# RTU-310G

## IP SERVICES TEST HEAD


COMPLETE IPv6 TESTING

EtherSAM

MEF METRO ETHERNET FORUM

FROST & SULLIVAN 2011 BEST PRACTICES AWARD
GLOBAL GIGABIT ETHERNET TEST EQUIPMENT GROWTH EXCELLENCE AWARD

**Please note that this model has been discontinued. For more information, visit EXFO.com**

SPEC SHEET

Fully integrated 10 GigE test head for centralized performance assurance of Ethernet-based services



## KEY FEATURES

- Complete EtherSAM (ITU-T Y.1564) test suite. EtherSAM is the new standard for testing turning up and troubleshooting mobile backhaul and business Ethernet services
- LAN and WAN PHY capability in a single unit
- Comprehensive functionality for assessing the performance of Ethernet transport networks
- Throughput, back-to-back, latency and frame loss measurements as per RFC 2544 (bidirectional)
- Multistream generation and analysis, allowing quality of service (QoS) verification through VLAN and TOS/DSCP prioritization testing
- MPLS, MPLS-TP and PBB-TE support for complete Carrier Ethernet validation
- Interoperable with the FTB-8510B Packet Blazer Ethernet Test Module, the FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module and the AXS-200/850 Ethernet Test Set
- Fully remote controllable via EX-Vu application

EXFO

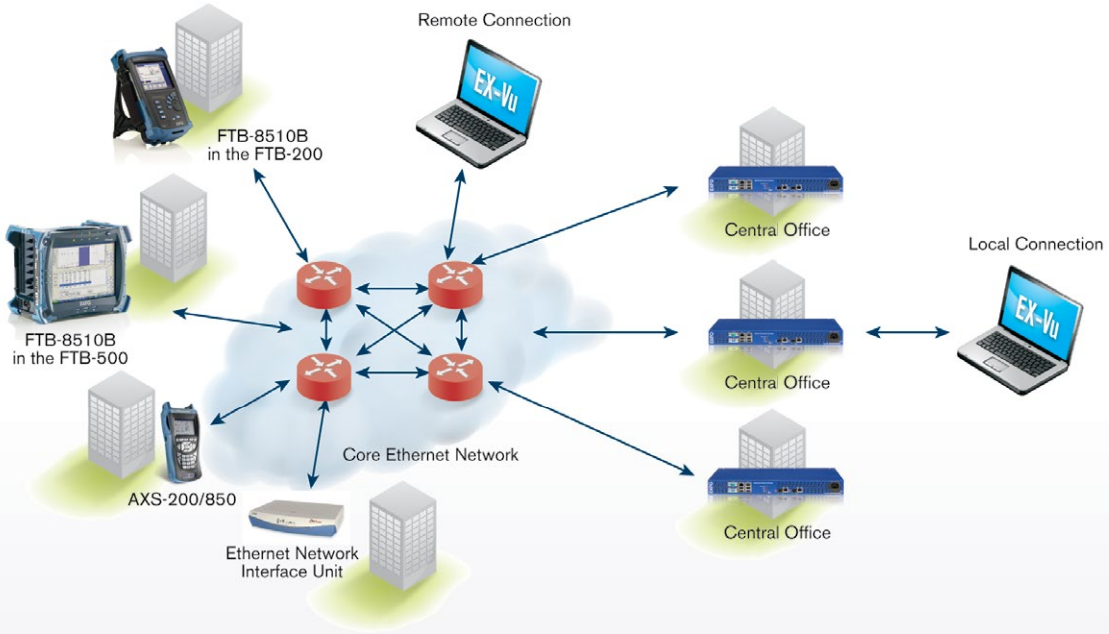
## THE CHOICE FOR 10 GIGABIT ETHERNET PERFORMANCE ASSURANCE

EXFO's RTU-310G IP Services Test Head is a carrier-grade test device that offers performance assurance capabilities for 10 Gigabit Ethernet-based services. Its suite of test applications provides all the measurements required for service turn-up, troubleshooting, as well as validating service-level agreements (SLAs) between service providers and their customers. This 1U rack-mounted, central office (CO)-based device–combined with its portable counterparts, EXFO's award winning FTB-8510B Packet Blazer Ethernet Test Module and the FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module or the FTB-860 Network Blazer–simplify and accelerate the deployment of Ethernet services. In fact, the RTU-310G is the functional equivalent of the FTB-8510G and supports all the test features found in the portable version.

