APIs for Test Automation and Remote Access

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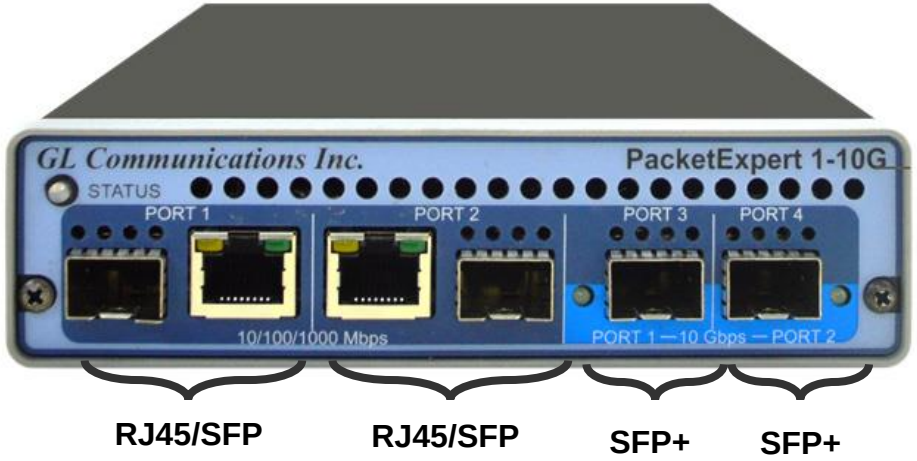
PacketExpert™ 10GX - Portable Unit (PXN100, PXN101)



Physical Specifications	• Length: 8.45 in (214.63 mm) • Width: 5.55 in (140.97 mm) • Height: 1.60 in (40.64 mm) • Weight: 1.713 lbs
External Power Supply	• +12 Volts (Medical Grade), 3 Amps (For portable units having serial number ≥ 188400) • +9 Volts, 2 Amps (For portable units having serial number < 188400)
BUS Interface	• USB 3.0 • Optional 4-Port SMA Jack Trigger Board(TTL Input/Output)
Protocols	• IEEE 802.3ae LAN PHY compliance • RFC 2544 compliance

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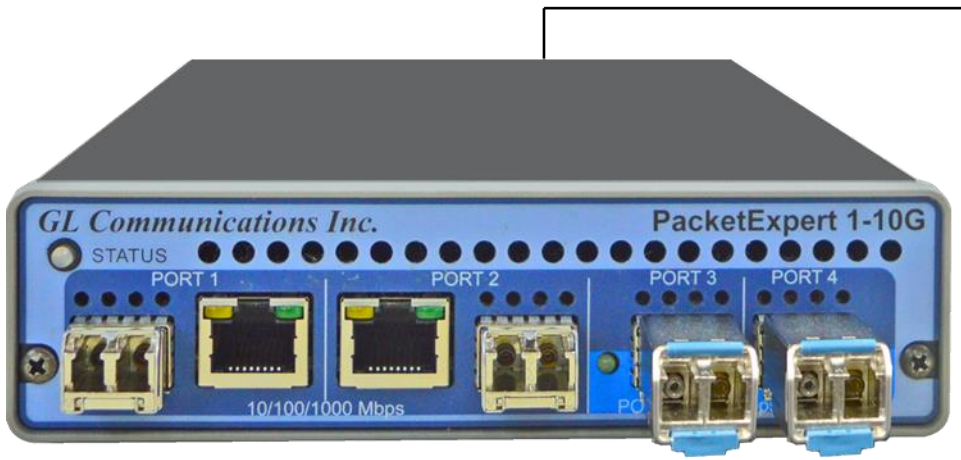
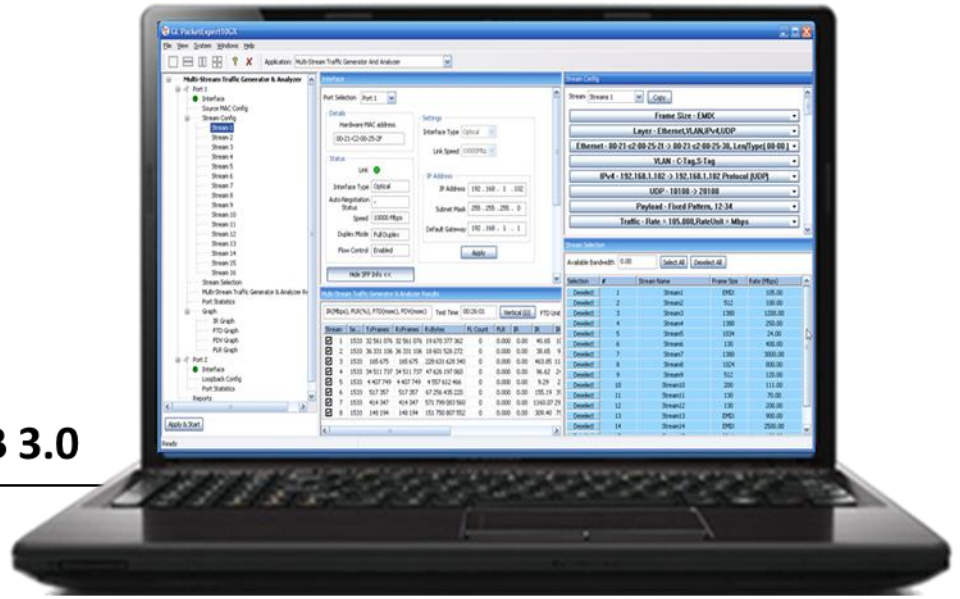
PacketExpert™ Software



USB 3.0



PacketExpert™ 10GX
(10/2.5/1Gbps)
(10/100/1000 Mbps)

