

GigE Triple Play PIM

Platform Interface



Platform Interface Module

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PIM-41S/D-GigE

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AnaCise GigE Triple Play PIM is an advanced ergonomic CSA Platform Interface Module (PIM) capable of testing 10/100/1000Mbps Gigabit Ethernet network, providing field demanding functions conforming to the latest demands of Next Generation Network (NGN) Triple Play services.

Increasingly, service providers are consequently capable to design and optimize their managed Ethernet services like FTTB (Fiber to the Building) and VPN (Virtual Private Network) to enterprise customers and FTTH services for home users.

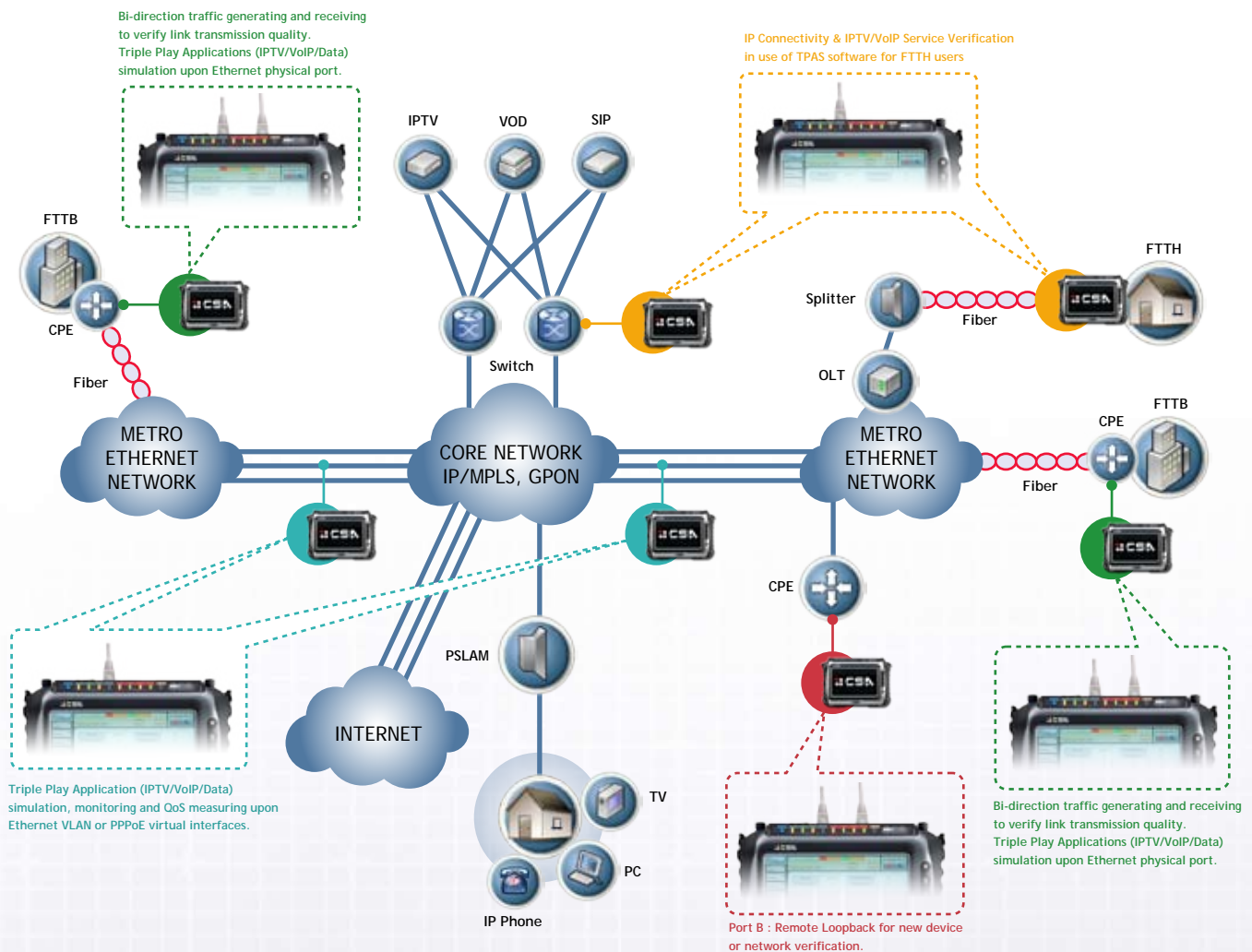
While developing worthwhile but bandwidth-intensive Triple-Play services, service providers are confronting fiercer than ever competitions which lead them craving to decrease operational and capital expenditures yet struggling to boost revenues. As such, an applicable testing tool to help them developing an economic, efficient, and adaptable IP networks is much needed.

