ITU-T Y.1564 ExpertSAM™

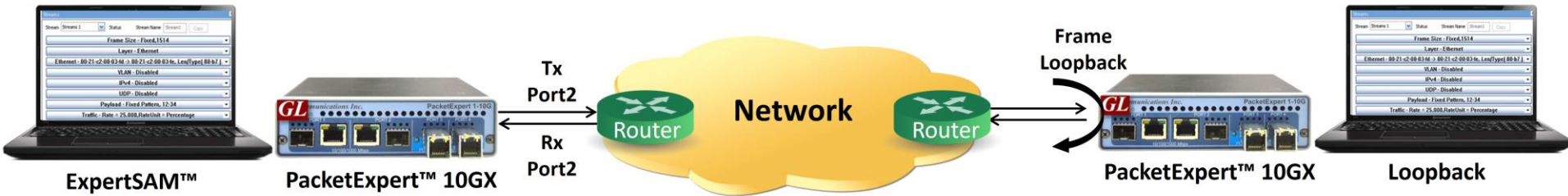## (1 Gbps, 2.5 Gbps, or 10 Gbps)

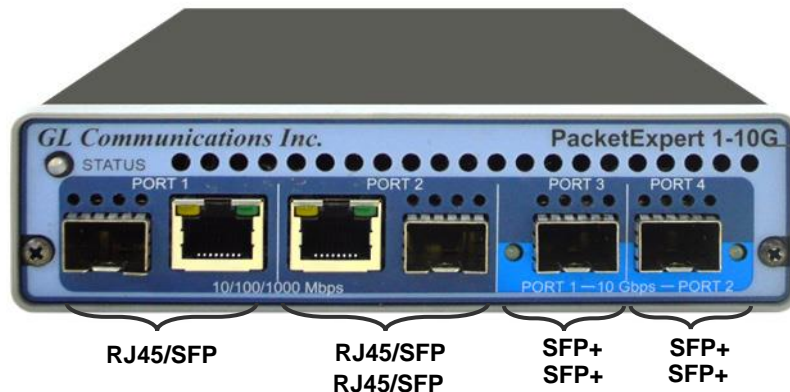**GL Communications Inc.**

Ethernet Network Testing

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

RJ45/SFP   **RJ45/SFP**   **SFP+**   **SFP+**
               RJ45/SFP   **SFP+**   **SFP+**

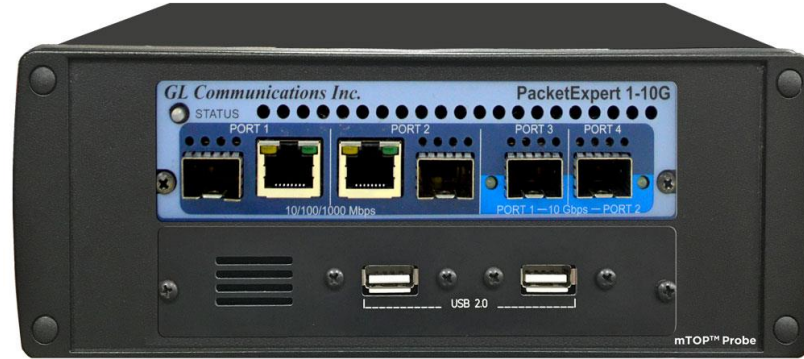| Physical Specifications	• Length: 8.45 in (214.63 mm) • Width: 5.55 in (140.97 mm) • Height: 1.60 in (40.64 mm) • Weight: 1.713 lbs
External Power Supply	• +12 Volts (Medical Grade), 3 Amps (For portable units having serial number ≥ 188400) • +9 Volts, 2 Amps (For portable units having serial number < 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

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, Window® 11 Pro 64-bit OS • USB 2.0 and USB 3.0 Ports, ATX Power Supply • USB Type C ports, Ethernet 2.5GigE port • Min 256GB Hard drive, 8G Memory • Two HDMI ports

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 USB 3.0 Hub, 12V/3A Power Supply • USB Type C ports, Ethernet 2.5GigE port • 256 GB Hard drive, 8G Memory (Min) • Two HDMI ports

Optical Connectors and SFP Transceivers

LC Connectors
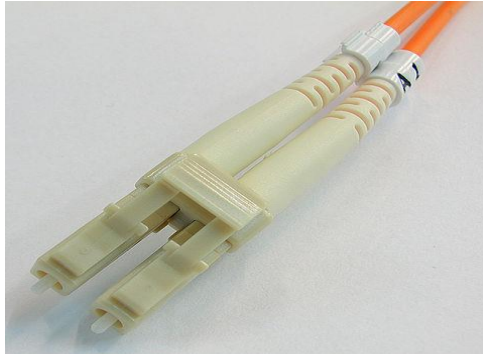
850nm/1310nm/1550nm SFP Module

- 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.