## FLEXIBLE END-TO-END TESTING FROM A CENTRALIZED POINT

With the RTU-310G IP Services Test Head, the user can perform end-to-end testing through control of the remote unit via the LAN connection under test. This unique approach gives service providers access to test results for each direction of test, which is essential to fully qualify Ethernet services. It is also possible to perform end-to-end testing by using the Smart Loopback mode where the remote unit will return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack. For example, up to ten 1 GbE test patterns can be looped back simultaneously, allowing service providers to run multiple tests from different locations all at the same time. This increases the test set's flexibility and makes testing more efficient.

The RTU-310G tests connectivity in its native format: 10GBASE-xR or 10GBASE-xW used for transport of Ethernet-based LAN-to-LAN services. It can also be used to test next-generation SONET/SDH, hybrid multiplexers, dark fiber or xWDM networks running 10 Gigabit Ethernet interfaces. The RTU-310G simplifies and speeds up the deployment of Ethernet services.



## KEY FEATURES

- Complete EtherSAM (ITU-T Y.1564) test suite allowing full validation of today's Ethernet services (bidirectional results through dual test set)*
- Measures throughput, back-to-back, latency and frame loss as per RFC 2544 (bidirectional results through dual test set)
- Performs packet jitter measurement (IP packet-delay variation as per RFC 3393) to qualify Ethernet transport networks for transmission of delay-sensitive traffic such as video and voice-over-IP (VoIP)
- Q-in-Q capability with the ability to go up to three layers of stacked VLANs
- LAN PHY and WAN PHY available in a single module
- Simultaneous traffic generation and reception at 100 % wire speed for 10GBASE-SR, -ER, -LR, -SW, -EW or -LW full-duplex interfaces at all valid frame sizes
- Transmits and analyzes up to ten streams, providing per-stream measurements for throughput, latency, frame loss and packet jitter
- Configurable advanced filters for in-depth network troubleshooting
- PBB-TE and MPLS support for carrier Ethernet
- UDP, TCP and IP header integrity validation
- Expert mode capability for defining test pass/fail thresholds
- Easy-to-use smart user interface (SUI) for configurable screens, customization of test suites, as well as real-time and historical performance reporting
- Remote control capability through Ex-Vu or VNC software
- Smart Loopback
- Service disruption time measurement
- Internet protocol version 6 (IPv6) testing
- Up to 10 Gbit/s full-line-rate data capture and decode