Answering these technology trends from the service providers' prospects, AnaCise has designed a GigE PIM which is installed in CSA platform to support traffic generation for a visibility of performance and passive monitoring to user traffic.



Available in single port module with one 10/100/1000BaseT electronic UTP and one 1000BaseX optical SFP port, or dual port module with two 10/100/1000BaseT UTP and two 1000BaseX SFP ports can be ordered in accordance to requirement.





Key Applications

GigE Triple Play PIM

- Complete test functions from physical layer to application performance measurement for the managed Ethernet services
- Support Data, VoIP and IPTV application analysis by enabling Triple Play Analysis Suite software on GigE PIM
- Comprehensive prioritization support including VLAN Q-in-Q, layer 3 IP ToS and Cisco DSCP
- Simultaneous 4 streams with complex traffic profile setting (source MAC/IP address, destination MAC/IP address, VLAN/QinQ, Priority/ToS, Frame Length and Type, Frame Count, UDP port, etc.)
- Multi-Stream Profile-up to 64 streams with different MAC/IP addresses or VLAN ID to simulate up to 64 users or applications
- IP QoS measurement conforms to the recommendation of ITU-T Y.1541
- Passive monitor to gain insight into end-user Quality of Experience
- Monitor mode is used to monitor real-time traffic, especially passively monitor network traffic for both directions of transmission
- RFC 2544 test validate the efficiency, response time, link burst and service integrity for an interconnected network
- Bandwidth Billboard gives users a simply view of network statistics with top talker ranking list
- NIC mode enables Port A/B or tag Port A/B to different VLAN to emulate terminal hosts for Triple-Play service testing

Physical Layer Connectivity and Service Verifying

Highlights

- Flexible hardware configuration to support single or dual port with copper 10/100/1000 Mbps and fiber connectivity
- Fully conform to the standard of IEEE 802.3 2000 compliance
- Concise indicator to reveal the physical port status and the state of logical connectivity

The CSA GigE PIM has several features allowing users to inspect the link, device or network and gather information related about performance. Through ways to simulate from lower layer circuit connectivity to higher layer application communication, it simplifies network testing. While a basic cable certification helps to verify Ethernet cable signal quality and speed, other various applications help to determine whether the performance issue is caused by physical or upper layer. It provides cost-effective ways to validate the status of a new physical link or network and devices from the beginning, or pinpoint error/s and diagnose a network or device in-use problem quickly.

Before testing Ethernet performance, CSA GigE PIM provides ways to verify physical layer connectivity such as detecting copper cable faults in open, short and distant fault in addition to information on link status, signal, pattern sync, data or error, laser on or off indication. All above verifications have corresponding LED indicators on GigE PIM top panel allowing easy inspection of Ethernet physical and logical connection status at a glance.

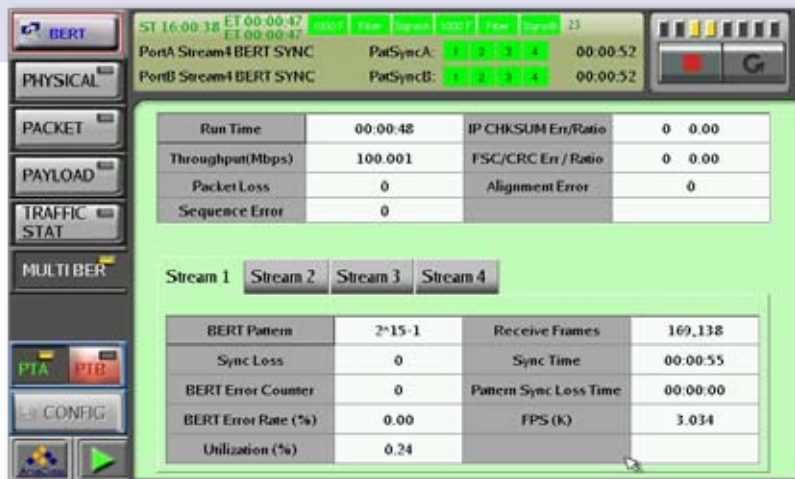
The screenshot displays the software interface for the GigE Triple Play PIM. At the top, there is a status bar with 'ST 16:02:28', 'ET 00:01:33', and 'ET 00:01:33'. Below this, the 'PHYSICAL' section shows 'PortA Idle' and 'PortB Idle' with 'PatSyncA' and 'PatSyncB' indicators. The main configuration area is divided into two columns. The left column contains settings for 'Port' (Media: Fiber, Capability: Auto, Pause: Enable, Loopback: Disable, Clock: Auto, Asym-Pause: Enable) and a 'Set' button. The right column shows the 'Setup Assistance Status' table.