Windows 10/11 64-bit OS

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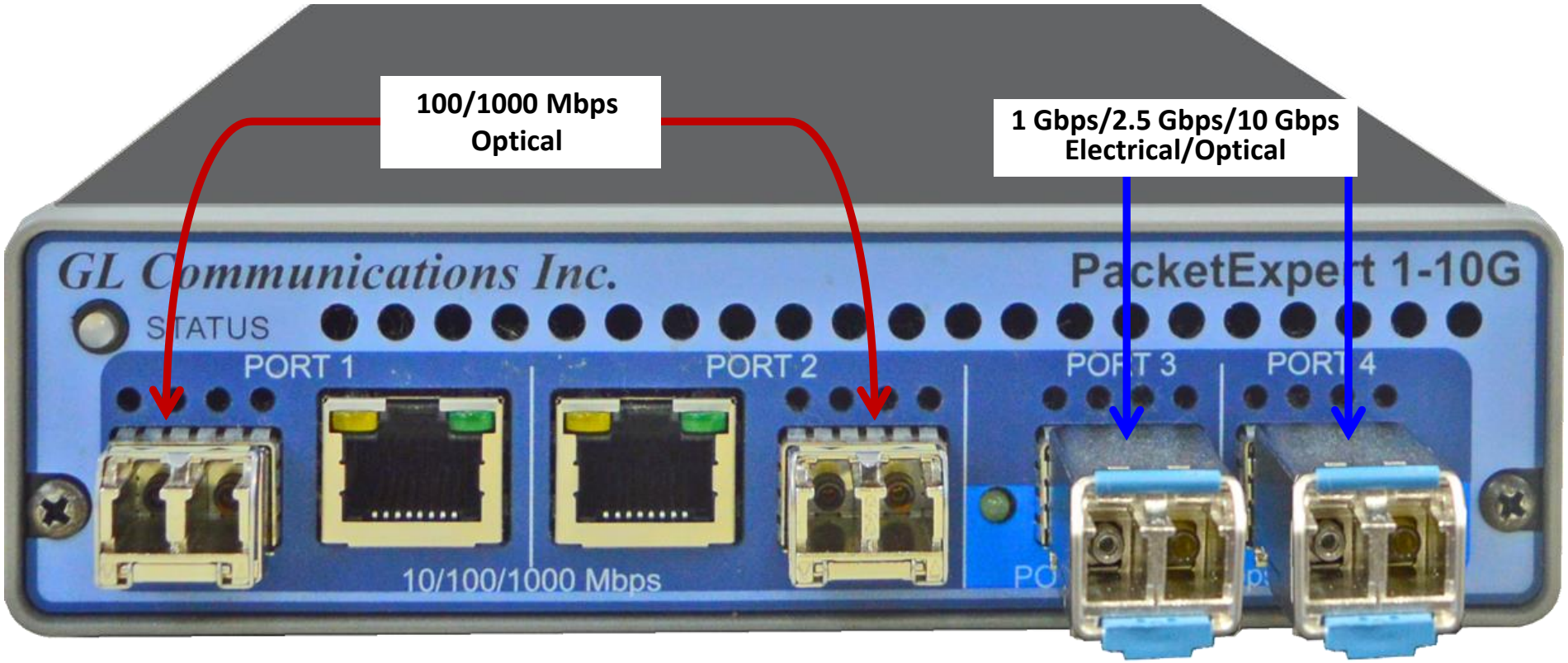
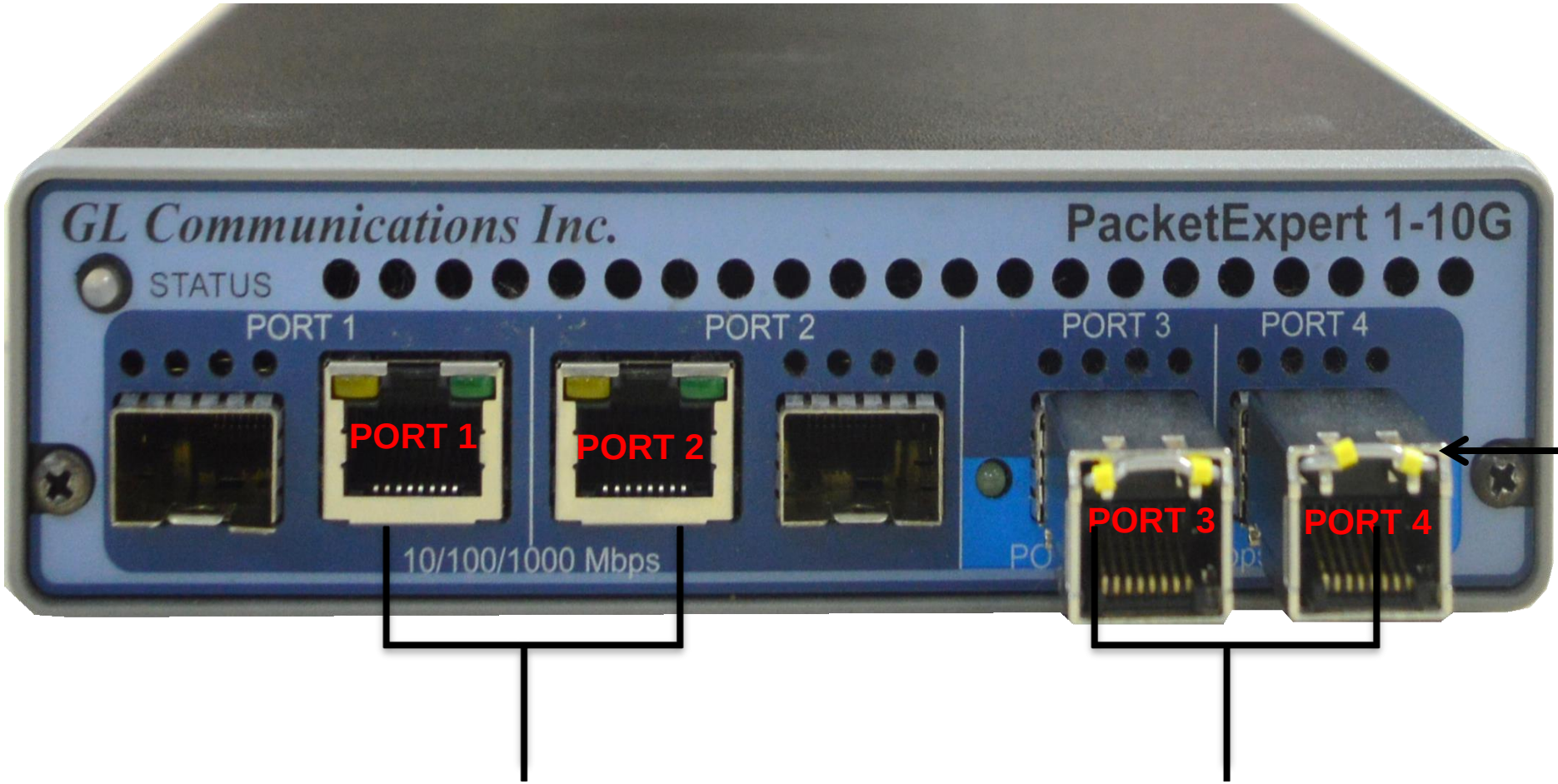
PacketExpert™ 10GX - Optical Ports



