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# ITU-T Y.1564 ExpertSAM™ (1Gbps)

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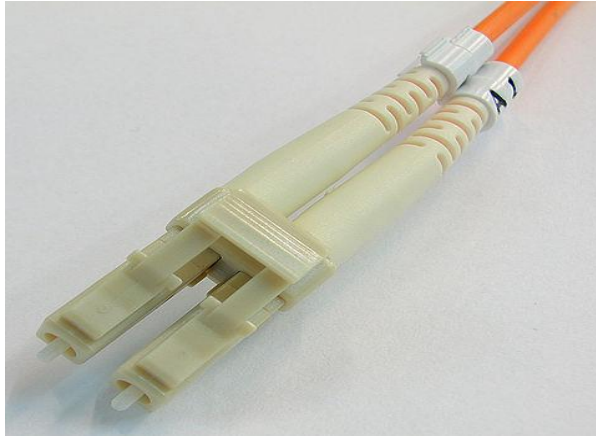
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818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878  
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: [info@gl.com](mailto:info@gl.com)  
Website: <https://www.gl.com>

# Optical Connectors and SFP Transceivers

## LC Connectors



## 850/1310 nm SFP Module



- PacketExpert™ supports LC connectors and 850/1310 nm 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

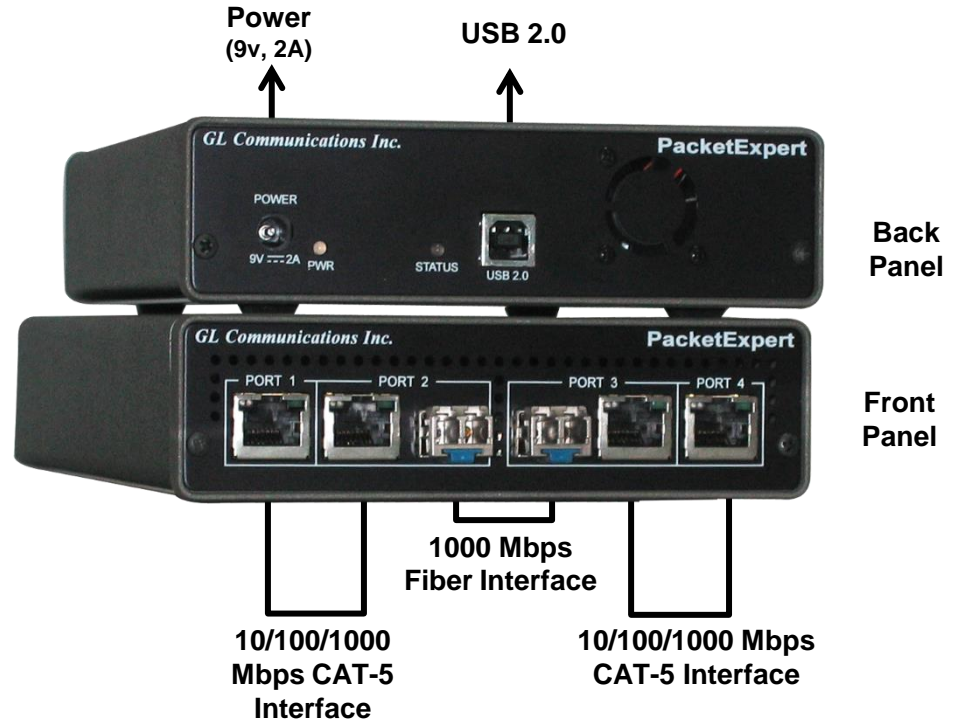


**PacketExpert™**

- 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

# PacketExpert™ 1G Portable Unit

- Interfaces
  - 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)
- Protocols:
  - RFC 2544 compliance
  - ITU-T Y.1564 (ExpertSAM™)
- Power:
  - +9 volts, 2.2 Amps
- Bus Interface:
  - USB 2.0



# PacketExpert™ 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 Equivalent, Windows® 10 64-bit Pro Operating System
- 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

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

## PacketExpert™ SA (PXE112)

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

**SBC Specs:** Intel Core i3 or optional i7 Equivalent, 240GB Hard drive, 8G Memory (Min), Windows® 10 64-bit Pro OS, USB 2.0 or 3.0 Ports, ATX Power Supply. 19" 1U Rackmount Enclosure (If options, then x 3)