	Local	Remote
Speed	1000 F	---
Error	Auto Nego	OK
Capability	1000 F	1000 F
Pause	BOTH	BOTH
PWR(dBm)	Tx = -5.2	Rx = -5.1
AutoNego	ON	ON
Asym-Pause	ON	ON
Signal Loss	00:01:10	
OOS	00:08:33	

At the bottom, there is a 'Mode Selection' panel with icons for BERT, QoS, MONITOR, RFC2544, NIC, and POWER OFF MODULE. The version information 'GigE Triple Play PIM Version 2.11h-CHT' and 'For CSA platform : csa v3.12' is displayed at the very bottom.

Ethernet Performance Measuring

Ethernet performance measurement is composed by a wire-speed traffic generation with BER or IP QoS payload. These methodologies are approved to measure the performance of Ethernet and IP network impartially, totally there is up to 4 streams with different traffic profiles can be generated simultaneously on each port.



CSA GigE PIM supports both IEEE 802.3z (1000Base-X) and 802.3ab (1000Base-T) with maximum two available ports to transmit and receive frames, user is able to make sure whether there is loss or out of sequence as a result of sequence number insertion while transmitting traffic.

The advanced Remote Loopback mode is used to send back traffic with automatic source and destination address swap to the source station or tester, this solves the choke point of Ethernet bridging mechanism which does not allow loops. This may be a necessary configuration with IP QoS or BER measurements because the procedure typically demands that a single piece of test equipment is responsible for test pattern generation and analysis.



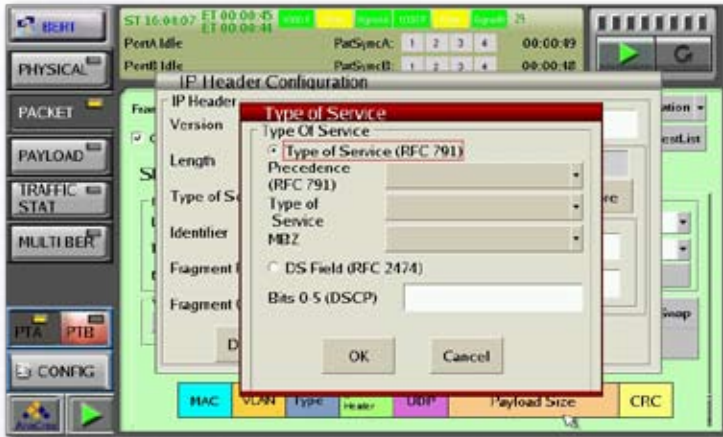
The Packet and Payload configuration categories allows users to specify Ethernet frame type and frame size which support fixed, random, jumbo or steps from 32 to 2040 bytes. IP versions are configurable to be v4 or v6 upon the real condition, both MAC and IP addresses are also custom defined by users or enable ARP and DHCP-client function to get IP address.

Different load rates or wire speed can be defined to generate applicable traffic to device or network, the duration is also designated as infinite, specific time frame or number of frame before starting the test. In general, real world network traffic won't be constantly, thus the support of shaped traffic and frame gap is significant. CSA GigE PIM supports all familiar shaping which are constant, ramp and burst.