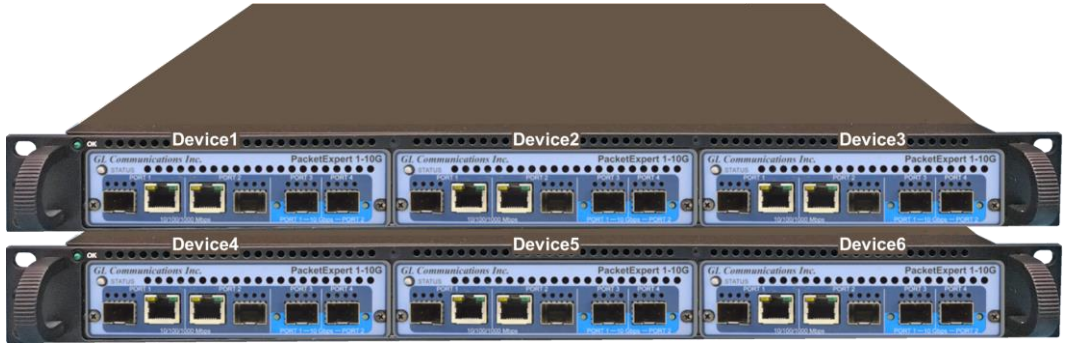
PacketExpert™ 10GX - Electrical Ports



mTOP™ 1U Rack Option with 12 TTL

MTOP™ Rack Units

High Density 1U Rack option



Stacked High Density 1U Rack option

Physical Specifications	• Length: 16 in (406.4) • Width: 19 in (482.6) • Height: 1U / 2U
External Power Supply	• ATX Power Supply
BUS Interface	• 1U mTOP™ (MT001 + 3x PXN100) ➢ Rackmount Enclosure can support up to 3 PXN100s • 2U Rack Mount (with 6x PXN100) ➢ Rackmount Enclosure can support up to 6 PXN100s • Optional 4 to 12 Port SMA Jack Trigger Board (TTL Input/Output)
SBC Specifications	• 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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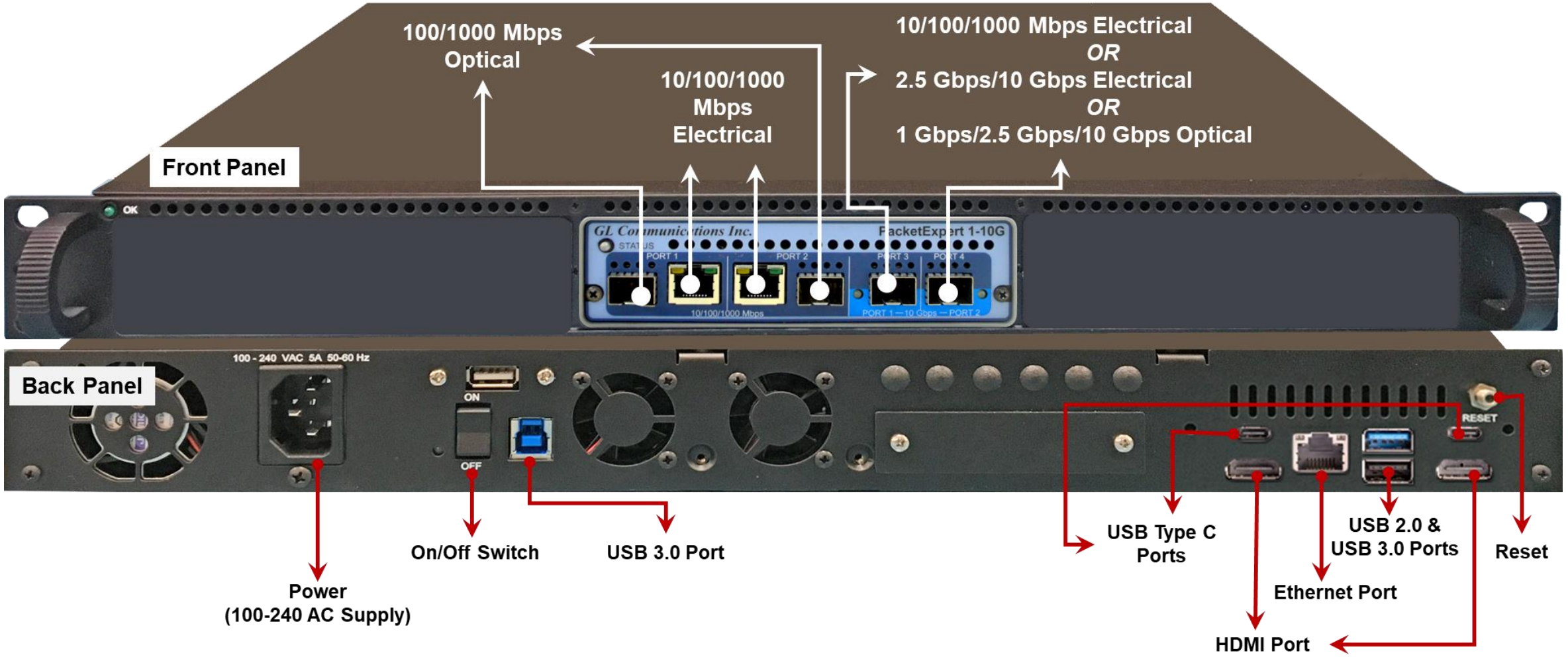
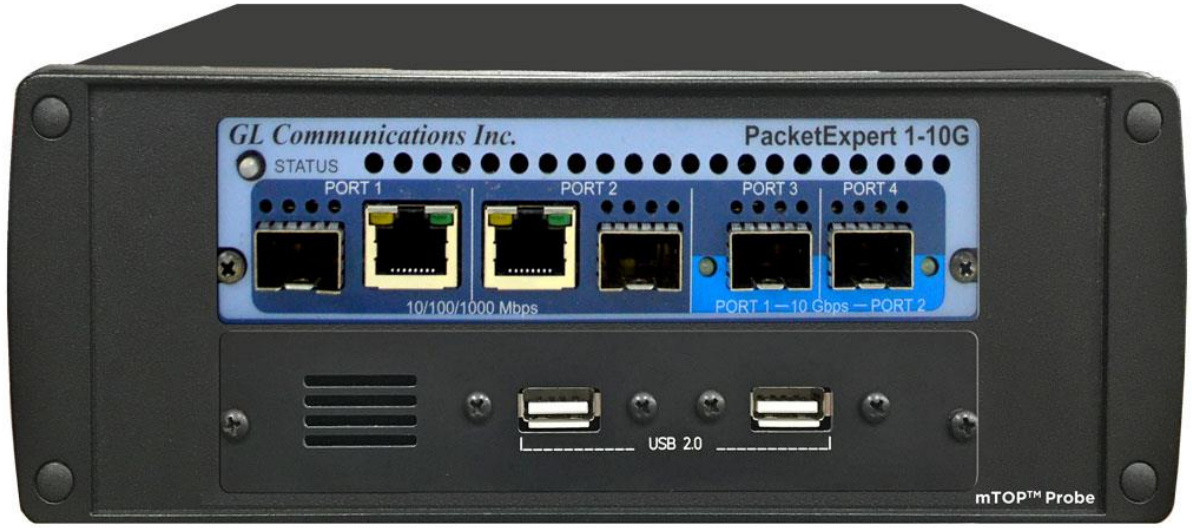
mTOP™ 1U Rack Option with Built in SBC



mTOP™ Probe with 10GX Hardware Unit + SBC



Physical Specifications	• Length: 10.4 in. (264.16 mm) • Width: 8.4 in. (213.36 mm) • Height: 3.0 in. (76.2 mm) • Optional 4-Port SMA Jack Trigger Board (TTL Input/Output) • External USB based Wi-Fi adaptor
External Power Supply	• +12 Volts (Medical Grade), 3 Amps
SBC Specifications	• Intel Core i3 or optional i7 NUC Equivalent, • Windows® 11 64-bit Pro Operating System • USB 2.0 and 3.0 Ports, 12V/ 3Amps Power Supply • USB Type C Ports, Ethernet 2.5GigE port • 256 GB Hard drive, 8G Memory (Min) • Two HDMI ports

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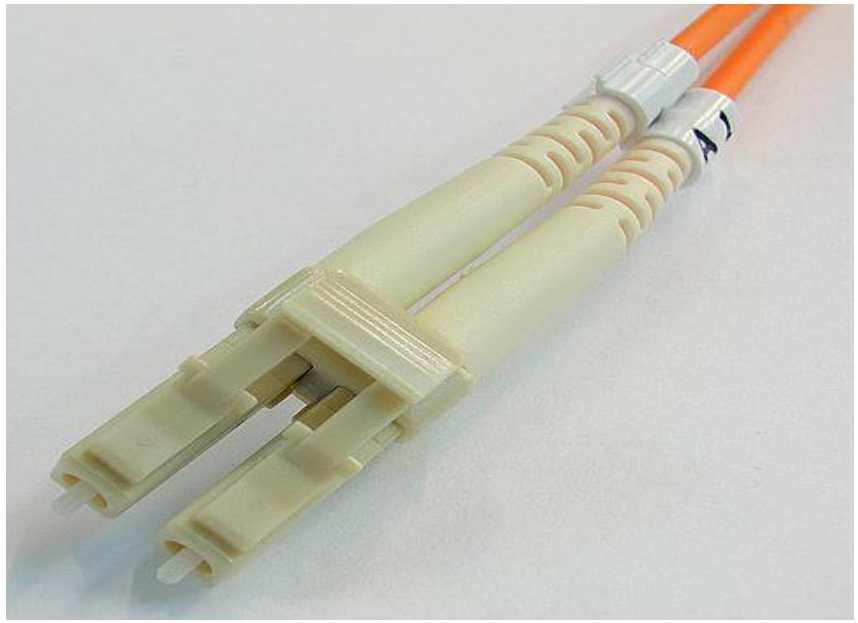
Optical Connectors and SFP Transceivers

