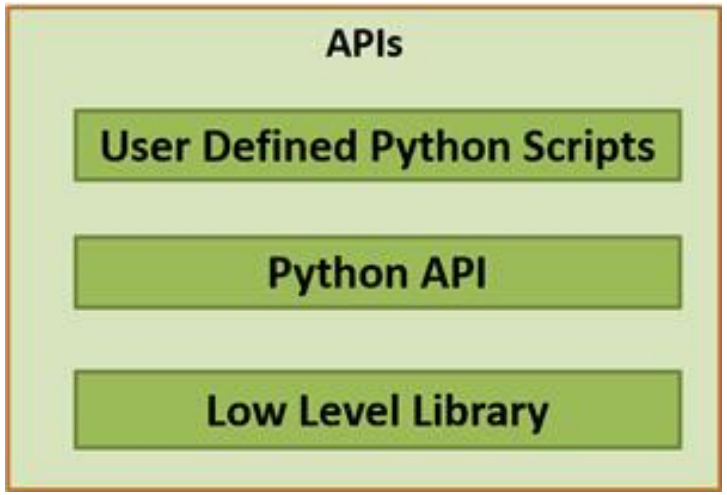
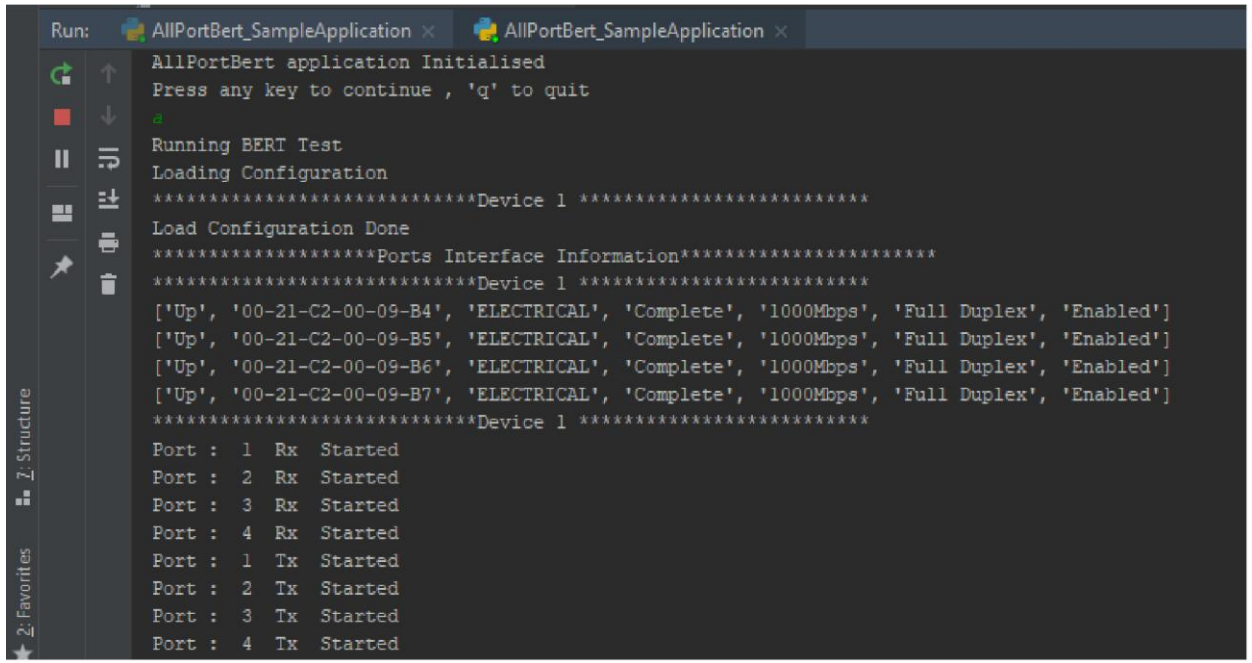
Python Client and Scripting

- The Python Client consists of following components:
- Python API scripts, that provide High Level APIs, using which all the PacketExpert™ functionalities are accessible to the users
- These APIs in turn use a low level library to communicate with the PacketExpert™ MAPS™ server