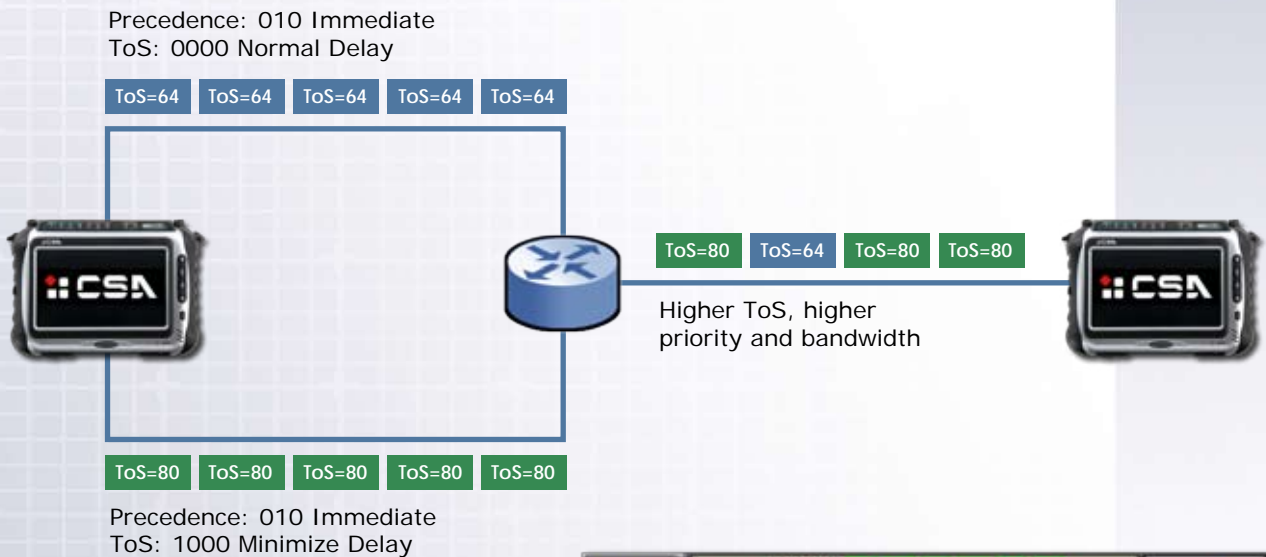
GigE Triple Play PIM

For specific VLAN network, GigE PIM is capable to specify single and Q-in-Q VLAN ID in each stream as a standard feature. Q-in-Q VLAN is a widespread application in service providers while implementing Ethernet over PMLS to offer Ethernet VPN and Virtual Private LAN services to enterprise customers.



With CSA GigE PIM traffic generation, different priorities can be designated within a stream to emulate real world network. Prioritization is enforced upon VLAN ID (802.1q), priority (802.1p), and IP ToS or Cisco DSCP. These supported features are extraordinary to verify the device or network is configured properly to offer best transmission quality.

According to different priority configuration, receiver PIM should receive stream at different timeframe when multiple streams with different QoS levels are transmitted through device or network. User can verify a variety of QoS by Traffic Prioritization application. For example, Sender PIM generates stream1 with higher priority and stream2 with normal priority over a competition link. Stream1 should be transmitted to receiver PIM due to higher priority, while stream2 will be transmitted later or dropped depends on the forwarding class within DiffServ and the available bandwidth of tested link.



The enhanced error insertion allows users to insert Bit error, CRC or IP checksum alignment while performing BER testing, and further OOS <Out of Sequence> error can be inserted upon IP QoS testing.