** Patent pending*

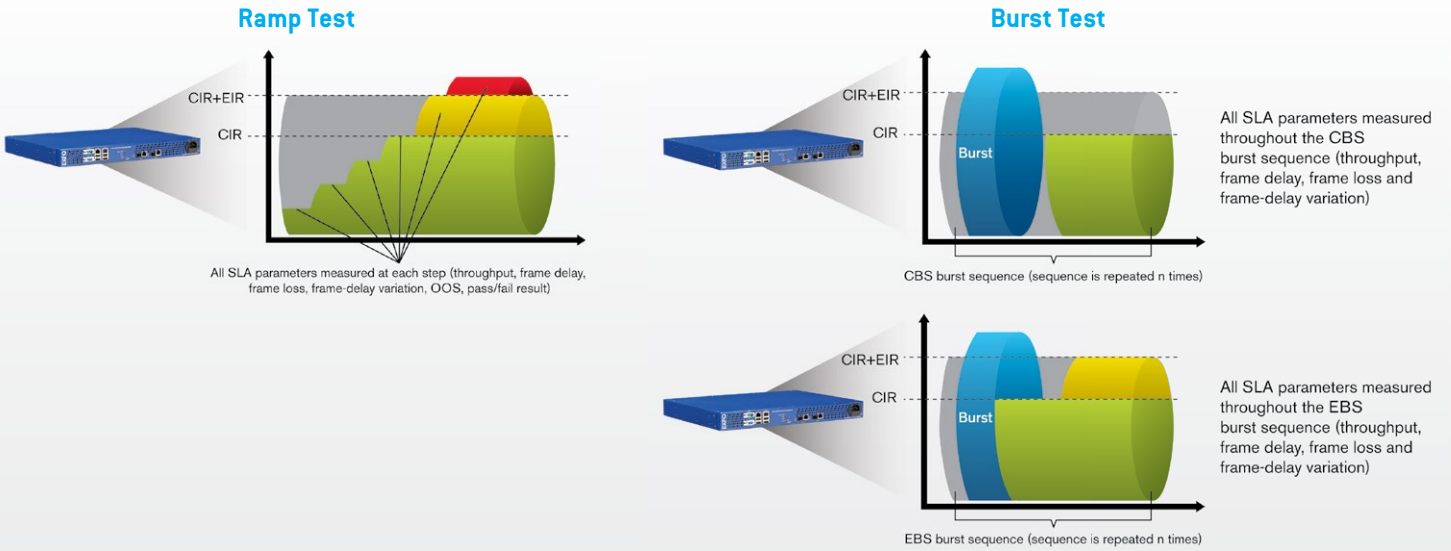
## ETHERSAM: THE NEW STANDARD IN ETHERNET TESTING

ITU-T Y.1564 is the new standard for turning up and troubleshooting Carrier Ethernet services. This methodology is completely adapted to today's Ethernet services especially mobile backhaul and commercial services. Up to now, RFC 2544 has been the most widely used methodology. However, it was designed for network device testing in the lab, not for services testing in the field. ITU-T Y.1564 is the first testing standard developed for the field. It has a number of advantages over the RFC 2544 including validation of critical SLA criteria such as packet jitter and QoS measurements. This methodology is also significantly faster, therefore saving time and resources while optimizing QoS.

Contrary to other methodologies, EtherSAM supports new multiservice offerings. It can simulate all types of services that will run on the network and simultaneously qualify all key SLA parameters for each of these services. Moreover, it validates the QoS mechanisms provisioned in the network to prioritize the different service types, resulting in more accurate validation and much faster deployment and troubleshooting. EtherSAM is comprised of two phases, the service configuration test and the service performance test.

### Service Configuration Test

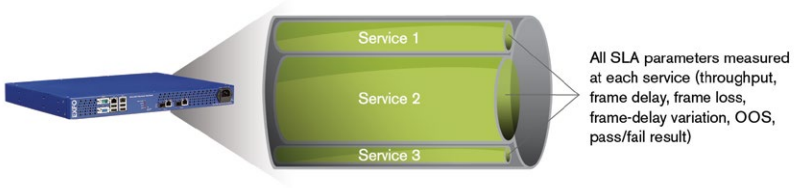
The service configuration test consists in sequentially testing each service. It validates that the service is properly provisioned and that all specific KPIs or SLA parameters are met. A ramp test and a burst test are performed to verify the committed information rare (CIR), excess information rate (EIR), committed burst size (CBS) and excess burst size (EBS).



# ETHERSAM: THE NEW STANDARD IN ETHERNET TESTING (CONT'D)

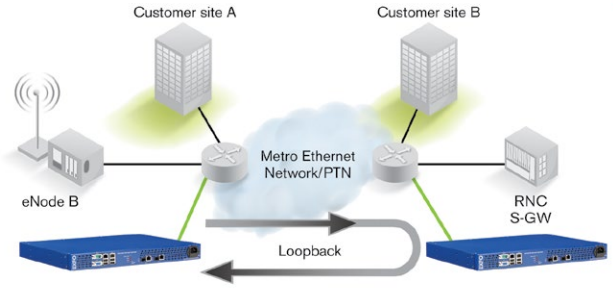
## Service Performance Test

Once the configuration of each individual service is validated, the service performance test simultaneously validates the quality of all the services over time.

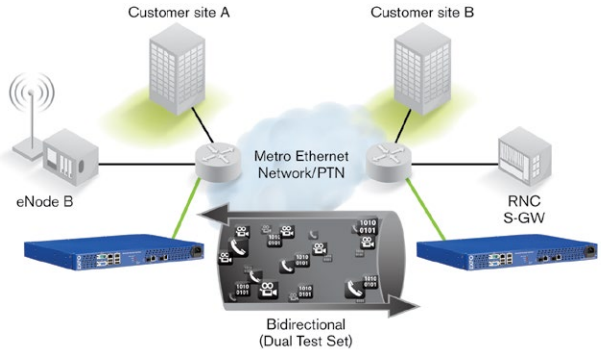



## EtherSAM Bidirectional Results

EXFO's EtherSAM approach proves even more powerful as it executes the complete ITU-T Y.1564 test with bidirectional measurements. Key SLA parameters are measured independently in each test direction, thus providing 100 % first-time-right service activation—that is the highest level of confidence in service testing.