Ethernet / IP Testing Modules

PacketExpert™ 10GX

- Wire-Speed BERT

- Layer-wise and Smart Loopback

- RFC 2544 (Single and Dual Port)

- ITU-T Y.1564 (ExpertSAM™)

- Wire-Speed Record / Playback with Filter

- WAN Emulation (IPLinkSim™)

ITU-T Y.1564 (ExpertSAM™)

- A single test to validate service-level agreements (SLAs) as per ITU-T Y.1564 standard

- ITU-T Y.1564 completes this testing in two phases based on the SLA parameters:

  - **Service Level Agreement Parameters**: Information Rate (IR), Frame Transfer Delay (FTD), Frame Delay Variation (FDV), Frame Loss Ratio (FLR)

  - Service Configuration Test

  - Service Performance Test

Highlights

- Complete validation of Ethernet service-level agreements (SLAs) in a single test

- ITU-T Y.1564 standard compliance

- Service Configuration and Service Performance tests methodology supported

- KPIs like Information Rate (IR) or Throughput, Frame Loss Ratio (FLR), Frame Transfer Delay (FTD) or Latency, and Frame Delay Variation (FDV) or Jitter, measured simultaneously for multi streams, and Pass/Fail verdict declared

- Capability to generate traffic at throughput of CIR (guaranteed traffic), EIR (best effort bandwidth), and traffic policing (dropped bandwidth) rates ensuring Key performance indicators (KPI) validation

- EMIX frame sizes supported per service – up to 7 frame sizes can be defined per service

- Supports multiple services with varying performance requirements that meets full load conditions

- Stacked VLAN supported – C-Tag and S-Tag to simulate Carrier Ethernet traffic

- Simultaneous validation of all the services quality over time

RFC 2544 VS Y.1564 (ExpertSAM™)

	RFC 2544	Y.1564
Measurements	Throughput, burstability, frame loss and latency	Throughput, burstability, frame loss, latency, packet jitter, QoS
Services	Link level	Multiple concurrent service levels
Performance	Measuring maximum performance	Key performance indicators (KPI) validation
Throughput	No separation of the committed and excess traffic	CIR, EIR and Traffic Policing constantly ensuring that KPI are met during the test
Frame Delay	Tests one frame in every test time and does not consider any latency variation that might occur over a longer test period.	Latency is measured during the test on all the generated frames measuring any deviation out of the defined range
Frame loss	Frame loss is measured during rate distribution throughput test where the frame loss distribution doesn't align with committed rate without complying to the KPI	Frame loss measurement during throughput test
Frame Delay Variation	Frame delay variation is not measured	Frame delay variation is measured for traffic generated up to the CIR ensuring proper traffic prioritization

ITU-T Y.1564 (ExpertSAM™)

- **Service Configuration Test** - confirms the end to end configuration with the SLA parameters for all configured traffic streams