Executing Sample Python Client




```
Port :  4  Tx  Started
**********Device 1 **********

Bert Results of Port 1
[{'Traffic Status': 'Rx Traffic'},
 {'Sync Status': 'InSync'},
 {'Bit Error Status': 'No Error'},
 {'Out Of Sequence Status': 'No Error'},
 {'BERT Status': 'Sync'},
 {'BERT Test Time': '00:00:07'},
 {'Bits Received': '5 226 410 336'},
 {'Bit Error Count': '0'},
 {'Bit Error Rate': '0.000E+00'},
 {'Bit Error Seconds': '0'},
 {'Sync Loss Count': '0'},
 {'Sync Loss Seconds': '0'},
 {'Out of Sequence Count': '0'},
 {'Out of Sequence Seconds': '0'},
 {'Error Free Seconds': '7'}]

Bert Results of Port 2
[{'Traffic Status': 'Rx Traffic'},
 {'Sync Status': 'InSync'},
 {'Bit Error Status': 'No Error'},
 {'Out Of Sequence Status': 'No Error'},
 {'BERT Status': 'Sync'},
 {'BERT Test Time': '00:00:07'},
```

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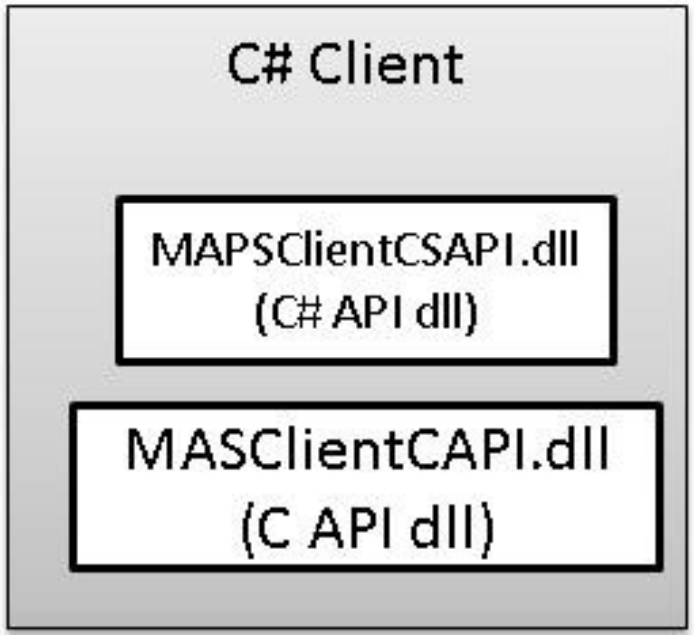
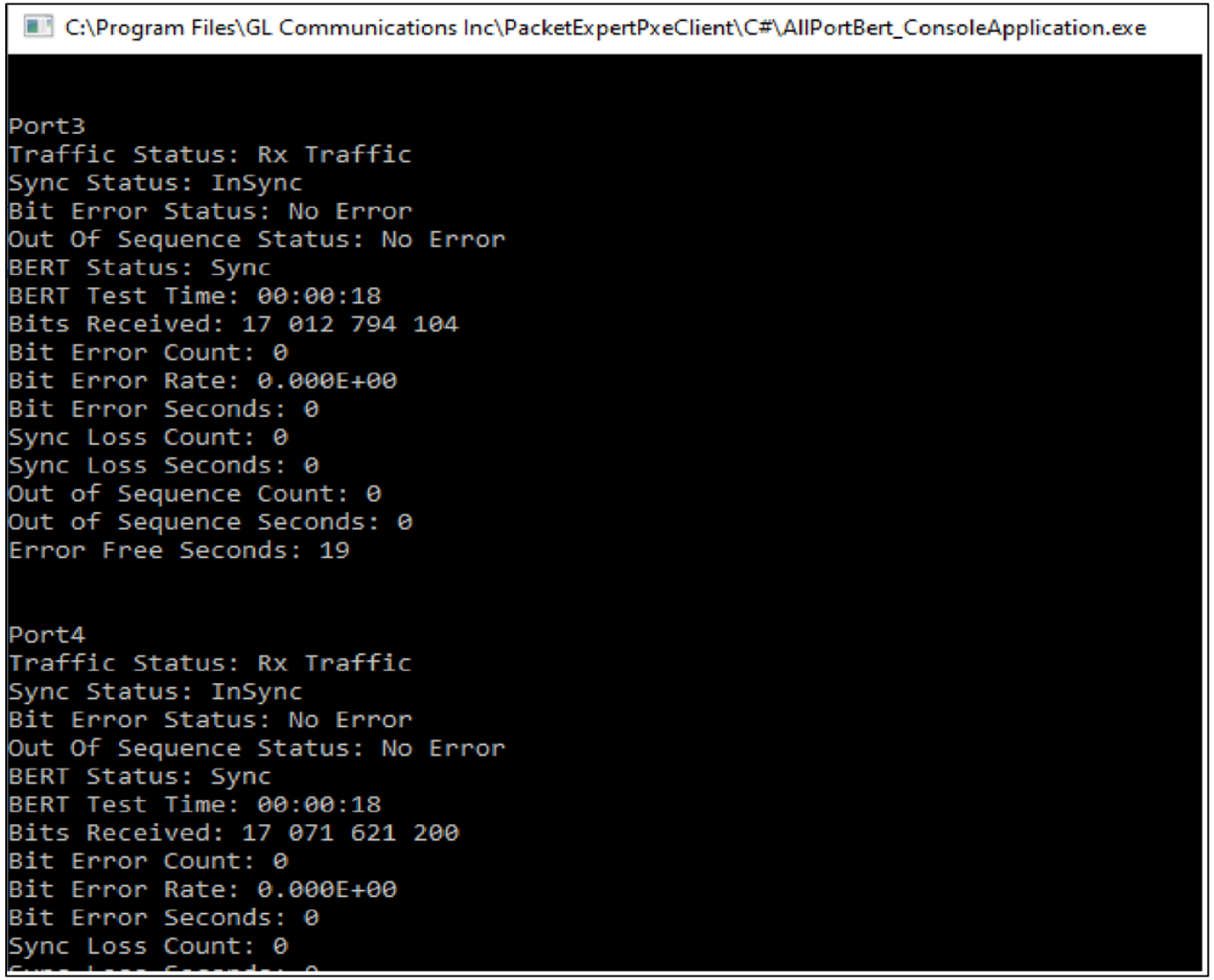
C# Client and Scripting