Round-trip results only

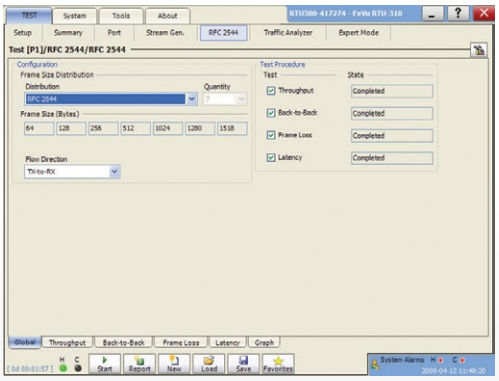



Simultaneous independant results for each test direction per individual service

## RFC 2544 Test Suite

The RTU-310G IP Services Test Head can perform the RFC 2544 test suite for 10 GbE LAN/WAN interface at all frame sizes and at full line rate, allowing the provider to certify that the circuit is efficient and error-free at 100 % utilization.

The IP services test head supports automated RFC 2544 testing, which helps ensure repeatable results. Automation also provides ease of use for field technicians by enabling accurate, efficient measurements and results through a clear and simple pass/fail indication. In addition, the IP services test head delivers reports that can be given to customers for future reference related to their specific SLAs.



*RFC 2544 testing.*

# EFFICIENT TESTING LEADS TO RELIABLE PERFORMANCE

## MPLS, MPLS-TP and PBB-TE: Carrier Ethernet Transport Solution Testing

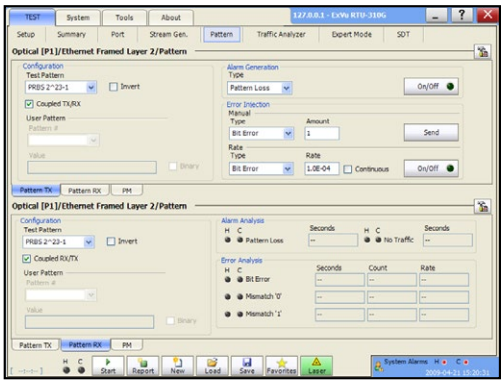
As technologically sophisticated business and residential consumers continue to drive demand for premium, high-bandwidth data services such as voice and video, service providers worldwide are evolving their transport infrastructures to support these bandwidth and quality-intensive services. No longer is an all-IP core sufficient; providers must now expand their IP convergence to the edge/metro network, in a cost-effective, quality-assured manner. Ethernet has long been accepted as an inexpensive, scalable, data-networking solution in LAN environments. The stringent QoS expectations require solutions that tap into the cost-effectiveness of Ethernet without sacrificing the benefits of connection-oriented (albeit it costly) TDM solutions such as SONET/SDH.

Ethernet tunneling technologies such as Provider Backbone Bridge-Traffic Engineering or PBB-TE (also referred to as PBT) and transport MPLS address these requirements. These technologies enable connection-oriented Ethernet, providing carriers with a means of offering scalable, reliable and resilient Ethernet services. The PBB-TE and MPLS options on the RTU-310G offer service providers a comprehensive field tool to efficiently qualify Ethernet services from end to end, validating metro and core tunneling technologies.

### EtherBERT™

Ethernet is increasingly carried across a variety of layer 1 media over longer distances. This creates a growing need for the certification of Ethernet transport on a bit-per-bit basis, which can be done using bit-error-rate testing (BERT).

BERT uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for acceptance testing of physical-medium transport systems. BERT-over-Ethernet should usually be used when Ethernet is carried transparently over layer 1 media, in cases such as Ethernet over DWDM, CWDM or dark fiber.