- **Service Performance Test** - transmits all configured traffic streams simultaneously CIR confirming all traffic is able to transverse the network under full load with the above mentioned parameters.
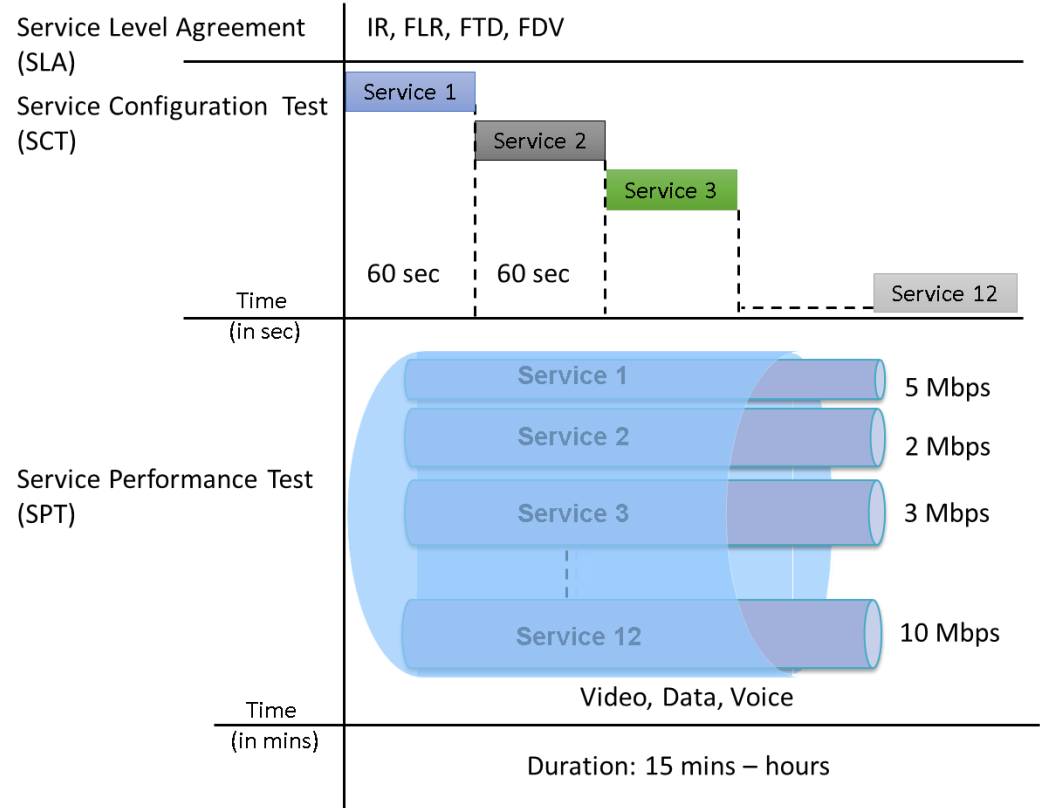
Service Level Agreement (SLA) — IR, FLR, FTD, FDV

Service Configuration Test (SCT)

Service 1
Service 2
Service 3
60 sec   60 sec
Service 12

Time (in sec)

Service Performance Test (SPT)

Service 1 — 5 Mbps
Service 2 — 2 Mbps
Service 3 — 3 Mbps
Service 12 — 10 Mbps

Video, Data, Voice

Time (in mins)

Duration: 15 mins – hours

ITU-T Y.1564 (ExpertSAM™) Graph
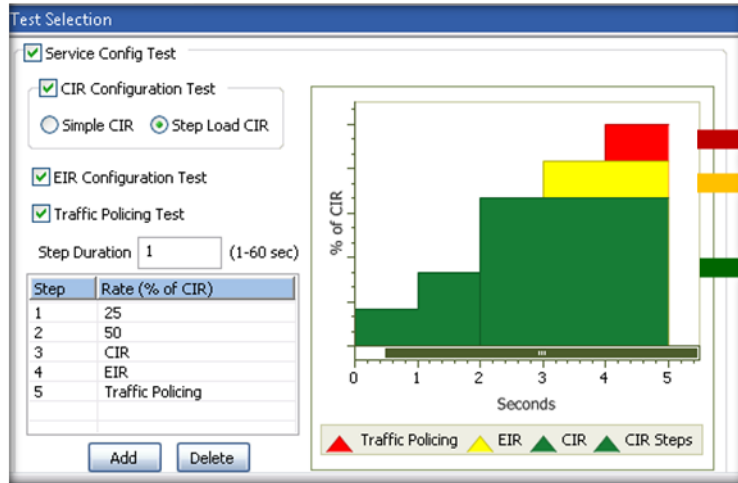
- Committed information rate or CIR is the average bandwidth guaranteed by a service provider. At any given time, the bandwidth should not fall below this committed figure.

- Excess Information Rate or EIR is the CIR plus excess rate that service provider claims to provide on a 'best-effort' basis.