## PacketExpert™ SA (PXE124)

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

**SBC Specs:** Intel Core i3 or optional i7 Equivalent, 240GB Hard drive, 8G Memory (Min), Windows® 10 64-bit Pro OS, USB 2.0 or 3.0 Ports, ATX Power Supply. 19" stacked 1U Rackmount Enclosure (If options, then x 6)

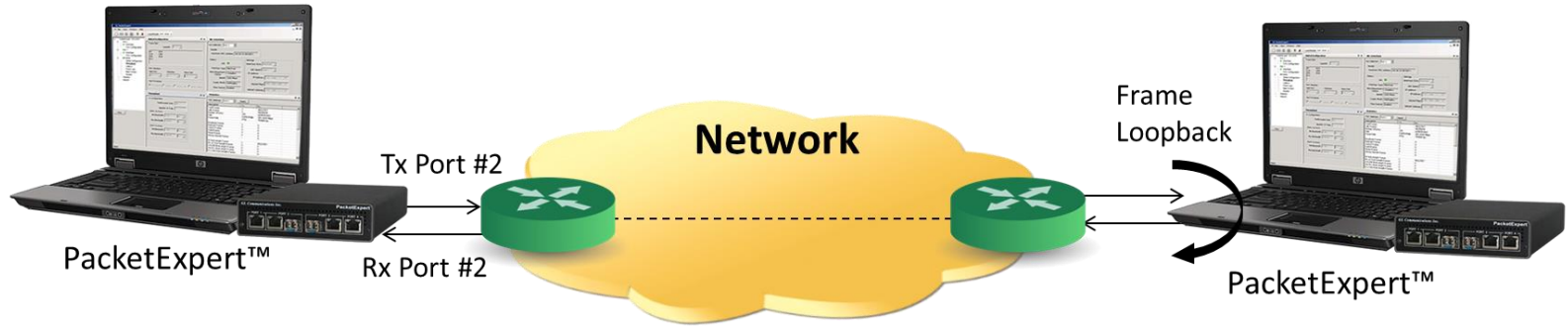


# HD PacketExpert™ (12 and 24 GigE Ports)



- Offers higher densities from 12/24 ports form factor solution for testing GigE switches, routers and network conditions
- The chassis comprises of both electrical and optical (fiber) interfaces

# 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

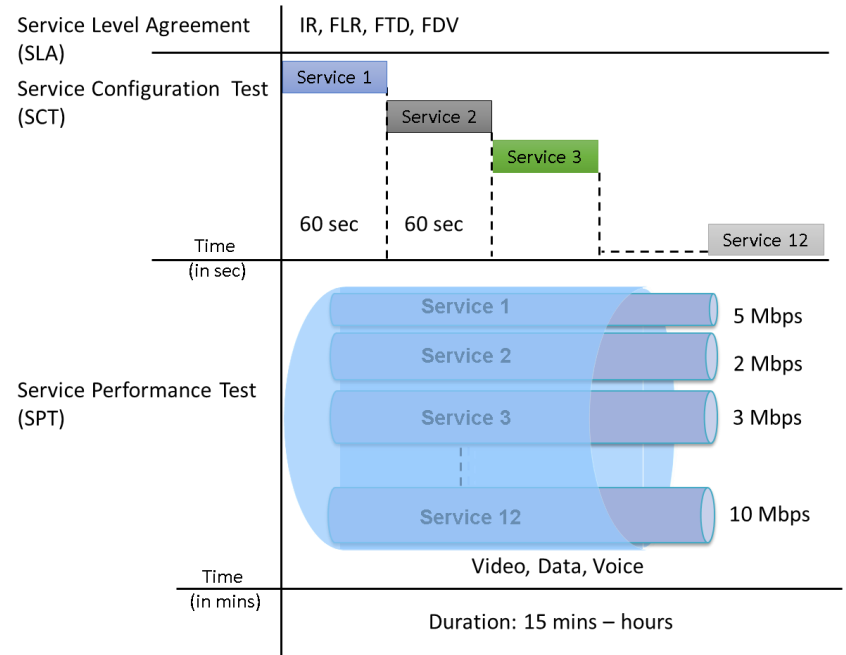
- Complete validation of Ethernet service-level agreements (SLAs) in a single test
- ITU-T Y.1564 standard compliance
- Service Configuration and Service Performance tests methodology supported
- KPIs like Information Rate (IR) or Throughput, Frame Loss Ratio (FLR), Frame Transfer Delay (FTD) or Latency, 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, burst ability, frame loss and latency	Throughput, burst ability, 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 can transverse the network under full load with the above-mentioned parameters