- The C# interface developed for PacketExpert™ allows users to control all features of PacketExpert™ through C# APIs
- The C# client connects to the MAPS™ CLI server using TCP/IP sockets



Executing Sample C# Client



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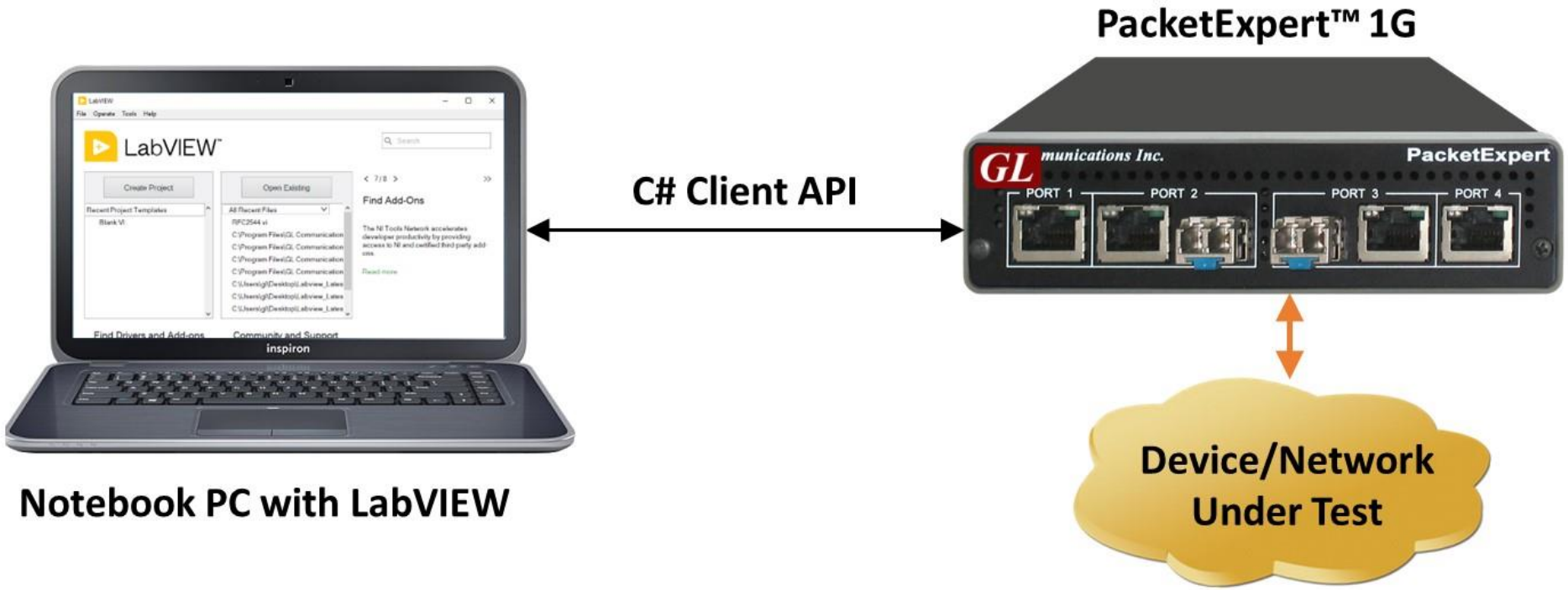
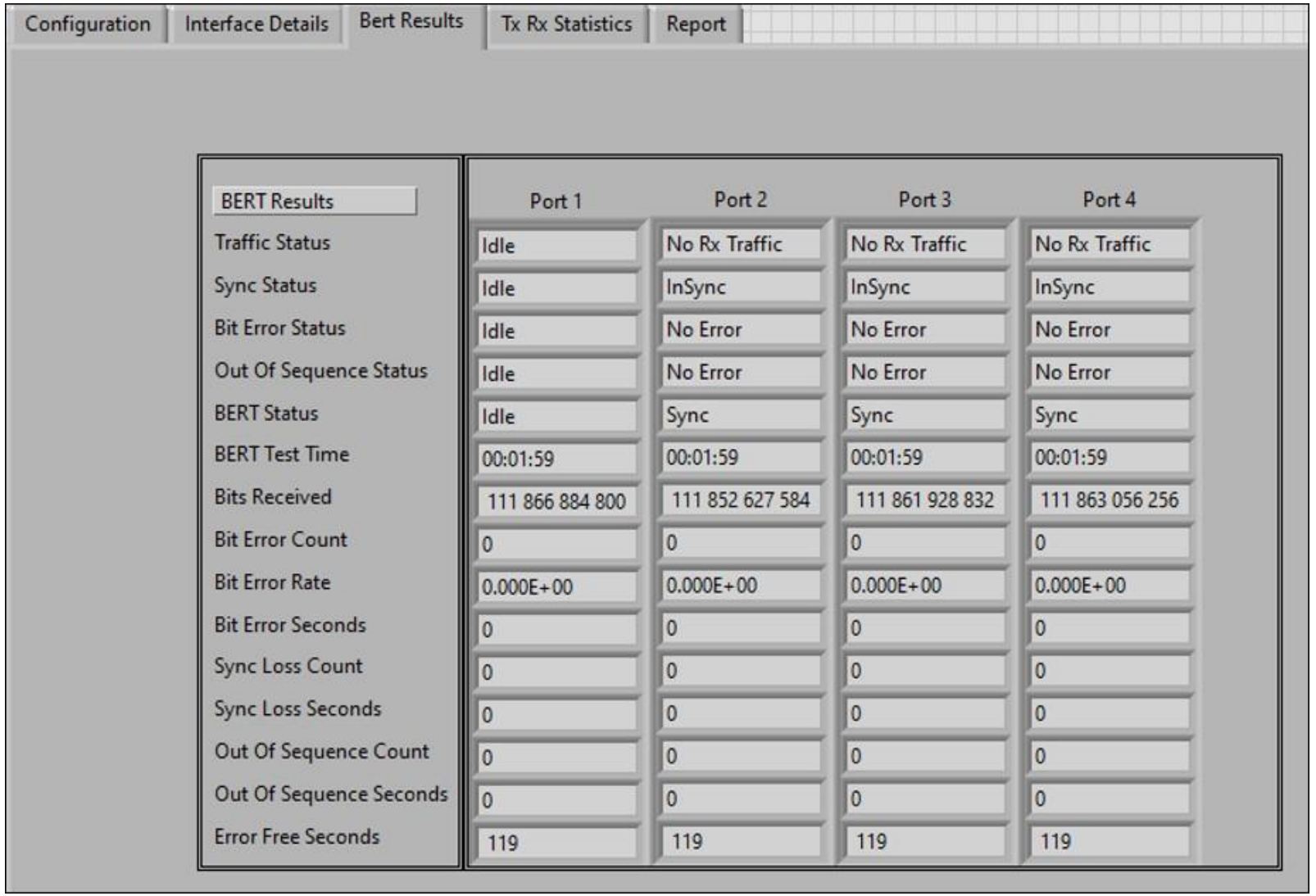
PacketExpert™ 1G Integration with LabVIEW using C# Client