*BERT analysis screen.*

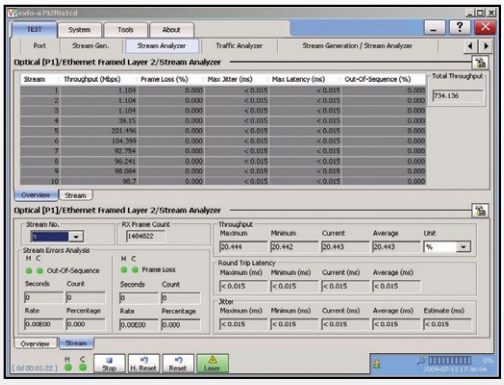
### Ethernet QoS Measurement

Data services are making a significant shift toward supporting a variety of applications on the same network. Multiservice offerings such as triple-play services have fuelled the need for QoS testing to ensure the condition and reliability of each service and fully qualify SLA parameters. The RTU-310G allows service providers to simultaneously simulate and qualify different applications through its multistream application. The user has the capability to configure up to ten streams with different Ethernet and IP QoS parameters such as VLAN ID (802.1Q), VLAN Priority (802.1p), VLAN stacking (802.1ad Q-in-Q), ToS and DSCP. Specific stream profiles to transmit VoIP, video and data can be selected for each stream. Throughput, latency, frame loss and packet jitter (RFC 3393) measurements are also available simultaneously for each stream, allowing fast and in-depth qualification of all SLA criteria.

### Ethernet Advanced Troubleshooting

The RTU-310G provides a number of advanced features essential for in-depth troubleshooting in the event of network failures or impairments. The advanced filtering option allows the user to configure up to ten filters with each up to four operands, which will be applied to the received Ethernet traffic. Detailed statistics are available for each configured filter, providing the user with critical information required to pinpoint specific problems.

The RTU-310G also supports full-line-rate data capture and decode. This key troubleshooting tool enables field technicians to easily identify complex network issues. The comprehensive capture feature includes the capability to configure capture filters and triggers to quickly zero-in on network events.



*Statistics for each stream.*

## COMMAND AND CONTROL

### Remote Management

The user interface for the RTU-310G IP Services Test Head is accessible via EX-Vu remote management software. It enables a remote connection to the instrument, as well as providing the graphical user interface (GUI) for test setup and device management. The EX-Vu application is supported on any Windows based workstation and allows for simplified remote testing and data analysis, as well as remote monitoring. Up to five simultaneous EX-Vu sessions can be supported via a standard Ethernet connection to the platform.

### Automated Test Scripting

The RTU-310G supports .NET programming environment for users who prefer to build their automation test routines. The unit comes with a built-in macro-recorder, which allows users to easily record their test actions and automatically create test scripts; this also enables them to build standard test routines that can easily be accessed and run by technicians with little or no manual intervention. Scripts from the macro-recorder can be used as the basis for larger automation routines, which can be created or edited in any .NET environment.

### Test Logger and Reporting

The RTU-310G supports a detailed test logger and test reporting tools, enabling users to view any errors/alarms that occurred during the test interval, which can then be used for post-processing of results or SLA conformance validation.

# FUNCTIONAL SPECIFICATIONS

## OPTICAL INTERFACES

| | 10GBASE-SW | 10GBASE-SR | 10GBASE-LW | 10GBASE-LR | 10GBASE-EW | 10GBASE-ER |
|---|---|---|---|---|---|---|
| Wavelength (nm) | 850 | 850 | 1310 | 1310 | 1550 | 1550 |
| | Multimode | Multimode | Singlemode | Singlemode | Singlemode | Singlemode |
| Tx level (802.3ae-compliant) (dBm) | −7.3 to −1 | −7.3 to −1 | −8.2 to 0.5 | −8.2 to 0.5 | −4.7 to 4 | −4.7 to 4 |
| Rx operating range (dBm) | −9.9 to −1 | −9.9 to −1 | −14.4 to 0.5 | −14.4 to 0.5 | −15.8 to −1 | −15.8 to −1 |
| Transmission bit rate | 9.95328 Gbit/s ±4.6 ppm* | 10.3125 Gbit/s ±4.6 ppm* | 9.95328 Gbit/s ±4.6 ppm* | 10.3125 Gbit/s ±4.6 ppm* | 9.95328 Gbit/s ±4.6 ppm* | 10.3125 Gbit/s ±4.6 ppm* |
| Reception bit rate | 9.95328 Gbit/s ± 150 ppm | 10.3125 Gbit/s ± 150 ppm | 9.95328 Gbit/s ± 150 ppm | 10.3125 Gbit/s ± 150 ppm | 9.95328 Gbit/s ± 150 ppm | 10.3125 Gbit/s ± 150 ppm |
| Tx operational wavelength range (802.3ae-compliant) (nm) | 840 to 860 | 840 to 860 | 1260 to 1355 | 1260 to 1355 | 1530 to 1565 | 1530 to 1565 |
| Measurement accuracy (uncertainty)<br>optical power (dB)<br>frequency (ppm) | <br>±2<br>±4.6 | <br>±2<br>±4.6 | <br>±2<br>±4.6 | <br>±2<br>±4.6 | <br>±2<br>±4.6 | <br>±2<br>±4.6 |
| Maximum Rx before damage (dBm) | 0 | 0 | 1.5 | 1.5 | 4 | 4 |
| Jitter compliance | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae |
| Ethernet classification | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae | IEEE 802.3ae |
| Laser type | VCSEL | VCSEL | DFB | DFB | EML | EML |
| Eye safety | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 | Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1 |
| Connector | Duplex LC | Duplex LC | Duplex LC | Duplex LC | Duplex LC | Duplex LC |
| Transceiver type (compliant with XFP MSA) | XFP | XFP | XFP | XFP | XFP | XFP |