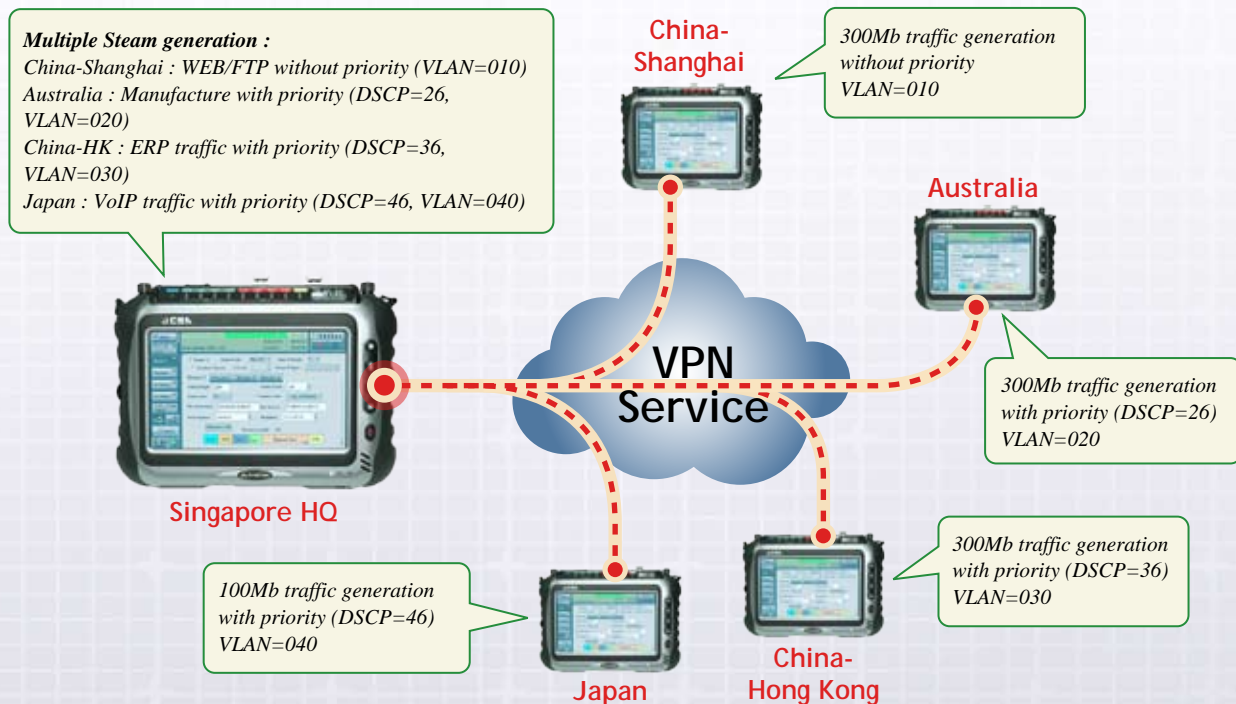


Multi-Stream Profile

Multi-Stream Profile features allows users to configure up to 64 streams profile with different MAC/IP addresses or VLAN ID to simulate up to 64 users. This allows users to configure a range of MAC source/destination addresses and/or a range of IP source/destination addresses simply to simulate 64 network conversations.

Stream	Parameters	From	To
Stream 1	Ctag VlanID	1	7
Stream 1	IPSource	1.1.1.0	1.1.1.0
Stream 1	MacDestination	00:18:75:3B:A0:5	00:18:75:3B:A0:12
Stream 2	IPSource	1.1.1.2	1.1.1.7

Furthermore, CSA GigE PIM supports generating up to 4 streams to simulate real user applications which allows to configure different "Frame Length"、"Frame Type"、"Frame Count" to simulate different service behaviors、"VLAN ID"、"VLAN QinQ ID"、"UDP port"、"Diffserv or ToS level" and so on. This support is dramatically helpful to verify a VPN services (point-to-multi-points) offered by service providers, as you may simulate up to 4 branches communicates to headquarter simultaneously based on different applications which have different priorities and scenarios. The follow simple architecture of CSA Multi-BERT shows about how to verify VPN services.



ARP Detect & DHCP Client

IF the MAC address of the destination host is unknown, ARP Detect will help CSA automatically obtain destination MAC address. (Method: ARP broadcasts an ARP Request, and the Broadcast requests the Mac address of the destination host. The destination host then responses with an ARP Reply packet containing its own Mac address.)

However, when user needs an IP address from DHCP service, user enters the local MAC address to obtain local IP address.

Destination	Source
Mac : 01:01:00:11:11:11	Mac : 01:01:01:11:11:11
<input type="checkbox"/> ARP(Auto Detect)	IP : 1.1.1.1
IP : 1.1.0.1	<input type="checkbox"/> DHCP Client

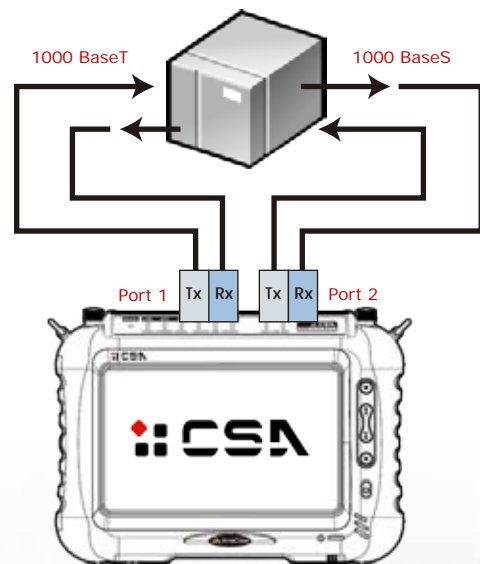
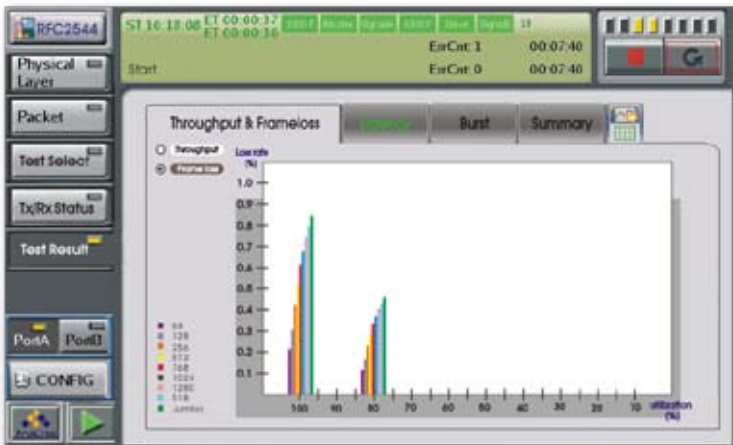
RFC 2544