LC Connectors



850nm/1310nm/1550nm

SFP Module

- PacketExpert™ 10GX supports LC connectors and 850nm/1310nm/1550nm SFP (Small Factor Pluggable) modules

  Note: In case customer have different type of connectors, then we need converters like LC-to-SC, LC-to-FC and vice-versa

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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™ 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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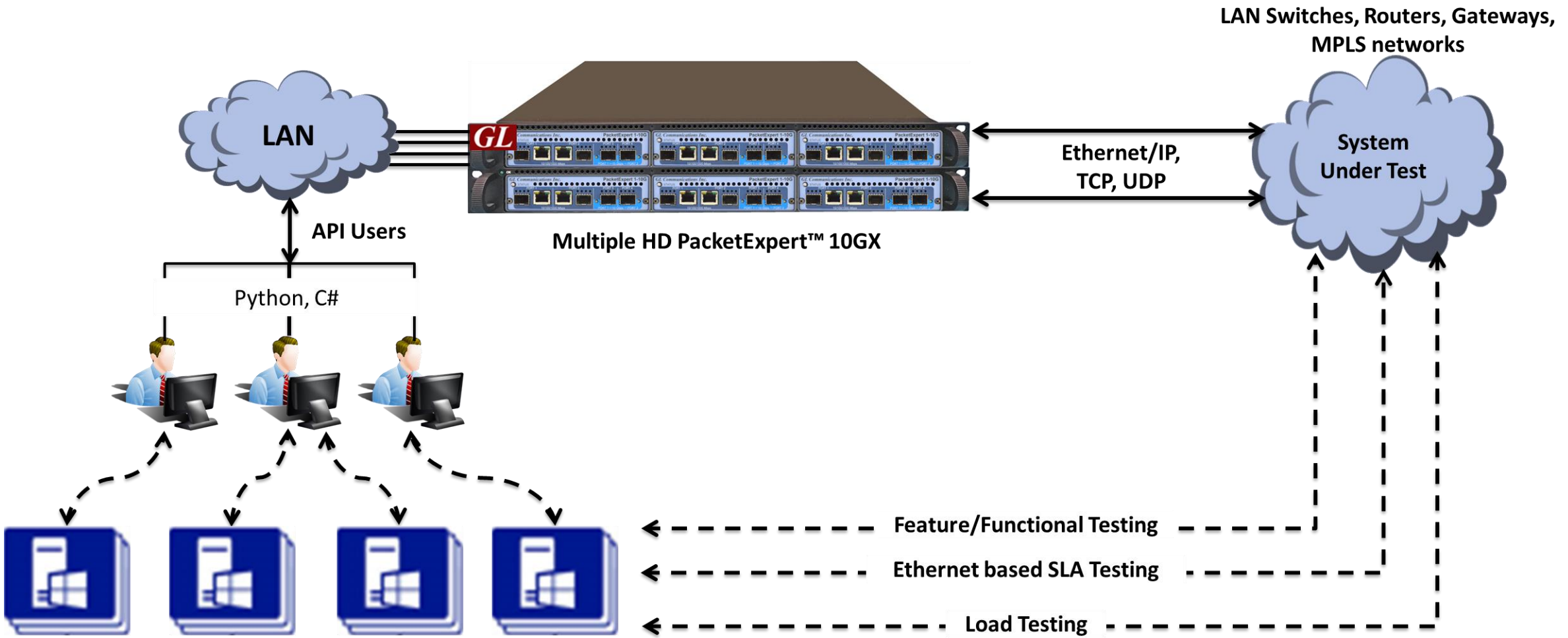
Overview


LAN Switches, Routers, Gateways,
MPLS networks
LAN
GL
Ethernet/IP,
TCP, UDP
System
Under Test
API Users
Multiple HD PacketExpert™ 10GX
Python, C#
Feature/Functional Testing
Ethernet based SLA Testing
Load Testing