*When clocking is in internal mode

## SYNCHRONIZATION INTERFACES

### DS1/E1 external input clock interface

| Parameter | DS1 | E1 |
|---|---|---|
| Rx level sensitivity (short haul only) | For 772 kHz: TERM: 6 dB (cable loss only) | For 1024 kHz: TERM: 6 dB (cable loss only) |
| Reception bit rate | 1.544 Mbit/s ± 50 ppm | 2.048 Mbit/s ± 50 ppm |
| Input jitter tolerance | AT&T PUB 62411, GR-499 section 7.3 | G.823 section 7.2 |
| Line coding | AMI and B8ZS | HDB3 and AMI |
| Input impedance (resistive termination) | 100 ohms ± 5 %, balanced | 120 ohms ± 5 %, balanced |
| Connector type | BANTAM | BANTAM |

### Clock out interface

| Parameter | Value | |
|---|---|---|
| Tx pulse amplitude | 600 mVpp ± 130 mV | |
| Transmission frequency<br>Clock divider = 16<br>Clock divider = 32<br>Clock divider = 64 | LAN<br>644.53 MHz<br>322.266 MHz<br>161.133 | WAN<br>622.08 MHz<br>311.04 MHz<br>155.52 MHz |
| Output configuration | AC coupled | |
| Load impedance | 50 ohms | |
| Maximum cable length (m) | 3 | |
| Connector type | SMA | |

## OPTICAL INTERFACES

| | |
|---|---|
| Optical interfaces | 10 GigE LAN and 10 GigE WAN [a] |
| Available wavelengths (nm) | 850, 1310 and 1550 |

**Note**

a. Available as a software option.

# FUNCTIONAL SPECIFICATIONS (continued)

## ELECTRICAL INTERFACES

| | | |
|---|---|---|
| Electrical interfaces | External clock DS1/E1 and clock output | |
| External clock DS1/E1 | Line coding | DS1: AMI and B8ZS<br>E1: AMI and HDB3 |
| | Termination mode | DS1/E1: Term |
| | Framing | DS1: SF and ESF<br>E1: PCM30, PCM30CRC, PCM31 and PCM31CRC |
| | Clocking | Internal, external (BITS) and recovered |
| Clock output | Clock out | Clock out divider: 16, 32 and 64 |

