SPIRENT TECH-X FLEX
ADSL/VDLS2 TEST MODULE

Spirent's all in one DSL module provides test capability for ADSL through to VDSL2 services. The single module ensures maximum chipset compatibility, while ensuring Triple Play testing is also accomplished for high-speed Internet services.

FEATURES & BENEFITS

- ADSL to VDSL2 modem emulation in a single solution reducing time and capital equipment costs
- DSL Chipset Interoperability provides a single solution to test against multiple DSLAMs that may exist in the service provider's network
- Full VGA color display ensures maximum readability when analyzing graphical results such as Bits per Bin and SNR
- User-configurable, color-coded pass/fail scripting allows for easy verification of compliance to service QoS parameters with a single button push
- Test and troubleshoot IP Video quality issues using MOS scores and Stream Expert Analysis
- xTU-C and router replacement feature allows full featured on-premise CPE testing
- POTS detection capability using the DSL module

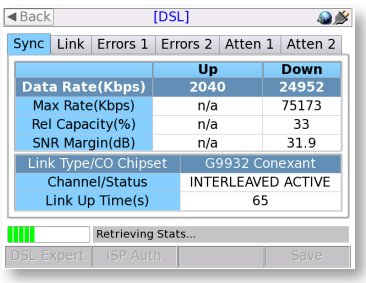
DSL SYNC

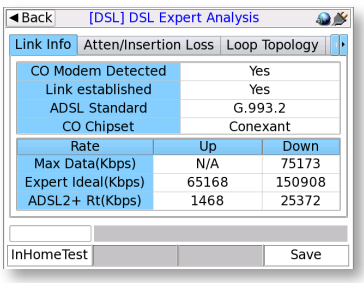
Tech-X Flex® has a single modem that emulates ADSL, ADSL2, ADSL2+ and VDSL 2 standards which ensures maximum flexibility when it comes to maintaining xDSL services in your network. By emulating the xTU-R (customer modem), it enables field technicians to Sync with the DSLAM to separate network issues from in-house problems. The unit also provides a xTU-C (network DSLAM) emulation capability to allow the technician to validate the customer modem is operating properly. The instrument trains with the far end device (DSLAM or Modem) and results such as upstream/downstream rates, noise margin and errors are provided. Graphical results such as bits/bin and noise/bin are easily viewable on the high resolution color display.

DSL EXPERT ANALYSIS

ADSL 2/2+ and VDSL/VDSL2 standards provide Management Information Bases (MIBs) for service technicians to obtain expert diagnostics on the source of low data rates. This can be done without interpreting hundreds of individual results. Using the DSL Expert Diagnostics option, a technician receives a report indicating disturbers such as bridged taps, missing micro filters, WB noise (e.g., T1, HDSL) and how they directly impact the data rate. Results are provided in plain text for immediate action by field personnel.

This option guides troubleshooting activities. The field technician avoids wasting time on problems that do not impact the data rate, thereby minimizing MTTR. The Tech-X Flex diagnostics option eliminates the need for each dispatched technician to be an expert at these new technologies. Fault isolation is quickly and reliably performed.





DSL CHIPSET INTEROPERABILITY

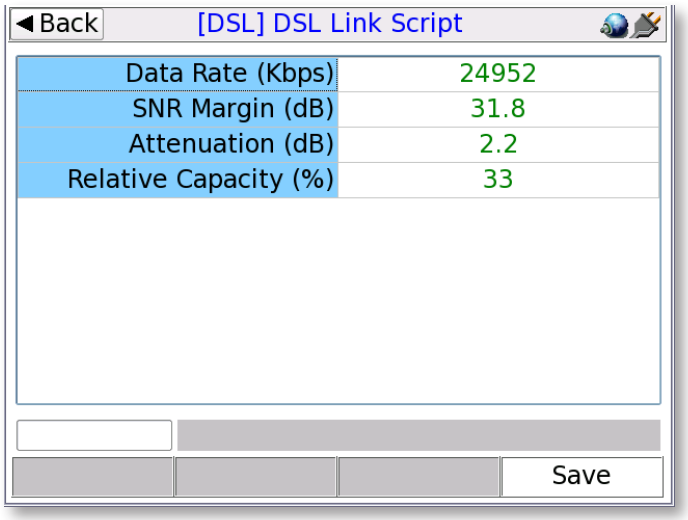
The modem used by Tech-X Flex provides interoperability between leading chipsets such as Infineon, Broadcom, Ikanos and Conexant. This ensures that no matter what DSLAM your field technician has to test against, Tech-X Flex is compatible. In addition, with support for multiple chipsets, you can migrate your DSL network without replacing your field testers.