# ITU-T Y.1564 (ExpertSAM™) Graph



BW Profile - CIR = 100.000 Mbps,EIR = 110.000 Mbps,Policing Rate = 150.000 ▲		
CIR	<input type="text" value="100.00"/>	Mbps
EIR	<input type="text" value="110.00"/>	Mbps
Traffic Policing Rate	<input type="text" value="150.00"/>	Mbps

- User can set the Committed Information Rate, Excess Information Rate and the Traffic Policing Rate per stream. These rates are generated during the Service Configuration test

# Service Configurations

## Service Configuration Expanded View

### Service Configuration Collapsed Summary View

The screenshot shows a 'Services' window with a collapsed summary view. The service is named 'Service1'. The configuration is summarized in a list of expandable items:

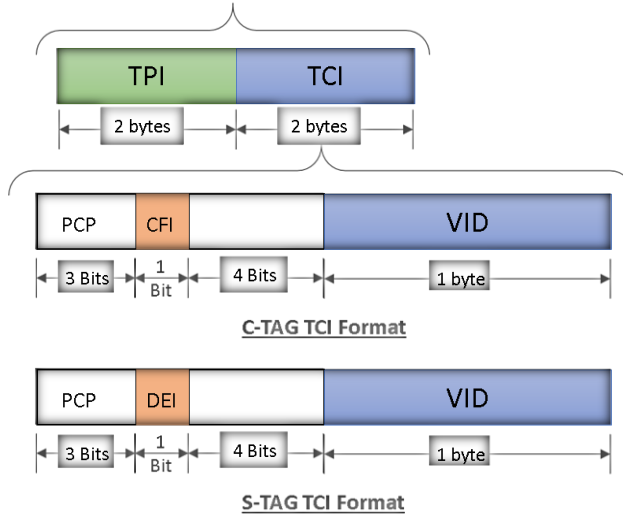
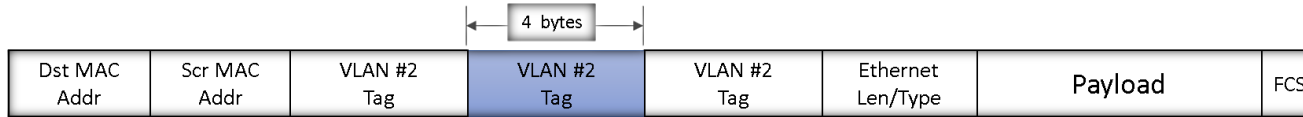
- Service: Services 1
- Status: ↑
- Service Name: Service1
- Copy
- Frame Size - Fixed,128
- Layer - Ethernet,VLAN,IPv4,UDP
- Ethernet - 11-11-11-11-11-11 -> 22-22-22-22-22-22, Len/Type( 08-00 )
- VLAN - C-Tag
- IPv4 - 192.168.1.11 -> 192.168.1.44 Protocol (UDP)
- UDP - 10000 -> 20000
- Payload - Fixed Pattern, 12-34
- 3W Profile - CIR = 100.000 Mbps,EIR = 500.000 Mbps,Policing Rate = 500.000
- Color Aware = On, Color Method = IP ToS
- SAC Parameters - FLR = 20.000 %,FTD = 20.000 msec,FDV = 5.000 msec

The screenshot shows the 'Services' window with the configuration expanded. The service is named 'Service9'. The configuration details are as follows:

- Service: Services 9
- Status: ↑
- Service Name: Service9
- Copy
- Frame Size - Fixed,512
- Layer - Ethernet,VLAN,IPv4,UDP
- Ethernet
  - MAC
    - Source MAC Address: 11-11-11-11-11-11
    - Destination MAC Address: 22-22-22-22-22-22
    - Length/Type: 08-00 IPv4
- VLAN
  - VLAN Enable
  - C-Tag Type: 81-00 ID: 12 Priority: 1
  - S-Tag Type: 88-A8 ID: 13 Priority: 1
- IPv4 - 192.168.9.11 -> 192.168.9.44 Protocol (UDP)
- UDP - 4000 -> 5000
- Payload - Fixed Pattern, 12-34
- BW Profile
  - CIR: 7.00 Mbps
  - EIR: 10.00 Mbps
  - Traffic Policing Rate: 15.00 Mbps
- Color Aware = On, Color Method = IP ToS
  - Color Aware
  - Color Method: IP ToS
  - Green Frames: 1,7
  - Yellow Frames: 6,3
- SAC Parameters
  - Frame Loss Ratio: 20.00 %
  - Frame Transfer Delay: 20.000 msec
  - Frame Delay Variation: 5.000 msec