## TESTING

| | |
|---|---|
| EtherSAM (ITU-T Y.1564) | Capability to perform the service configuration test, including the ramp and burst tests, and service performance test as per ITU-T Y.1564. Tests can be performed to a loopback or dual test set mode for bidirectional results. |
| RFC 2544 | Throughput, back-to-back, frame loss and latency measurements according to RFC 2544. Frame size: RFC-defined sizes, user-configurable (bidirectional). |
| BERT | Unframed layer 1 up to layer 4 with or without VLAN Q-in-Q. |
| Patterns (BERT) | PRBS 2E9-1, PRBS 2E11-1, PRBS 2E15-1, PRBS 2E20-1, PRBS 2E23-1, PRBS 2E31-1, and up to ten user patterns. |
| Error insertion (BERT) | FCS, bit, 64B/66B block. |
| Error measurement | LAN/WAN: jabber/giant, runt, undersize, oversize, FCS, 64B/66B block.<br>WAN: B1, B2, B3, REI-L, REI-P, UDP, TCP and IP header checksum. |
| Error measurement (BERT) | Bit error, bit mismatch 0, bit mismatch 1, performance monitoring (G.821 and G.826). |
| Alarm insertion | LOS, link down, local fault, remote fault, LSS (BERT). WAN: SEF, LOF, AIS-L, RDI-L, AIS-P, RDI-P, LCD-P, LOP-P, ERDI-PSD, ERDI-PCD, ERDI-PPD, UNEQ-P. |
| Alarm detection | LOS, link down, local fault, remote fault, frequency offset, LSS (BERT). WAN: SEF, LOF, AIS-L, RDI-L, AIS-P, RDI-P, LCD-P, LOP-P, ERDI-PSD, ERDI-PCD, ERDI-PPD, PLM-P, UNEQ-P, link (WIS). |
| Service disruption time measurement (BERT) | Defect or No Traffic mode. Disruption time statistics include shortest, longest, last, average, total and count. |
| Multistream generation | Capability to transmit up to ten streams. Configuration parameters are: packet size, transmission mode (N-Frames, Burst, N-Burst, Ramp, N-Ramp and Continuous), MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TTL, UDP/TCP source/destination port and payload. Selectable predefined stream profiles for voice, video and data streams. VoIP codecs (G.711, G.723.1, G.729), video (MPEG-2 SDTV, MPEG-2 HDTV, MPEG-4 HDTV). |
| Multistream analysis | Capability to analyze packet jitter, latency, throughput, frame loss and out-of-sequence per-stream statistics. |
| VLAN stacking (Q-in-Q) | Capability to generate streams with up to three layers of VLAN (including IEEE802.1ad QinQ tagged VLAN) and to filter received traffic by VLAN ID or VLAN priority at any of the stacked VLAN layers. |
| Traffic analysis | Capability to analyze the incoming traffic and provide statistics according to a set of up to 10 configurable filters. Filters can be configured for MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TCP source/destination port and UDP. |
| Ethernet statistics | Multicast, broadcast, unicast, N-unicast, pause frame, frame size distribution, bandwidth, utilization, frame rate, frame loss, out-of-sequence frames, in-sequence frames. |
| Packet jitter statistics | Delay variation statistics (ms): min., max., last, average and jitter measurement estimate. |
| Flow control injection (frame analyzer) | Packet pause time. |
| Flow control statistics (frame analyzer and RFC 2544) | Pause time, last pause time, max. pause time, min. pause time, paused frames, abort frames, frames Tx, frames Rx. |
| Advanced filtering [a] | Capability to configure up to ten filters of four fields each that can be combined with and/or/not operations. A mask is also provided for each field value to allow for wildcards. Complete statistics are gathered for each defined filter. |
| PBB-TE [a] | Capability to generate and analyze streams with PBB-TE data traffic, including configuration of B-MAC (source and destination), B-VLAN and I-tag (as per 802.1ah), and to filter received traffic by any of these fields. |
| MPLS [a] | Capability to generate and analyze streams with up to two layers of MPLS labels and to filter received traffic by MPLS label or COS. |
| IPv6 [a] | Capability to perform BERT, RFC 2544, traffic generation and analysis and Smart Loopback tests over IPv6. Ping, traceroute, neighbor discovery and stateless auto-configuration. |
| Data capture [a] | Capability to perform 10G full-line-rate data capture and decode. Capability to configure detailed capture filters and triggers as well as capture slicing parameters. |
| Traffic scan [a] | Capability to scan incoming live traffic and auto-discover all VLAN/VLAN Priority and MPLS ID/COS flows.<br>Capability to provide statistics for each flow including frame count and bandwidth. |

**Note**

a. Available as a software option.

# FUNCTIONAL SPECIFICATIONS (continued)

## ADDITIONAL TEST AND MEASUREMENT FUNCTIONS

| | |
|---|---|
| Power measurement | Supports optical power measurement, displayed in dBm. |
| Frequency measurement | Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).<br>Frequency offset measurement<br>Range (ppm) ±120<br>Resolution (ppm) ±1<br>Accuracy (uncertainty) (ppm) ±4.6<br>Frequency offset generation<br>Range (ppm) ±150<br>Resolution (ppm) ±1<br>Accuracy (uncertainty) (ppm) ±4.6 |
| Signal label control and monitoring | Ability to configure and monitor J0 trace, J1 trace and payload signal label C2 (WAN). |
| Dual test set | Performs end-to-end, bidirectional performance testing (as required by leading standards bodies)—remote Packet Blazer controlled via the LAN connection under test. |
| DHCP client | Capability to connect to a DHCP server to obtain its IP address and subnet mask to connect to the network. |
| Smart Loopback | Capability to return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack. |
| IP tools | Capability to perform ping and traceroute functions. |

