
1Gbps, 10Gbps ITU-T Y.1564 ExpertSAM™



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Ethernet Network Testing



- Bit error rate testing
- RFC 2544
- Loopback
- ITU-T Y.1564
- Multi-stream traffic generator
- RFC 6349
- Record and playback traffic
- Wirespeed network tap
- Emulate impairments

Hardware Interfaces

- **Interfaces**

- 2 x 1Gbps Base-X Optical OR 10/100/1000 Base-T Electrical
- 2 x 10G Base-SR, -LR -ER Optical or 2x 10G Base-T Electrical interface
- 2 x 100 Mbps Base-FX optical interface
- 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)

- **Bus Interface:**

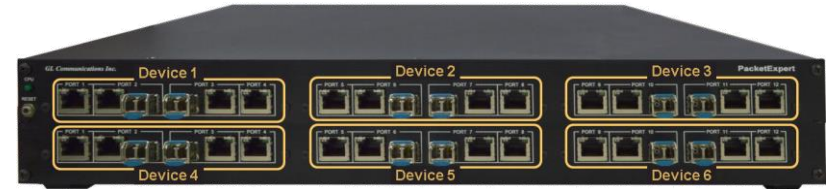
- USB 2.0

- **Power:**

- +9 volts, 2.2 Amps



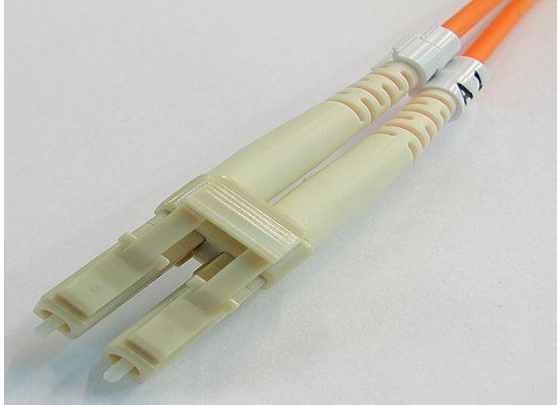
HD PacketExpert™ (12 and 24 GigE Ports)



- 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.

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.

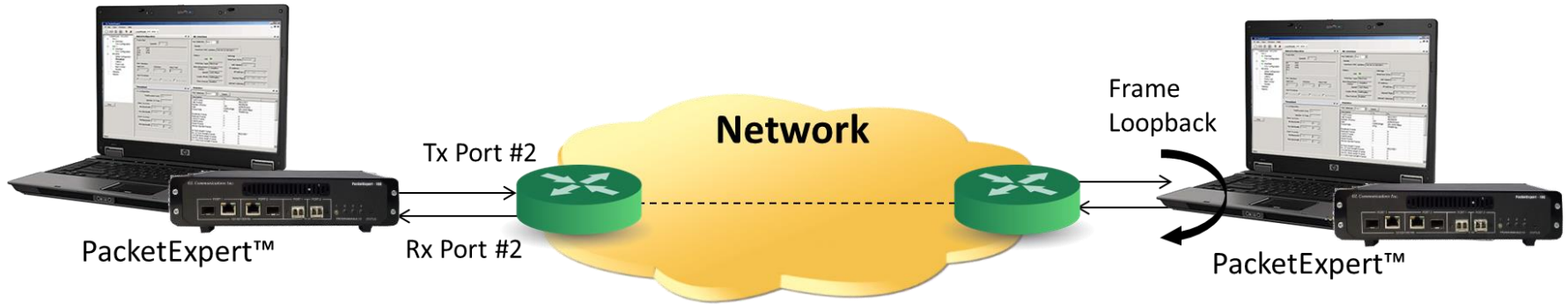
Ethernet / IP Testing Modules



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
- WAN Emulation (IPLinkSim™ IPNetSim™)