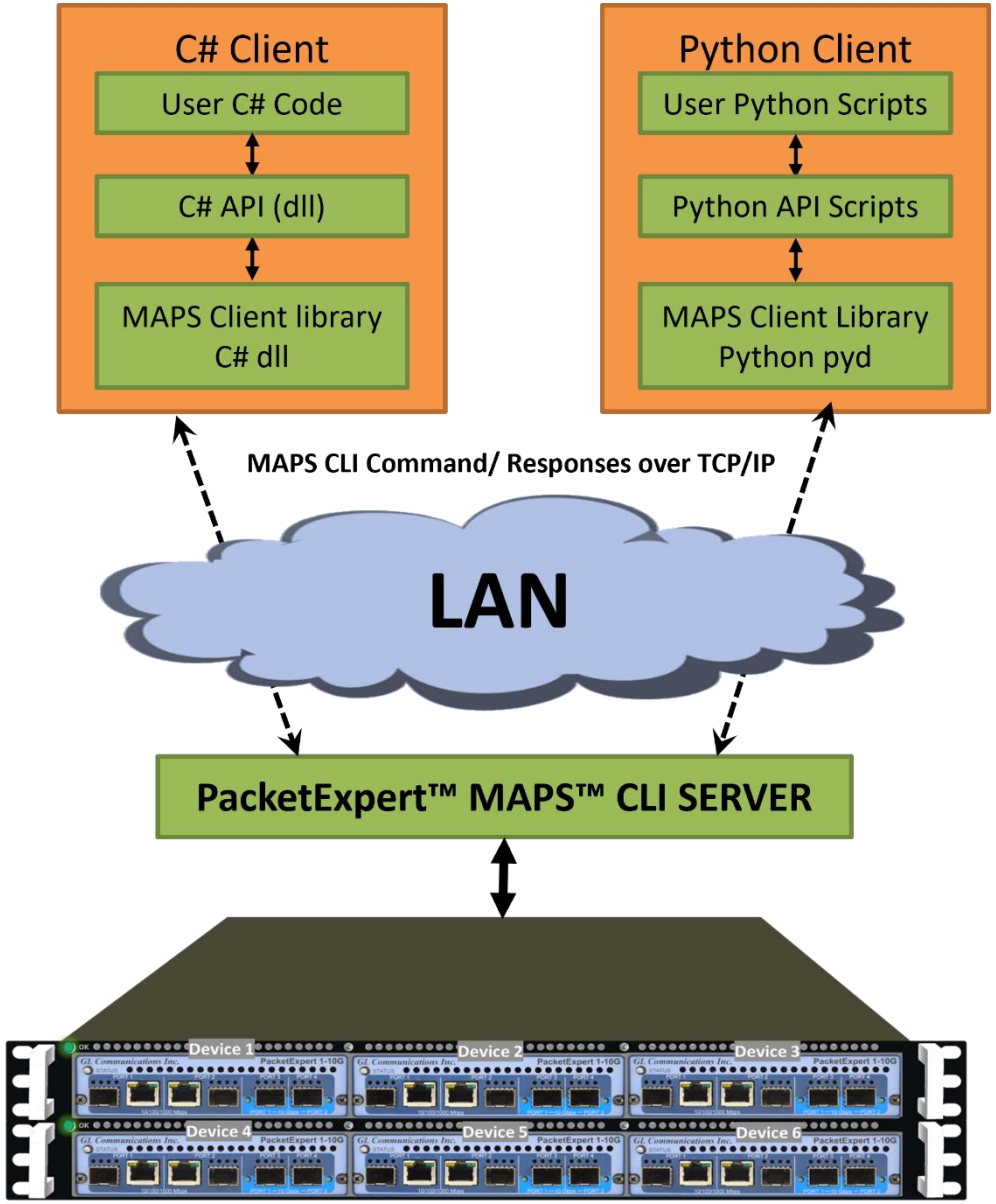
Overview

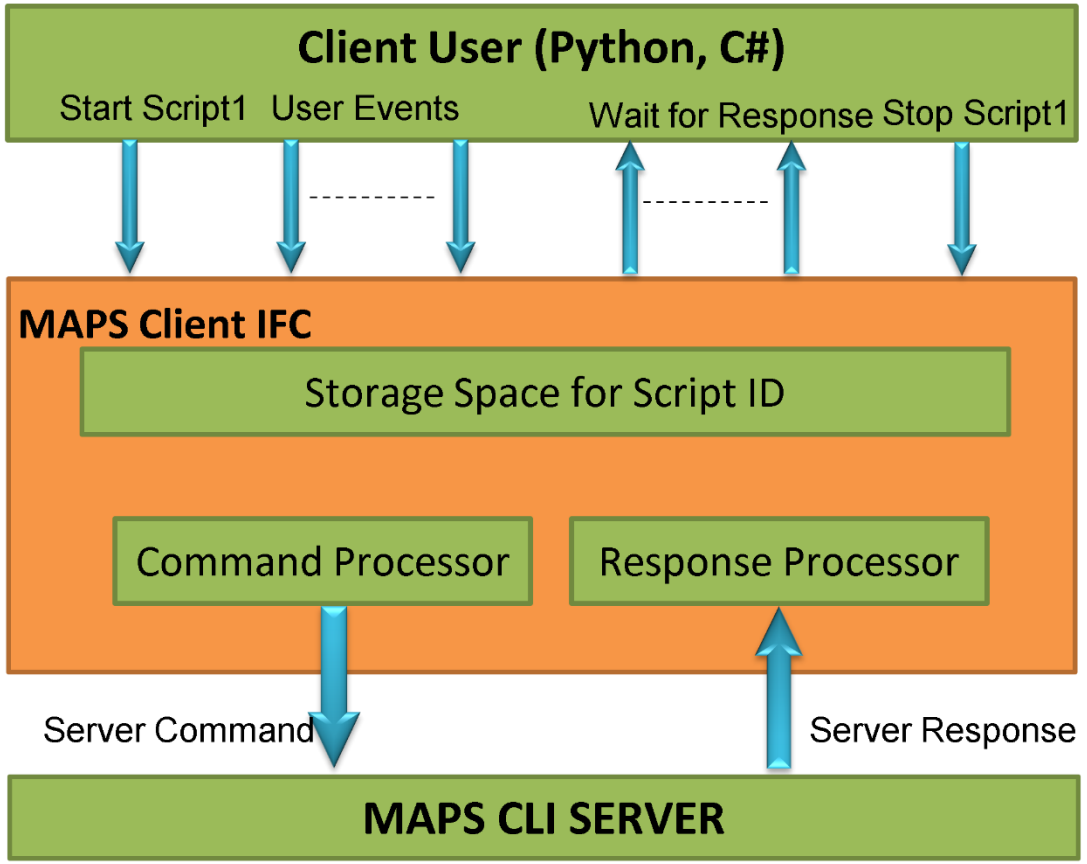
- With additional licensing, PacketExpert™ supports Command line Interface (CLI) to access all the functionalities remotely such as Bert, Loopback, RFC 2544, Record Playback, IPNetSim™, ExpertSAM™, PacketBroker™, and Multi Stream Traffic Generator and Analyzer using Python, C# client APIs and MAPS™ CLI Client/Server architecture
- PacketExpert™ 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

Working Principle of MAPS™ CLI





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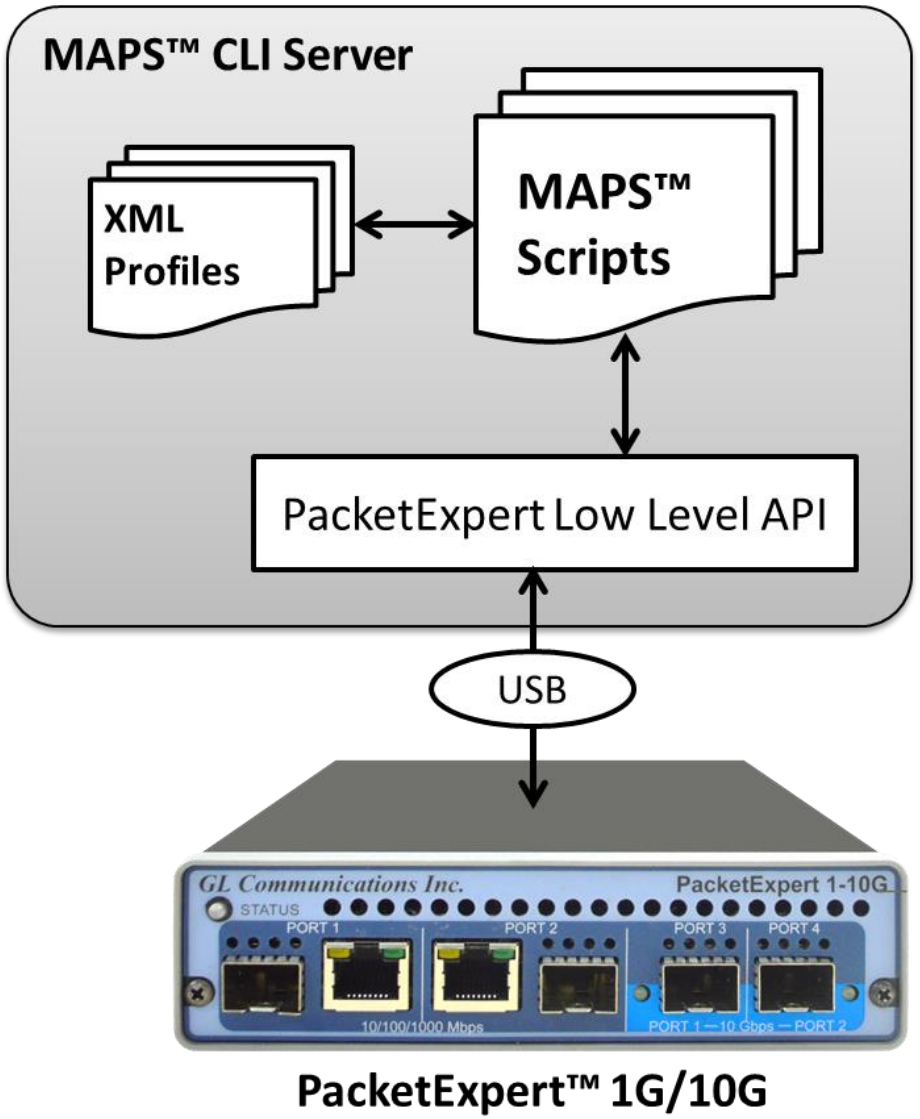
MAPS™ CLI Server