## ADDITIONAL FEATURES

| | |
|---|---|
| Expert mode | Ability to set thresholds in RFC 2544 and BERT mode to provide a pass/fail status. |
| Scripting | The built-in Visual Basic .NET scripting engine and embedded macro-recorder provide a simple means of automating test cases and routines. Embedded scripting routines provide a powerful means of creating advanced test scripts. |
| Event logger | Supports logging of test results, and the ability to print, export (to a file), or export the information contained in the logging tool. |
| Power up and restore | In the event of a power failure to the unit, the active test configuration and results are saved and restored upon bootup. |
| Save and load configuration | Ability to store and load test configurations to/from non-volatile memory. |
| Configurable test views | Allows users to customize their test view; i.e., to dynamically insert or remove test tabs/windows, in addition to creating new test windows, so as to accurately match their testing needs. |
| Configurable test timer | Allows a user to set a specific start and stop time for tests. |
| Test favorites | Capability to select and load from predefined or user-modified test conditions. |
| Report generation | Ability to generate test reports in the following user-selectable formats: .pdf, .html, .txt and .csv. |
| Graph | Allows to graphically display the test statistics of the performance (RFC 2544) and frame analysis tests. |
| Screen capturing | Capability to gather a snap-shot of the screen for future use. |
| Logger printing | Capability to send logger messages to a supported local printer. |
| Remote control | Remote control through Ex-Vu or VNC. |

## MODULE SPECIFICATIONS

| | RTU-310G-LAN | RTU-310G-WAN | RTU-310G-LAN/WAN |
|---|---|---|---|
| Port | One 10 Gigabit Ethernet port | One 10 Gigabit Ethernet port | One 10 Gigabit Ethernet port |
| Connector type | LC | LC | LC |
| Optical transceiver | 850 nm optics (10GBASE-SR)<br>1310 nm optics (10GBASE-LR)<br>1550 nm optics (10GBASE-ER) | 850 nm optics (10GBASE-SW)<br>1310 nm optics (10GBASE-LW)<br>1550 nm optics (10GBASE-EW) | 850 nm optics (10GBASE-SR/-SW)<br>1310 nm optics (10GBASE-LR/-LW)<br>1550 nm optics (10GBASE-ER/-EW) |
| Port capacity | Full-line-rate traffic generation and analysis | Full-line-rate traffic generation and analysis | Full-line-rate traffic generation and analysis |
| Ethernet testing | RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT | RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT | RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT |

## GENERAL SPECIFICATIONS

| | |
|---|---|
| Communication interface | |
| LAN port | RJ-45<br>Rates: 10/100 Mbit/s |
| Craft port | RJ-45<br>Rates: 10/100 Mbit/s |
| Optical test interface | XFP<br>Rates: 10 Gbit/s LAN/WAN |
| Other interfaces | Four USB ports<br>Serial port (RS-232 DB-9) and VGA port |
| Size (H x W x D) | 1U rack-mount unit 44 mm x 427 mm x 330 mmm (1 ¾ in x 16 $^{13}/_{16}$ in x 13 in)<br>(19-inch and 23-inch rack-mount supported) |
| Weight | 5.56 kg (12.3 lb) |
| Temperature<br>operating<br>storing | <br>0 °C to 50 °C (32 °F to 122 °F)<br>–40 °C to 60 °C (–40 °F to 140 °F) |
| Power | AC (110/220 V)<br>DC (–48 V); dual DC power feed |
| Power consumption | 70 W |
| Certifications | NEBS Level 1, CE, CSA, UL, WEEE and RoHS |

## ORDERING INFORMATION

**RTU-310G-XX-XX-XX**

**Model**
RTU-310G-LAN = IP Services Test Head – 10G LAN optical interface
RTU-310G-WAN = IP Services Test Head – 10G WAN optical interface
RTU-310G-LAN/WAN = IP Services Test Head – 10G LAN/WAN optical interface

Example: RTU-310G-LAN-PBB-TE-AC

**Power Supply**
AC = 100-240 VAC power supply
DC = –48 VDC power supply

**Other Software Options**
00 = Without other options
PBB-TE = Enable PBB-TE testing
MPLS = Enable MPLS testing
Adv_filtering = Enable advanced filtering capabilities
IPv6 = Enable IPv6 testing
EtherSAM = EtherSAM (ITU-T Y.1564) testing capabilities
Data_Capture = Data capture and decode capabilities
TRAFFIC-SCAN = VLAN/MPLS traffic scan

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