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

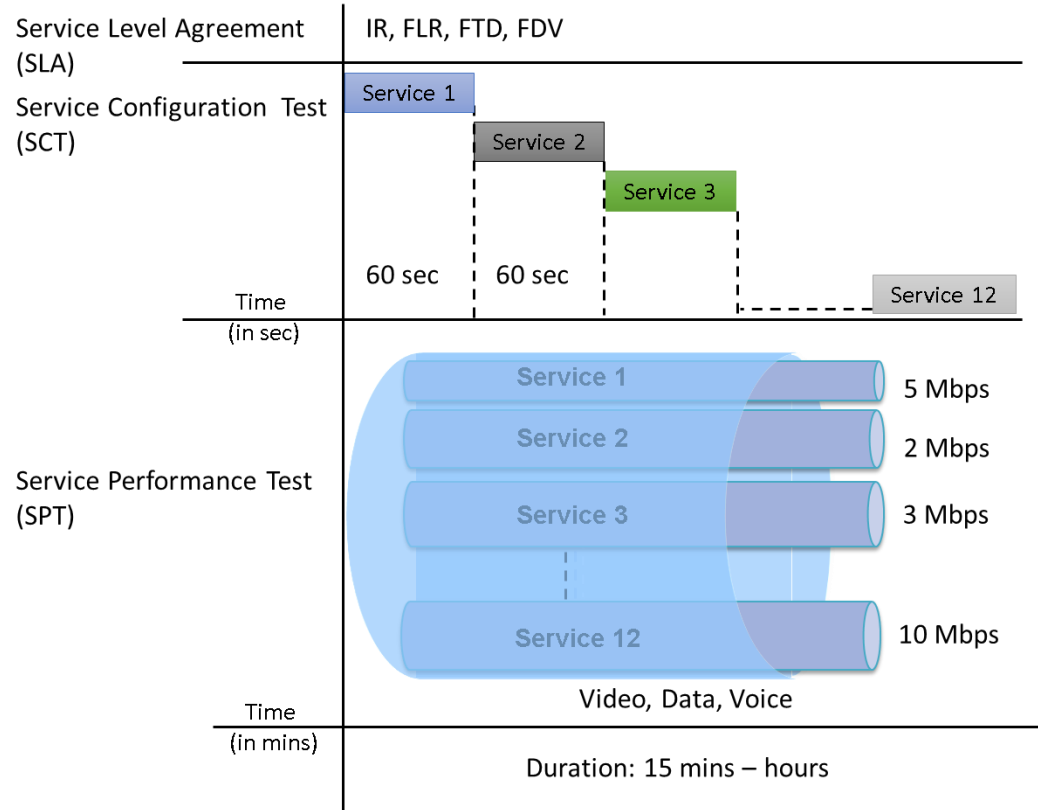
ITU-T Y.1564 (ExpertSAM)

- **Service Configuration Test -**

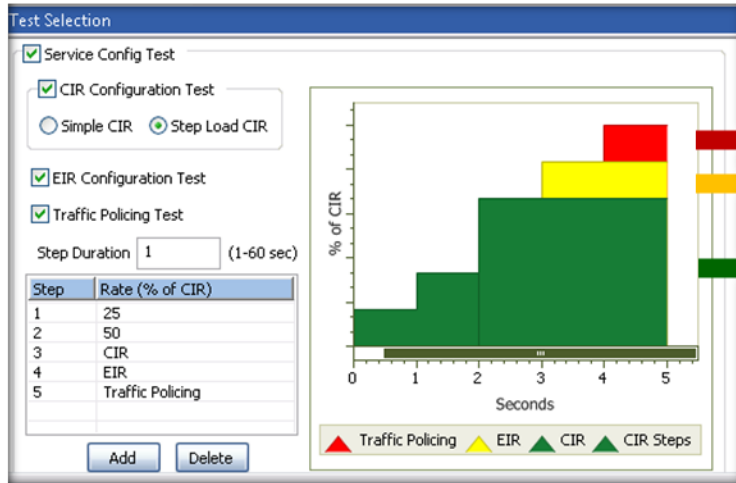
confirms the end to end configuration with the SLA parameters for all configured traffic streams




- **Service Performance Test -**

transmits all configured traffic streams simultaneously CIR confirming all traffic can transverse the network under full load with the specified parameters.



ITU-T Y.1564 (ExpertSAM) Graph



-  Dropped bandwidth (everything over EIR)
-  Best effort bandwidth (everything between CIR and EIR)
-  Guaranteed bandwidth (everything under CIR)

- 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

The screenshot shows a 'Services' window with a collapsed summary view for 'Service1'. The configuration is presented as a series of stacked, expandable sections:

- Service: Services 1
- Status: Service1
- 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
- BW 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**