Ethernet Performance Measuring relies chiefly on RFC 2544 benchmarking methodology, which is designed to provide a measure of how the device would perform in the real world. RFC 2544 mainly introduces a set of tests to describe device performance, the measured result becomes a reference of SLA to service providers. Theoretically the RFC 2544 is suggested to be performed upon the phase of service turn-on.

Highlights

- Lab mode provides a quick way to perform a standard test and easy to repeat test to verify the stability of device or network
- Metro mode is simplify the procedure and reduce work load for field engineers
- Programmable threshold to simplify the test result to indication with Pass, Margin and Fail in tabular report

Lab mode is designed for normal and typical measurement, there has to be a way to ensure the repeatable and reliable of standard RFC 2544 test sequenced by Throughput, Latency, Frame loss, Back-to-back, Recovery and Reset. as there are a plenty of parameters can be defined in the test. It allows users to easily repeat test with same parameters during lab test, it's simplify the procedure and reduce work load for field engineers.



BER PRBS Testing

Highlights

- Supports BER test in Asymmetric, Symmetric or Loop back mode
- Simultaneously 4 streams with individual profile can be generated on each port
- Multi-Stream Profile- up to 64 streams with different MAC/IP addresses or VLAN ID to simulate up to 64 users or applications
- Data pattern supports $2^{15}-1$, $2^{20}-1$, $2^{23}-1$ or $2^{31}-1$ with inverted option, as well as Long Continuous Random Test Pattern (CRPAT), Long Continuous Jitter Test Pattern (CJPAT) and Long Compliant Supply Noise Pattern (CSPAT)
- BER result is classified on the basis of ITU-T G.821 with Bit Error Count, Bit Error Rate, SYNC Loss, Pattern SYNC and Loss Time



The screenshot shows the BERT (Bit Error Rate Tester) software interface. It features a sidebar with various test modes: BERT, PHYSICAL, PACKET, PAYLOAD, TRAFFIC STAT, MULTIBER, PTA, PTB, and CONFIG. The main window displays 'Traffic Shaping' set to 'Constant' with the following parameters:

- Ratio (%): 10.0000
- GapTime (ns): 29,760
- Throughput (Mbps): 100.00
- FramePerSec (Kfps): 30.340

Below this, four streams are configured with individual test patterns and their resulting performance metrics:

Stream	Test Pattern	Ratio (%)	FramePerSec (Kfps)
Stream 1	2^15-1	2.427E-03	3.034E-04
Stream 2	2^20-1	8.738E-03	6.068E-04
Stream 3	2^23-1	2.476E-02	E-04
Stream 4	2^31-1	6.408E-02	1.214E-03

BER helps users to realize and verify the payload integration into the Ethernet packets and transmission quality of a device or network, CSA GigE PIM allows user to generate a variety of BER patterns to validate the maximum throughput while no lost or variation in pattern between sending and receiving traffic. This is an accredited method to validate the network before starting the operation of diagnosis and debugging.