Service Configurations

Service Configuration Collapsed Summary View

Service Configuration Expanded View

V-LAN C-Tag Configuration
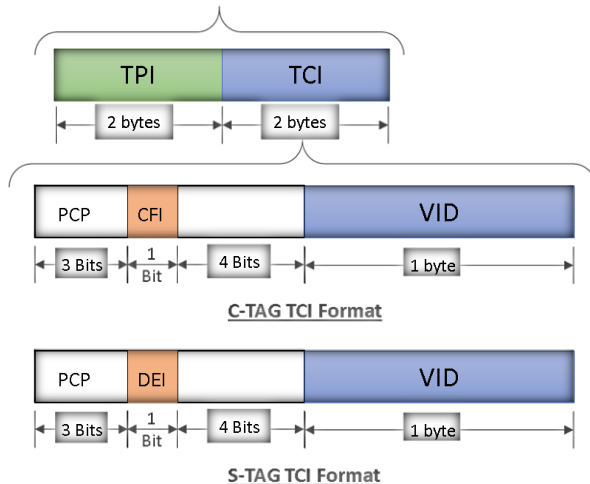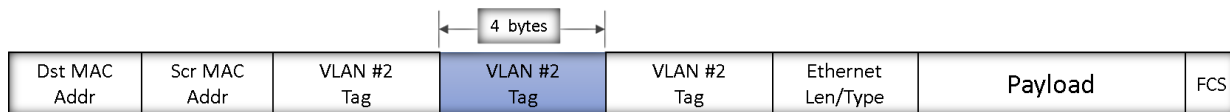
VLAN C-Tag Frame Format

VLAN C-Tag Configuration

Service Configuration Test Results

Service Configuration Results Overview

Overview

#	Service Name	Verdict	Current Step	Max IR(Mbps)	FLR(%)	Max FTD(msec)	Max FDV(msec)
1	Service1	✓	-	625.00	0.000	0.0014	0.000038
2	Service2	✓	-	625.00	0.000	0.0014	0.000038
3	Service3	✓	-	625.00	0.000	0.0014	0.000038
4	Service4	✓	-	625.00	0.000	0.0014	0.000038
5	Service5	✓	-	625.00	0.000	0.0014	0.000038
6	Service6	✓	-	625.00	0.000	0.0014	0.000038
7	Service7	✓	-	625.00	0.000	0.0014	0.000038
8	Service8	✓	-	625.00	0.000	0.0014	0.000038
9	Service9	✓	-	625.00	0.000	0.0014	0.000038
10	Service10	✓	-	625.00	0.000	0.0014	0.000038
11	Service11	✓	-	625.00	0.000	0.0014	0.000038
12	Service12	✓	-	625.00	0.000	0.0014	0.000038
13	Service13	✓	-	625.00	0.000	0.0014	0.000038
14	Service14	✓	-	625.00	0.000	0.0014	0.000038
15	Service15	✓	-	625.00	0.000	0.0014	0.000038
16	Service16	✓	-	625.00	0.000	0.0014	0.000038

Service Result Overview

Service Configuration Results Details

Service: Service1   IR(Mbps), FLR(%), FTD(ms), FDV(ms)   Vertical |||| FTD Unit msec   FDV Unit msec

Test	Verdict	IR (Curr)	IR (Min)	IR (Avg)	IR (Max)	FL (Count)	FLR (Rate)	FTD (Curr)	FTD (Min)	FTD (Avg)	FTD (Max)	FDV (Curr)	FDV (Min)	FDV (Avg)	FDV (Max)
CIR	PASS	624.99	624.99	625.00	625.00	0	0.000	0.001	0.001	0.002	0.001	< 1us	0.000	< 1us	< 1us
EIR	PASS	649.99	649.99	650.00	650.00	1	0.000	0.001	0.001	0.002	0.001	< 1us	0.000	< 1us	< 1us