- 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



PacketExpert™ 1G/10G

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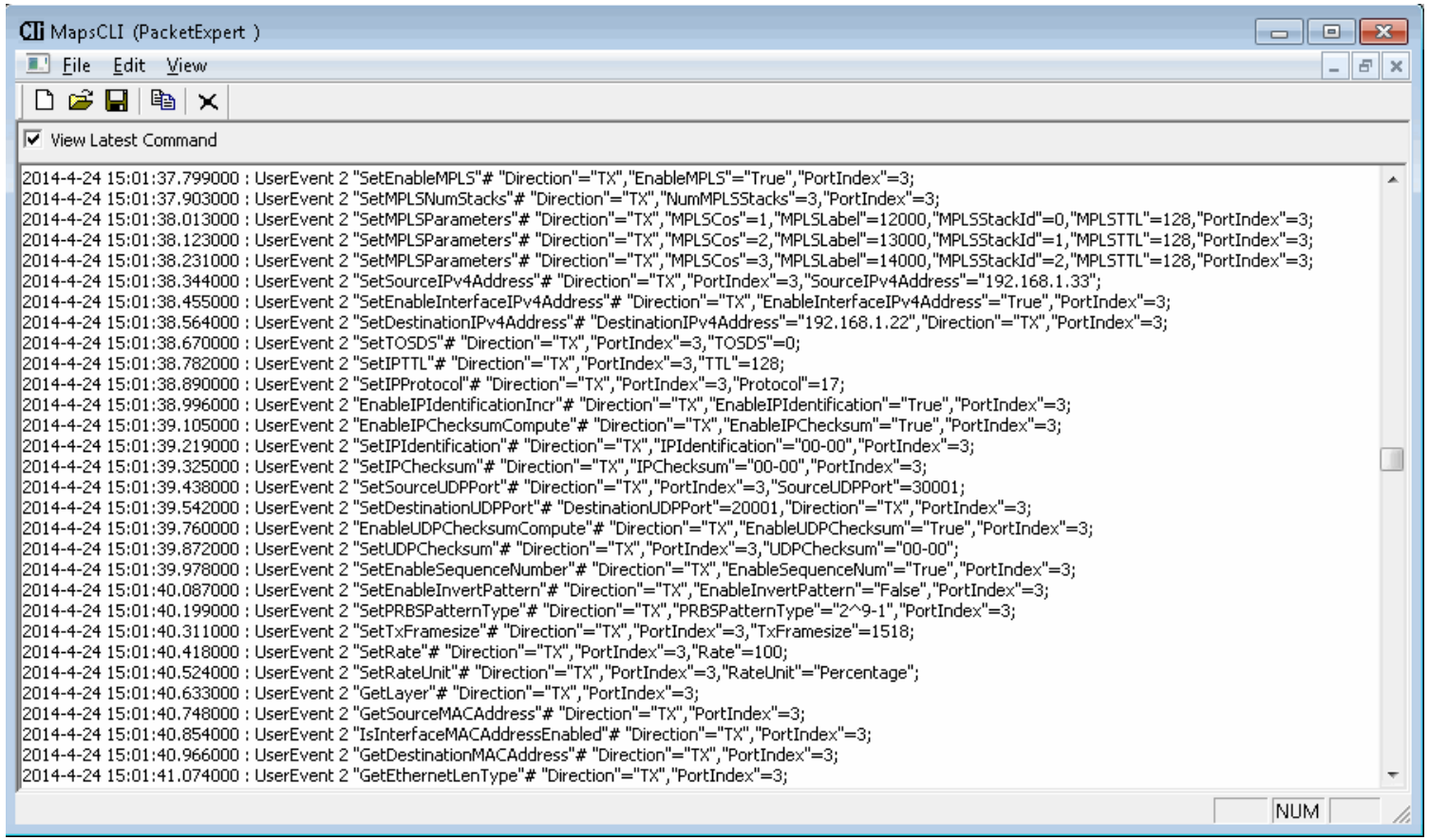
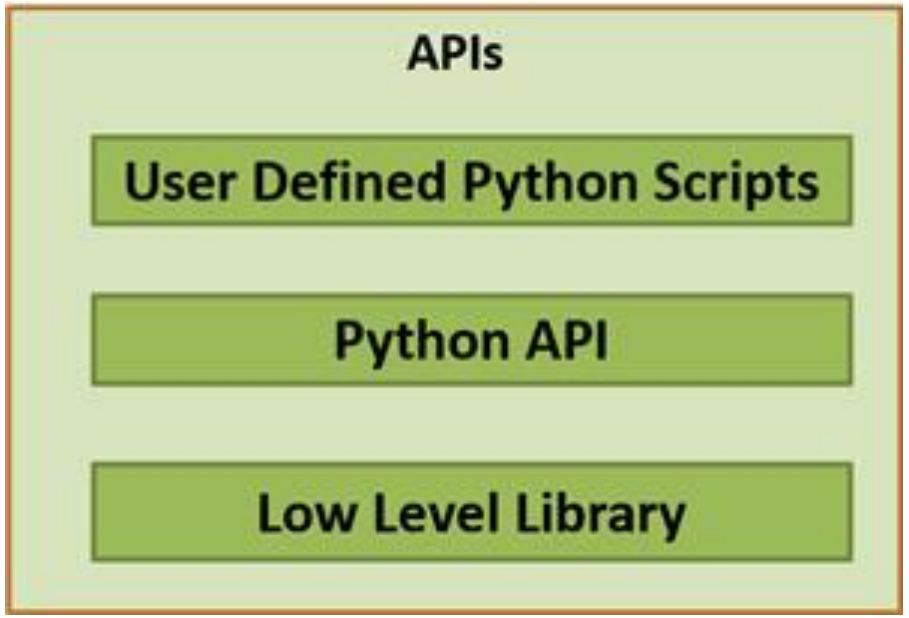
MAPS™ CLI Server (Contd.)



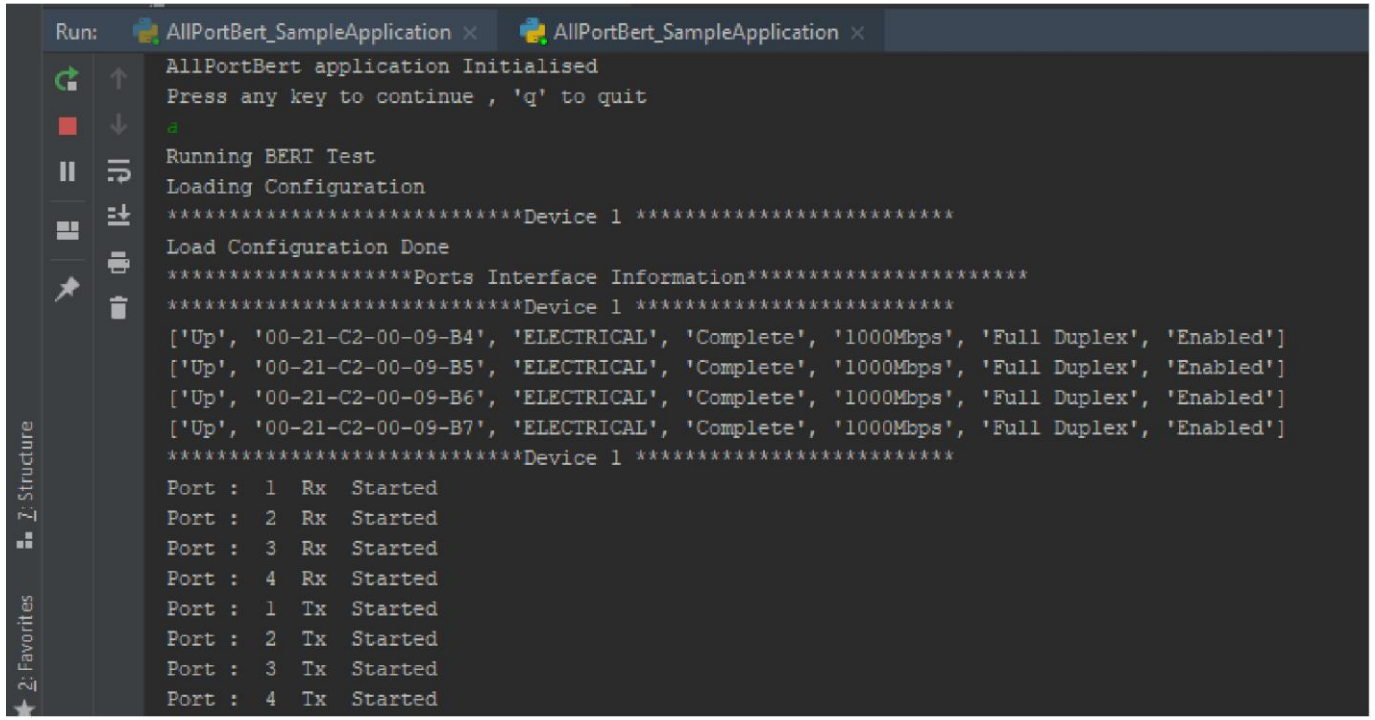
- CLI Server script execution is Event Driven, i.e., Server detects the Events such as InsertStatus, InterfaceStatus, IsRunning, LoadProfileStatus, RFC2544Init, RFC2544TestConfig, TestDirection and others