LabVIEW All Port BERT Results



BERT Results	Port 1	Port 2	Port 3	Port 4
Traffic Status	Idle	No Rx Traffic	No Rx Traffic	No Rx Traffic
Sync Status	Idle	InSync	InSync	InSync
Bit Error Status	Idle	No Error	No Error	No Error
Out Of Sequence Status	Idle	No Error	No Error	No Error
BERT Status	Idle	Sync	Sync	Sync
BERT Test Time	00:01:59	00:01:59	00:01:59	00:01:59
Bits Received	111 866 884 800	111 852 627 584	111 861 928 832	111 863 056 256
Bit Error Count	0	0	0	0
Bit Error Rate	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Bit Error Seconds	0	0	0	0
Sync Loss Count	0	0	0	0
Sync Loss Seconds	0	0	0	0
Out Of Sequence Count	0	0	0	0
Out Of Sequence Seconds	0	0	0	0
Error Free Seconds	119	119	119	119

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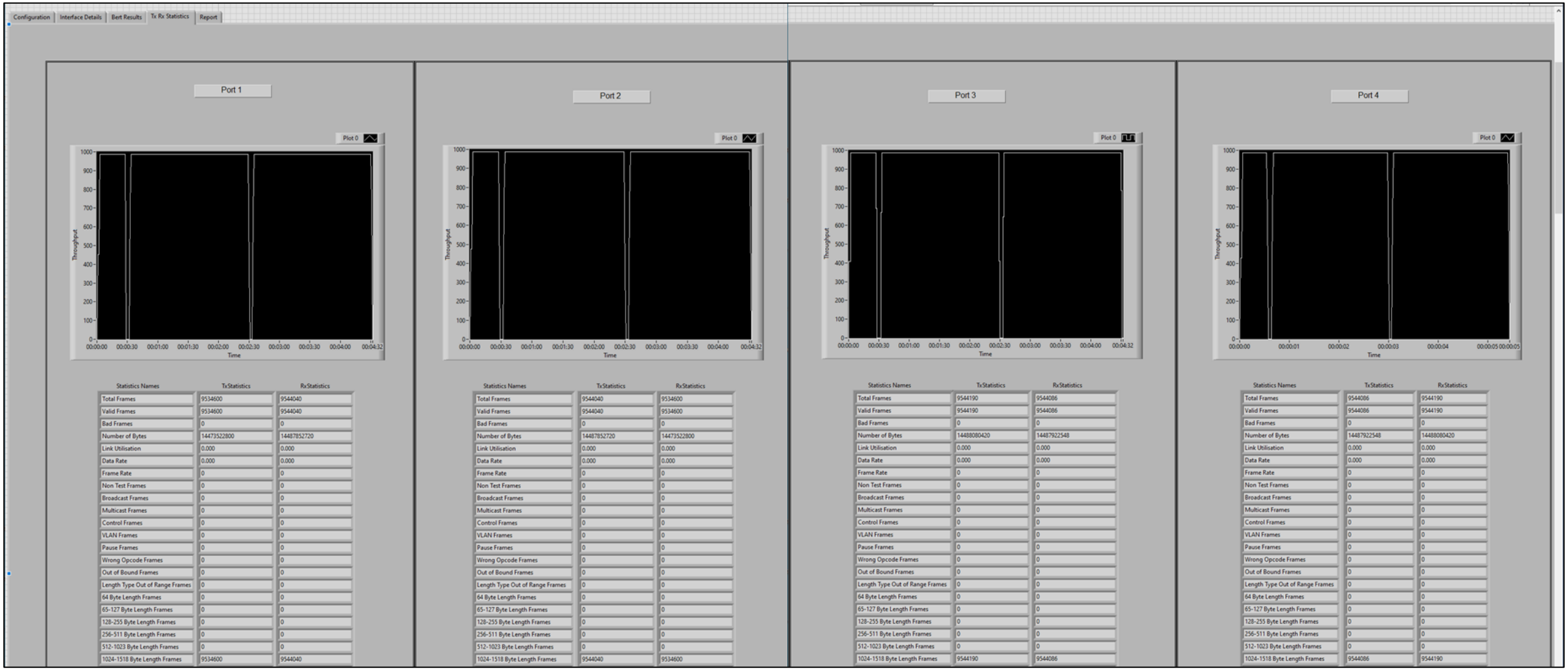
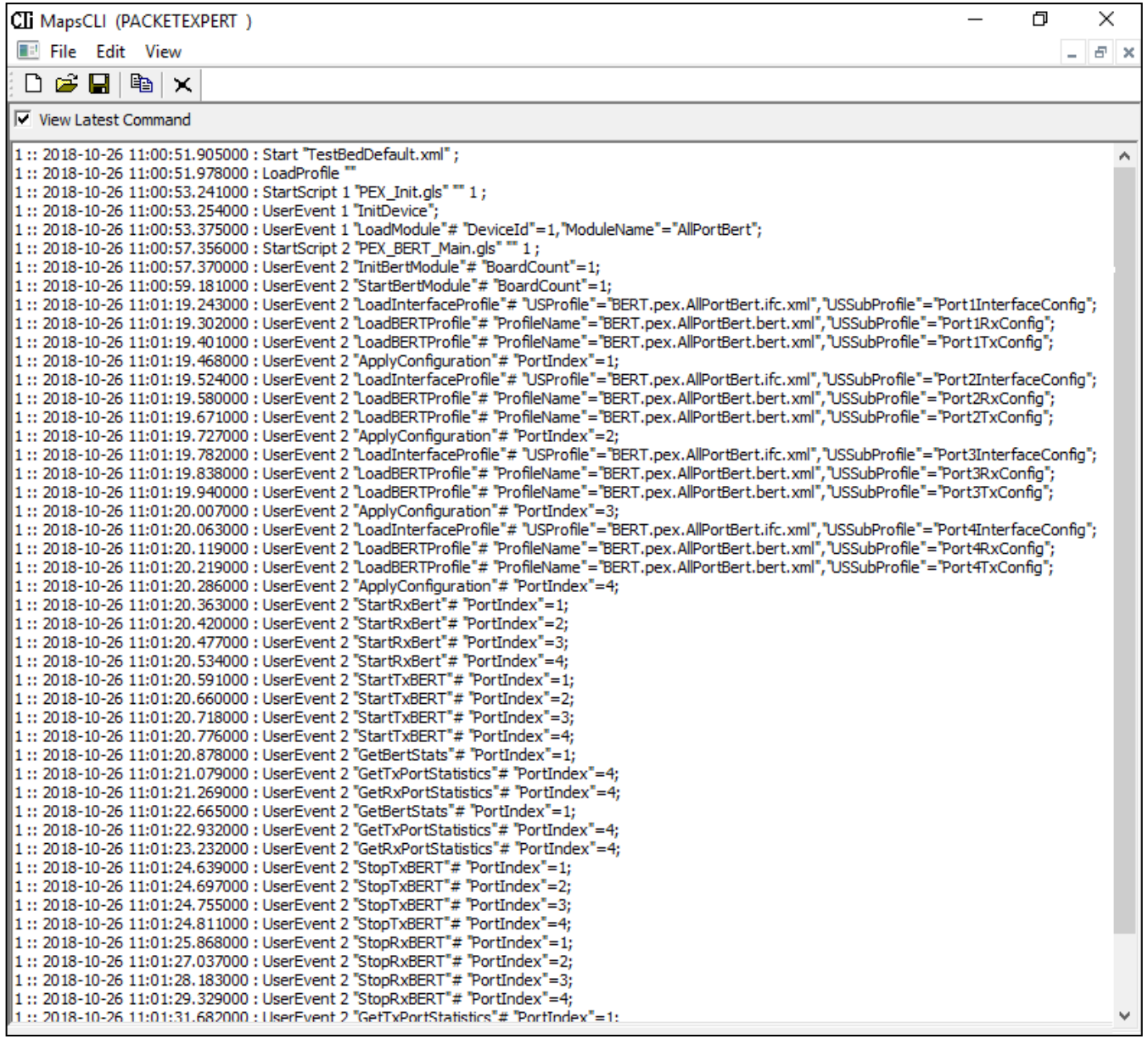
LabVIEW BERT All Port Statistics



MAPS™ CLI Server



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Thank You