Service Detail Results

Service Performance Test Overall Status
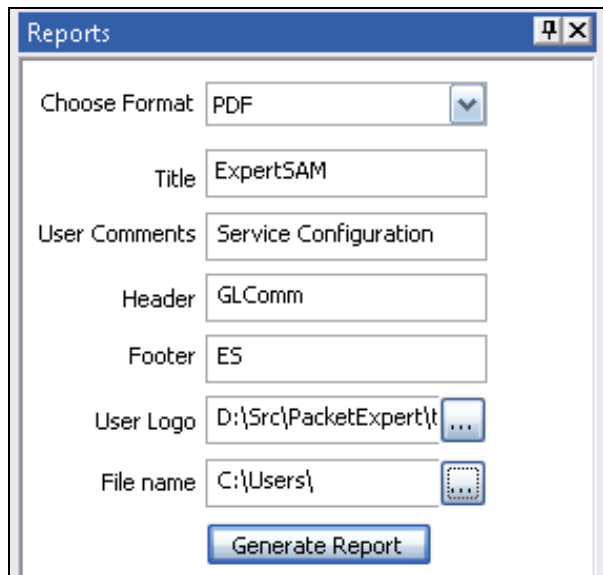
Service Performance Test Results

Service Performance Results

| IR(Mbps), FLR(%), FTD(msec), FDV(msec) | | Test Time | 00:00:16 | Vertical ||||| | FTD Unit msec ∨ | | FDV Unit usec ∨ |

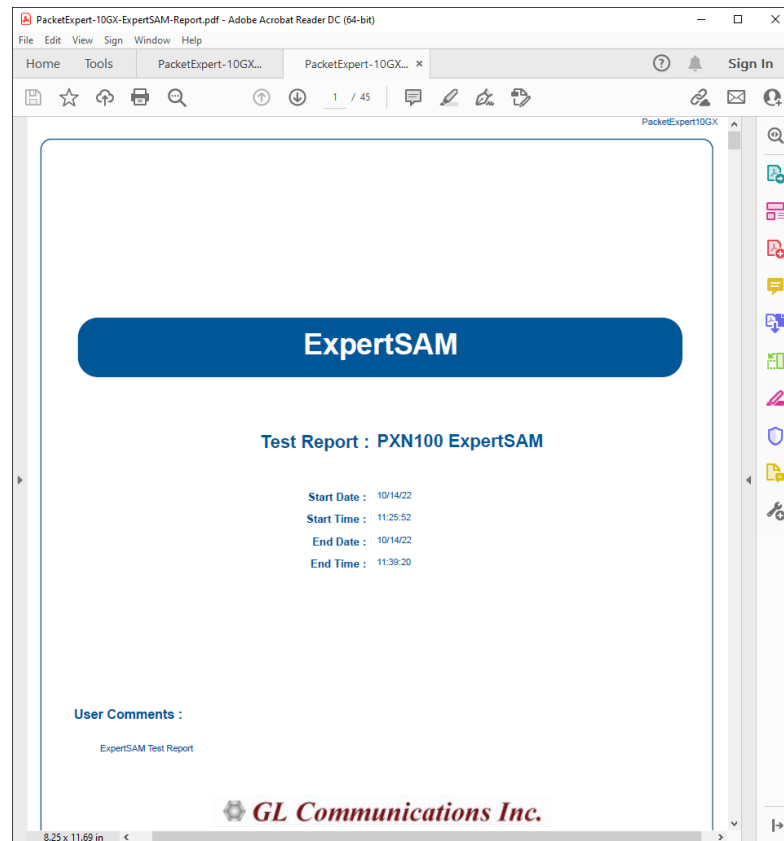| Service	Verdict	IR (Curr)	IR (Min)	IR (Avg)	IR (Max)	FL (Count)	FLR (Rate)	FTD (Curr)	FTD (Min)	FTD (Avg)	FTD (Max)	FDV (Curr)	FDV (Min)	FDV (Avg)	FDV (Max)
1	PASS	625.00	625.00	625.00	625.00	2	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
2	PASS	625.00	625.00	625.00	625.00	2	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.115000
3	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.115000
4	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
5	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
6	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.128000
7	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.115000
8	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
9	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
10	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
11	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.115000
12	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
13	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
14	PASS	625.00	625.00	625.00	625.00	3	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
15	PASS	625.00	625.00	625.00	625.00	2	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.122000
16	PASS	624.95	624.94	624.95	624.95	2	0.000	0.018	0.001	0.015	0.021	0.003000	0.003000	0.003000	8.128000

Report Generation

Report Generation

Sample PDF Report

Thank you