Real-Time IP QoS Testing

Highlights

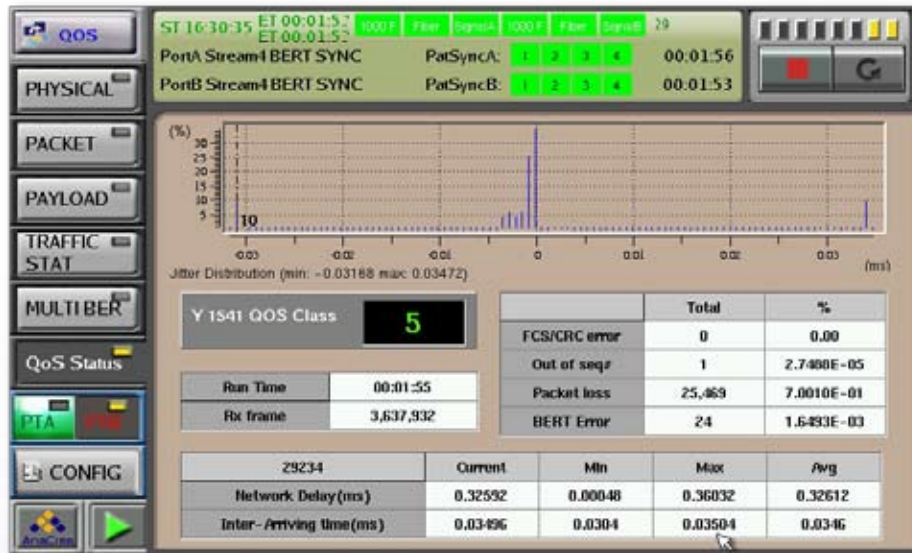
- Supports QoS test in Asymmetric, Symmetric or Loop back mode
- Simultaneously 4 streams with individual profile can be generated on each port
- The minimum inter-arrival time is 40ns in each stream to achieve the simulation of real user traffic
- Sequence number and timing (time stamp?) is inserted in payload automatically for measurement
- Comprehensive payload patterns including All 1's, All 0's, Alt 1/0, FOX, CJPAT, CRPAT and CRPAT are supported
- QoS result is classified on the basis of ITU-T Y.1541 standard

In the NGN Triple-Play network, a well-defined QoS helps to maintain user experience. To validate and quantify IP QoS helps service providers to realize how different service level applications will be carried on the network, and whether it's comply with the agreement of service quality which they promised. Therefore, the support of IP QoS traffic to verify the QoS achievement in device or network is obviously needed.

The CSA GigE PIM can be operated in asymmetrical and symmetrical environment, while only one side configured as transmitter to simulate client-server application, or both two ends configured as transmitters to simulate peer to peer application.

IP QoS application enables users to generate multiple streams with different QoS level and quantify performance individually. The measuring includes:- Real-Time/Cumulative Minimum, Average and Maximum Network Delay Time.

- Real-Time/Inter-Arrival Time
- Real-Time/Jitter
- Real-Time/Loss Number and Ratio
- Real-Time/Out of Sequence Number and Ratio



The main recommendation QoS is referred to ITU-T Y.1541 standard which delimit different QoS level according to different requirement of IPTD, IPDV, IPLR and IPER. There are 8 QoS classes for different applications;

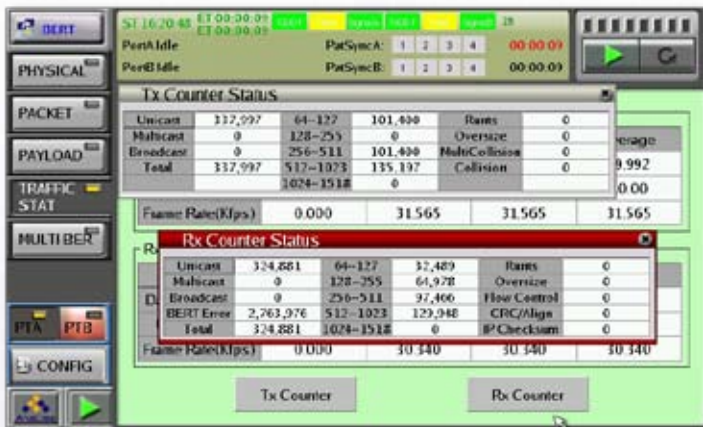
- (1) Class 0 : Real-time, Jitter Sensitive, High Interaction. Example: VoIP, VTC.
- (2) Class 1 : Real-time, Jitter Sensitive, Interactive. Example : VoIP, VTC.
- (3) Class 2 : Transaction Data, Highly Interactive. Example: Signalling.
- (4) Class 3 : Transaction Data, Highly Interactive.
- (5) Class 4 : Low Loss Only. Example : Short Transaction, Bulk Data, Video Streaming.
- (6) Class 5 : Traditional Applications of Default IP Networks.
- (7) Class 6/7 : Class 6 and 7 are intended to support the performance requirements of high bit rate user applications that have more stringent loss/error requirements than those supported by classless 0 through 4.