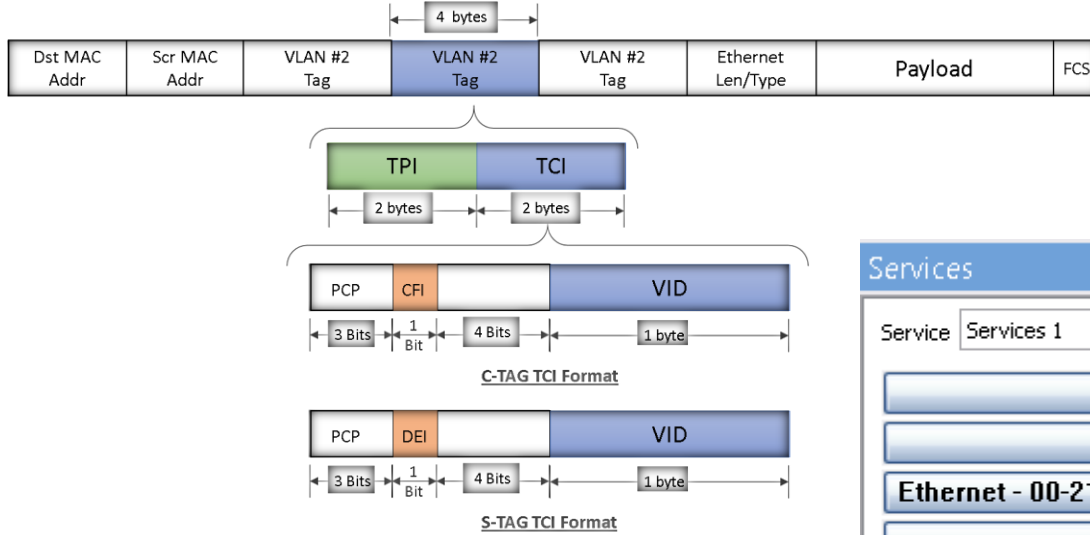
Service Configuration Expanded View

The screenshot shows the 'Services' window with the configuration for 'Service9' expanded to show detailed settings:

- Service: Services 9
- Status: Service9
- 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
 - Protocol: 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

The screenshot shows the configuration interface for a service named "Services 1". The configuration is as follows:

- Service: Services 1
- Status:
- Service Name: Service1
- Copy:
- 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 <input type="text" value="Service1"/>		IR(Mbps), FLR(%), FTD(msec), FDV(msec)													
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 ⏏ ✕

Overall Status  Global Verdict 

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

Alarm	Status
Link Status	
IR	
FLR	
FTD	
FDV	

Report Generation

Report Generation

Reports ⏏ ✕

Choose Format ▾

Title

User Comments

Header

Footer

User Logo ⋮

File name ⋮

Sample PDF Report

Test.pdf.pdf - Adobe Reader

File Edit View Window Help

66.7%

Comment Share

01/02/2014

Packet Expert Report

Hardware Ethernet Test Tool

ExpertSAM

Test Date : 10/03/14
Start Time : 11:32:51
End Time : 11:34:57

Test Report :

User Comments :

Interface

Port Selection : 2
Interface IP Address : 102.168.1.22
Interface Type : Electrical
Auto-Negotiation Status : Complete
Speed : 0
Duplex Mode : Full Duplex
Flow Control : Enabled

Test Selection

CIR Configuration Test Type : StepLoadCIR
ERR Configuration Test : Enabled
Traffic Policing Test : Enabled
Service Configuration Step Duration : 15
Service Performance Test : Enabled
Service Performance Test Duration : 1

Service Selection Services : Service1 **Service Selection** Service Count : 1

Service Configuration Results

Test	Verdict	R(Min)	R(Mean)	R(Max)	FLC(Min)	FLC(Mean)	FLC(Max)	FLR(Min)	FLR(Mean)	FLR(Max)	FDV(Min)	FDV(Mean)	FDV(Max)
CIR	PASS	99.877690	99.981824	99.981824	0	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ERR(Down)	PASS	99.877690	99.981824	99.981824	0	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ERR(Up)	PASS	24.003040	24.987448	25.110400	0.000000	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
duplex/negotiation	=	99.877690	99.981824	100.000000	0	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
rate	=	24.003040	24.987448	25.110400	0.000000	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Service Performance Results

Test	Verdict	R(Min)	R(Mean)	R(Max)	FLC(Min)	FLC(Mean)	FLC(Max)	FLR(Min)	FLR(Mean)	FLR(Max)	FDV(Min)	FDV(Mean)	FDV(Max)
1	=	99.999774	100.000000	100.000000	0	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Final All Status

Global Verdict : PASS

16:54 x 23:39 in <

Thank You