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



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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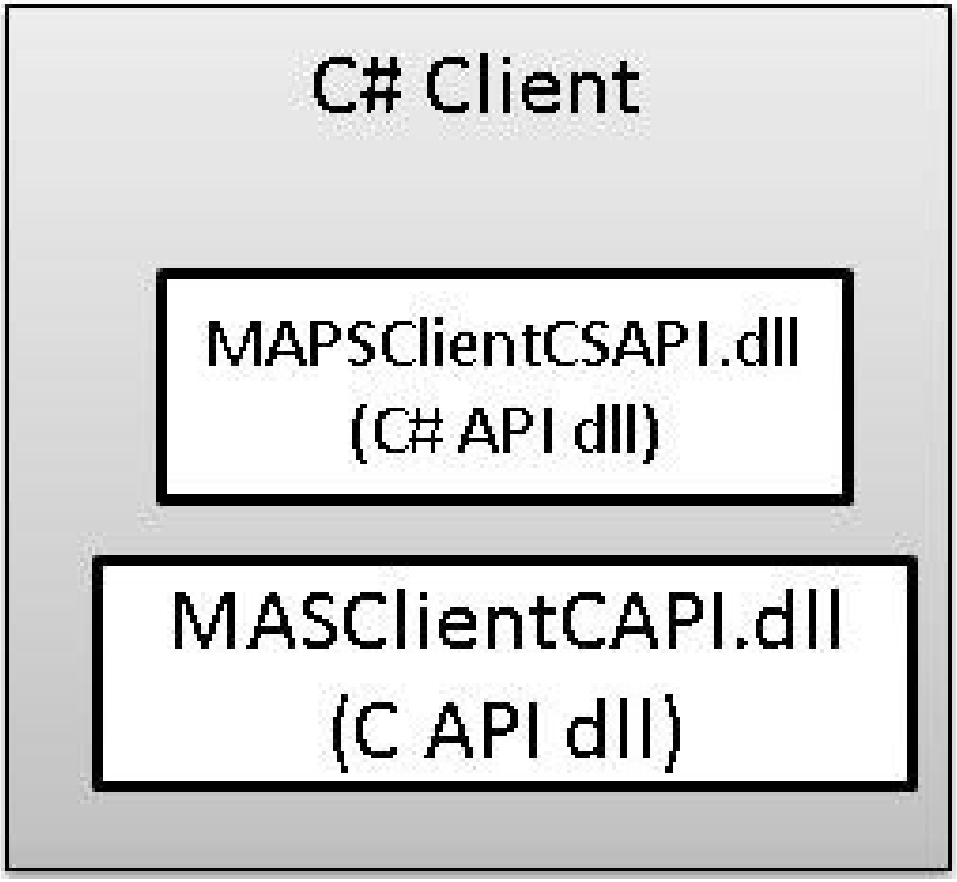
C# Client and Scripting

- 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



C# Client

C:\Program Files\GL Communications Inc\PacketExpertPxeClient\C#\AllPortBert_ConsoleApplication.exe

```
Port3
Traffic Status: Rx Traffic
Sync Status: InSync
Bit Error Status: No Error
Out Of Sequence Status: No Error
BERT Status: Sync
BERT Test Time: 00:00:18
Bits Received: 17 012 794 104
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: 19


Port4
Traffic Status: Rx Traffic
Sync Status: InSync
Bit Error Status: No Error
Out Of Sequence Status: No Error
BERT Status: Sync
BERT Test Time: 00:00:18
Bits Received: 17 071 621 200
Bit Error Count: 0
Bit Error Rate: 0.000E+00
Bit Error Seconds: 0
Sync Loss Count: 0
```