# V-LAN C-Tag Configuration

## VLAN C-Tag Frame Format



\* Tag Control Information (TCI)


## VLAN C-Tag Configuration

A screenshot of a network configuration interface titled "Services". It shows a service named "Services 1" with a status of "up" and a service name of "Service1". The configuration includes:



- Frame Size - Fixed, 512
- Layer - Ethernet, VLAN
- Ethernet - 00-21-c2-00-04-d0 -> 00-21-c2-00-04-d1, Len/Type[ 88-b5 ]
- VLAN - C-Tag
- VLAN Enable
  - C-Tag Type: 81-00, ID: 12, Priority: 1
  - S-Tag Type: 88-A8, ID: 13, Priority: 1

# Service Configuration Test Results


## Service Result Overview

Service Configuration Results Overview							
Overview 							
#	Service Name	Verdict	Current Step	Max IR(Mbps)	FLR(%)	Max FTD(msec)	Max
1	↑ Service1	✓	-	99.9266	0.0000	0.0218	0.0001
2	↑ Service2	✓	-	10.0001	0.0000	0.0089	0.0001
3	↑ Service3	✓	-	4.0009	0.0000	0.0131	0.0001
4	↑ Service4	✓	-	99.9266	0.0000	0.0216	0.0001
5	↑ Service5	✓	-	99.9266	0.0000	0.0216	0.0001
6	↑ Service6	✓	-	99.9266	0.0000	0.0217	0.0001
7	↑ Service7	✓	-	59.9482	0.0000	0.0080	0.0001
8	↑ Service8	✓	-	199.8490	0.0000	0.0216	0.0001
9	↑ Service9	✓	-	7.0011	0.0000	0.0216	0.0001
10	↑ Service10	✓	-	77.9699	0.0000	0.0215	0.0001
11	↑ Service11	✓	-	199.8490	0.0000	0.0216	0.0001
12	↑ Service12	✓	EIR	41.9642	0.0000	0.0215	0.0001

## Service Detail Results






Service Configuration Results Details  															
Service		IR(Mbps), FLR(%), FTD(msec), FDV(msec)													
Service	Service1														
Test	Verdict	IR (Curr)	IR (Min)	IR (Mean)	IR (Max)	FLR (Count)	FLR (Rate)	FTD (Curr)	FTD (Min)	FTD (Mean)	FTD (Max)	FDV (Curr)	FDV (Min)	FDV (Mean)	FDV (Max)
Step1	PASS	24.96	24.96	24.98	25.00	9	0.15	0.02134	0.02132	0.02138	0.02168	0.000123	0.000118	0.000129	0.000133
Step2	PASS	49.95	49.92	49.96	49.97	10	0.09	0.02134	0.02131	0.02381	0.02180	0.000125	0.000122	0.000127	0.000131
CIR	PASS	99.91	99.88	99.91	99.93	18	0.08	0.02131	0.02131	0.02138	0.02182	0.000132	0.000127	0.000130	0.000132
EIR(Green)	PASS	99.15	99.15	99.84	99.94	0	0.00	0.02133	0.02131	0.02377	0.02197	0.000096	0.000093	0.000096	0.000098
EIR(Yellow)	--	9.92	9.92	9.98	10.00	0	0.00	0.00000	0.00000	0.00000	0.00000	0.000133	0.000131	0.000132	0.000134
TrafficPo...	--	99.74	99.74	99.91	99.94	0	0.00	0.02180	0.02131	0.03057	0.02180	0.000113	0.000112	0.000114	0.000116
TrafficPo...	--	49.87	49.87	49.95	49.97	0	0.00	0.00000	0.00000	0.00000	0.00000	0.000130	0.000126	0.000129	0.000130