QoS class	IPTD	IPDV	IPLR	IPER	IPRR	Applications(examples)
0	100 ms	50 ms	1×10^{-3}	1×10^{-4}	-	Real-time, jitter sensitive, high interaction (VoIP, VTC)
1	400 ms	50 ms	1×10^{-3}	1×10^{-4}	-	Real-time, jitter sensitive, Interactive
2	100 ms	U	1×10^{-3}	1×10^{-4}	-	Transaction data, highly interactive (Signalling)
3	400 ms	U	1×10^{-3}	1×10^{-4}	-	Transaction data, interactive
4	1 s	U	1×10^{-3}	1×10^{-4}	-	Low loss only (short transaction, bulk data, video streaming)
5	U	U	U	U	-	Traditional applications of default IP network
6	100 ms	50 ms	1×10^{-6}	1×10^{-5}	1×10^{-6}	High bit rate, strictly low loss/error (TV broadcast on IP)
7	400 ms	50 ms	1×10^{-6}	1×10^{-5}	1×10^{-6}	High bit rate, strictly low loss/error

Monitoring and Statistical with distinct Billboard

Highlights

- Monitor mode allow GigE PIM to receive traffic from a span port on Ethernet switch in single port configuration or pass through traffic in dual port configuration
- A ping-pong protocol trace file can be obtained by the way of enabling TPAS-Data applications on GigE PIM
- Comprehensive hardware filters in MAC/IP address, VLAN ID and Priority, Multicast or Broadcast, IP ToS or Cisco DSCP to ensure GigE PIM performance and mitigate post analysis effort
- Simultaneously 10 streams can be identified, monitored and analyzed to generate Top 10 network talker in a tabular report



In addition to generate traffic to verify Ethernet qualities and characters, GigE PIM also support passive mode to facilitate the monitoring and analysis of real user traffic and introduce many significant performance indicators for troubleshooting. It provides an objective view of network efficiency since the analysis relays on real user traffic, it will become more constructive if technician can't find error from the active measurement.

Tag GigE PIM into the network through intrusive or non-intrusive way (Ethernet switch span port) to monitor and analyze user traffic in real-time, a state of the art hardware filter can be applied to ensure the performance of GigE PIM.

The Monitor mode is used to monitor real-time traffic. With two UTP (RJ-45) ports or two fiber SFP ports, user may passively monitor network traffic (through Port A and Port B) for both directions of transmission. Besides, the PORT A Traffic and PORT B Traffic windows will be displayed on the screen at the same time. This allows technicians to troubleshoot service problem efficiently.

A billboard for Top 10 talkers will be manually or automatically generated and displayed on screen, which allows to trace the major users in the link and analyze them when network traffic causes performance issue. It allows user to real-time monitor and analyzer up to 10 streams simultaneously with or without filter conditions. An easy-to-read Top 10 talkers automatically discovered by GigE can be ranked and viewed on Billboard, it is on the basis of MAC or IP address with the traffic rate in Mbps, utilization in percentage, frame per second and cumulated frame number.



NIC (Network Interface Card) Mode

NIC mode enables Port A and Port B to emulate two different terminal hosts. User may tag Port A and Port B to different VLAN or physical port, so that CSA can emulate multiple terminal devices in coordination with CSA TPAS (Triple Play Analyzer Suite) software packages to verify Triple Play services.

The Standby function in NIC mode is to suspend the PIM-41X-GigE program to reduce the power and CPU consumption, so that users can get better performance and faster response while performing CSA TPAS tests.



About CSA, Convergent Service Analyzer

CSA is a modular platform suited for copper and multi-service testing. Lightweight, rugged construction, long life battery powered. With the CSA in your hand you have the right cost-effective test platform that easily scales to basically any testing needs.

- Field installation
- Maintenance
- Troubleshooting
- Provisioning
- The CSA platform is Best-In-Class; Modular and Flexibility in Hardware and Software Architecture.
- The CSA can easily be upgraded to accommodate revisions in specification for new and emerging technologies.

Name the application and with the CSA LINUX based platform, your needs will be met.

About AnaCise

ANACISE TESTNOLOGY is a Taiwan-based company with HQ office in Taipei. We are at the forefront of helping our customers shape the changing broadband convergent technology landscape.

AnaCise's solutions enable network operators and service providers to better meet increasing demands for network availability and services. We accomplish this by providing market-driven test, measurement and monitoring solutions that accurately verify network performance, thus ensuring perfect telecommunications network planning and service continuity.



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