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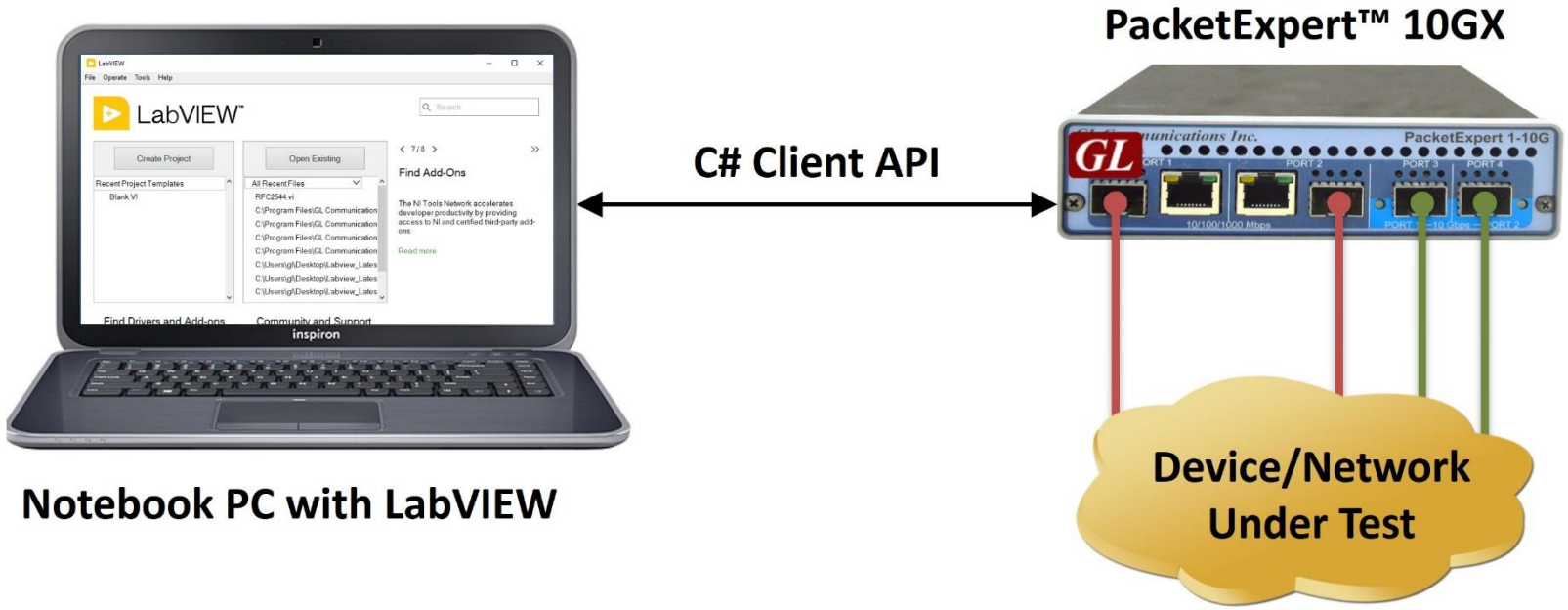
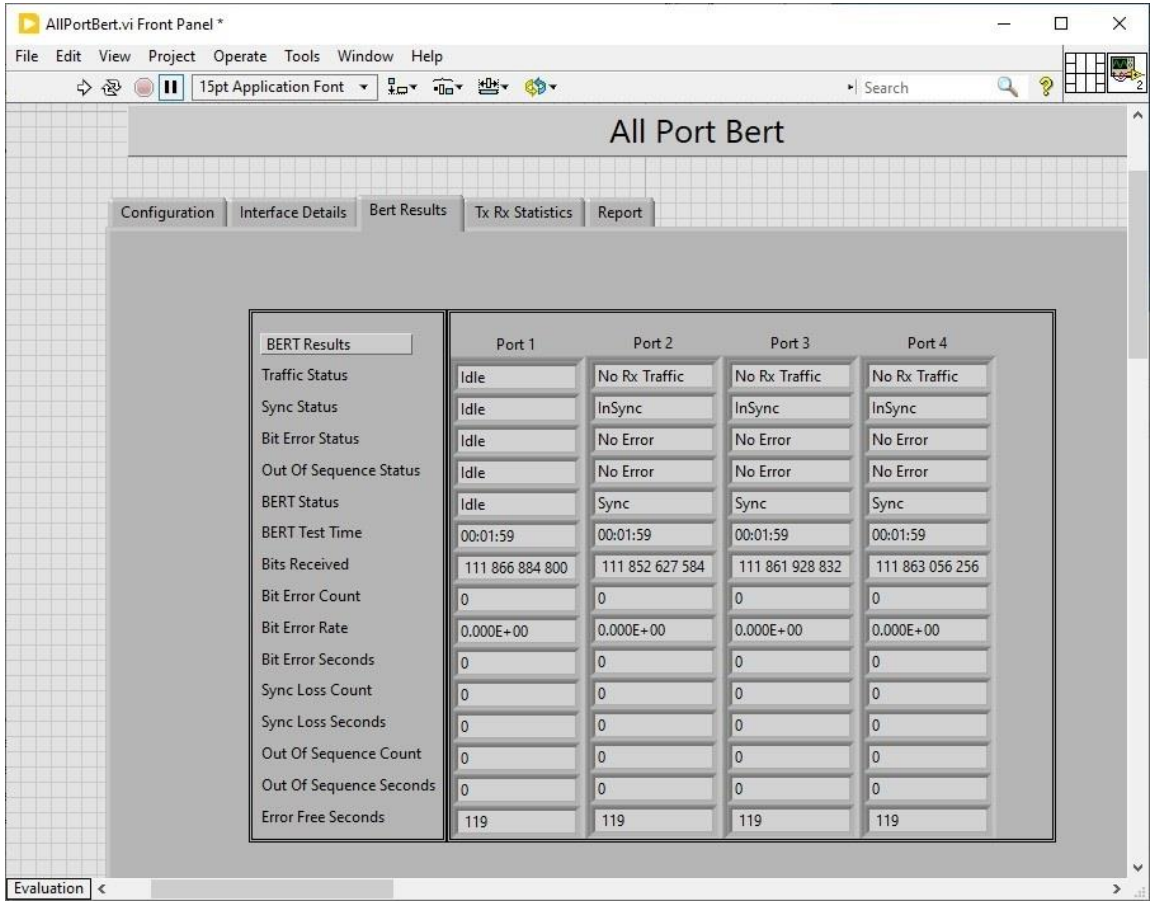
PacketExpert™ Integration with LabVIEW using C# Client

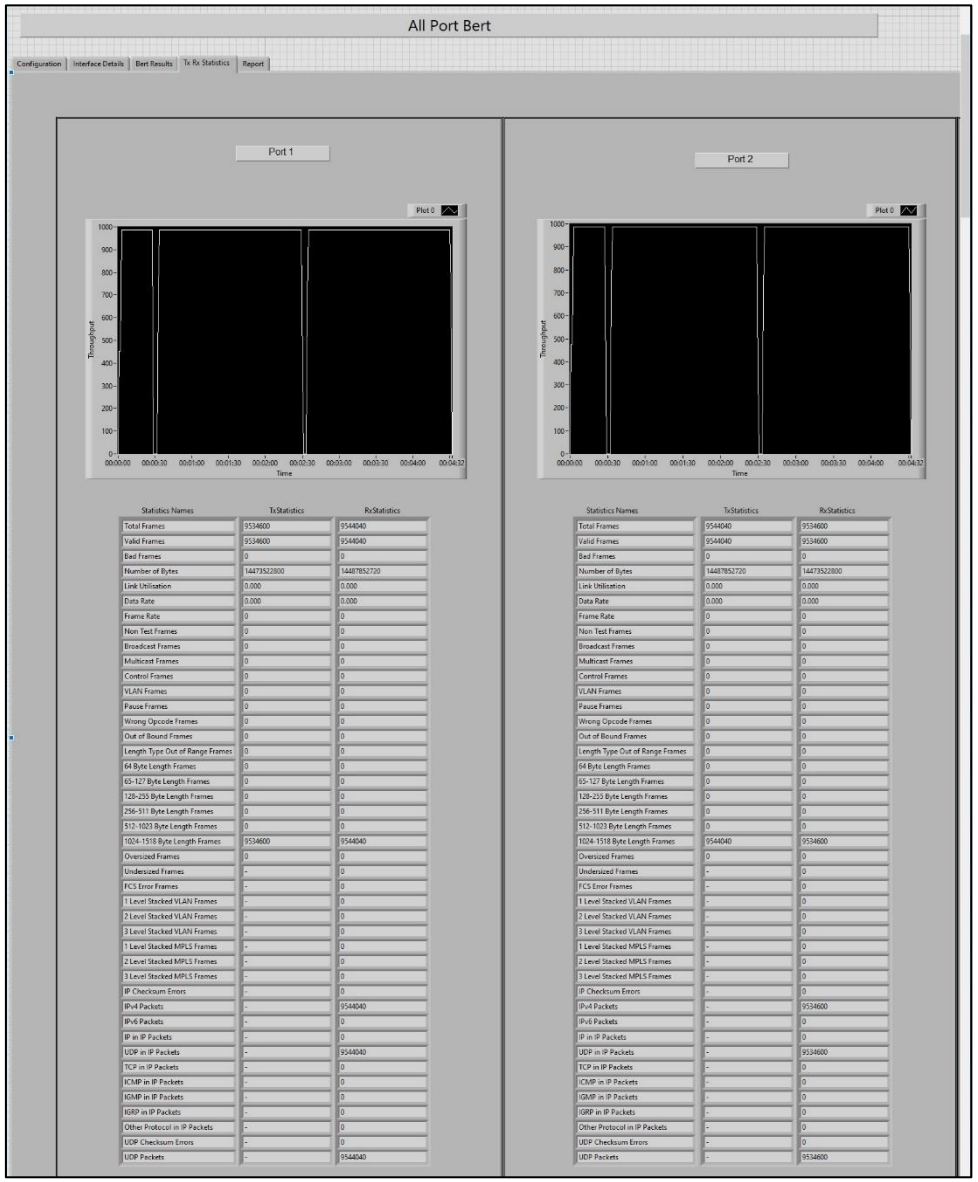


PacketExpert™ Integration with LabVIEW using C# Client

BERT Results



BERT Statistics



Thank You