# Service Performance Test Overall Status

Overall Status ↑ Global Verdict  

Test	Stream No	Subtest	Step No
Service Performance Test	-	-	-

Alarm	Status
Link Status	
IR	
FLR	
FTD	
FDV	



# Service Performance Test Results

Service Performance Results																	
IR(Mbps), FLR(%), FTD(msec), FDV(msec)														Test Time		00:02:59	
Test	Verdict	IR (Curr)	IR (Min)	IR (Mean)	IR (Max)	FLR	FLR (Rate)	FTD (Curr)	FTD (Min)	FTD	FTD (Max)	FDV (Curr)	FDV (Min)	FDV	FDV (Max)		
1	PASS	99.91	99.89	99.91	99.93	0	0.00	0.0245	0.0221	0.0344	0.0249	0.000010	0.000009	0.000010	0.000010		
2	PASS	9.99	9.99	9.99	10.00	0	0.00	0.0243	0.0000	0.0849	0.0249	0.000026	0.000016	0.000021	0.000033		
3	PASS	3.99	3.99	4.00	4.00	0	0.00	0.0245	0.0220	0.0245	0.0249	0.000070	0.000039	0.000051	0.000085		
4	PASS	99.91	99.90	99.91	99.92	0	0.00	0.0245	0.0221	0.0247	0.0249	0.000010	0.000009	0.000010	0.000010		
5	PASS	99.91	99.90	99.91	99.92	0	0.00	0.0245	0.0222	0.0247	0.0249	0.000010	0.000009	0.000010	0.000010		
6	PASS	99.90	99.90	99.91	99.92	0	0.00	0.0245	0.0222	0.0247	0.0249	0.000009	0.000009	0.000010	0.000010		
7	PASS	59.95	59.94	59.95	59.95	0	0.00	0.0245	0.0194	0.0245	0.0249	0.000008	0.000006	0.000008	0.000010		
8	PASS	199.82	199.80	199.82	199.84	0	0.00	0.0245	0.0216	0.0245	0.0249	0.000006	0.000006	0.000006	0.000007		
9	PASS	6.99	6.98	6.99	7.00	0	0.00	0.0245	0.0230	0.0245	0.0249	0.000050	0.000044	0.000051	0.000058		
10	PASS	77.93	77.90	77.93	77.94	0	0.00	0.0245	0.0222	0.0247	0.0249	0.000010	0.000009	0.000010	0.000011		
11	PASS	199.82	199.79	199.82	199.84	0	0.00	0.0245	0.0216	0.0245	0.0249	0.000007	0.000006	0.000007	0.000007		
12	PASS	40.96	40.95	40.96	40.98	0	0.00	0.0245	0.0224	0.0245	0.0249	0.000015	0.000013	0.000015	0.000016		

# Report Generation

## Report Generation

Reports 📄 ✕

Choose Format  ▾

Title

User Comments

Header

Footer

User Logo  ⋮

File name  ⋮

## Sample PDF Report

Testpdf.pdf - Adobe Reader

File Edit View Window Help

1 / 2 66.7%

Comment Share

EP102014

### Packet Expert Report

Hardware Ethernet Test Tool

**ExpertSAM**

Test Date : 10/3/14  
Start Time : 11:32:51  
End Time : 11:34:57

**Test Report :**

User Comments :

**Interface**

Port Selection : 2  
Interface IP Address : 102.161.1.22  
Interface Type : Electrical  
Auto-Negotiation Status : Consistent  
Speed : 0  
Duplex Mode : Full Duplex  
Flow Control : Enabled

**Test Selection**

CIR Configuration Test Type : DisableCIR  
EIR Configuration Test : Enabled  
Traffic Policing Test : Enabled  
Service Configuration Step Duration : 10  
Service Performance Test : Enabled  
Service Performance Test Duration : 1

**Service Selection**

Services : Service1

Service Count : 1

**Service1 Configuration Results**

Test	Verdict	FW(M)	FW(M+2)	FW(M+4)	FW(M+8)	FW(M+16)	FW(M+32)	FW(M+64)	FW(M+128)
CIR	PASS	99.97706	99.98126	99.99162	0	0	0.00000	0.00000	0.00000
EP1(Down)	PASS	99.91000	99.94706	100.00000	0	0	0.00000	0.00000	0.00000
EP1(Up)	PASS	24.20340	24.98749	25.11040	0.00000	0	0.00000	0.00000	0.00000
TrafficPolicing	-	99.91000	99.94706	100.00000	0	0	0.00000	0.00000	0.00000
TestPerformance	-	24.20340	24.98749	25.11040	0.00000	0	0.00000	0.00000	0.00000

**Service Performance Results**

Test	Verdict	FW(M)	FW(M+2)	FW(M+4)	FW(M+8)	FW(M+16)	FW(M+32)	FW(M+64)	FW(M+128)
1	-	99.949076	100.000000	100.000000	0	0	0.000000	0.000000	0.000000

**Over All Status**

Global Verdict : PASS

16.54 x 23.39 in

**Thank you**