DSL AUTO TEST—DSL LINK SCRIPT

The DSL Link Script is a quick test suite for comparing certain synchronization parameters with established thresholds in order to quickly evaluate line performance. The parameters evaluated include:

- Data rate (downstream)
- SNR margin
- Attenuation
- Relative capacity

When the script runs, it retrieves the most current versions of these parameters and compares them to the set thresholds.



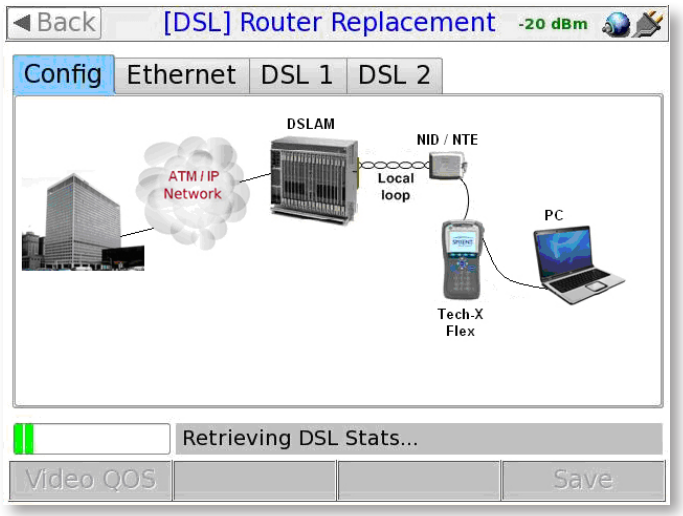
IP/ATM TESTING

The field technician should attempt to verify connectivity to the Internet service provider (ISP) using various IP measurements such as IP ping. By using a URL in a ping or traceroute test, the technician is assured the customer can reach the desired IP address and that the domain name server (DNS) works properly. Tests such as TraceRoute identify where excessive delay is introduced or how far the customer's traffic can traverse the network before a failure.

ROUTER REPLACEMENT FEATURE

The Router Replacement feature allows the Tech-X Flex to function as a simple DSL gateway/router, providing an interface between the DSL link and a downstream Ethernet device such as a computer. With this feature, the downstream device should have full connectivity with the provider network, including access to the Internet as applicable, through the Tech-X Flex unit.

Testing at the DSL Gateway/Router location, allows emulation of a router/ gateway in order to validate the connectivity up to that point and verify a suspect Gateway/Router.



ACTIVE WEB BROWSER

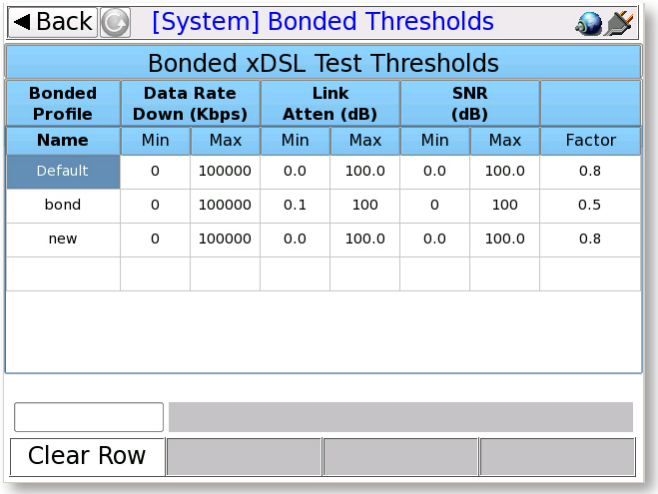
The web browsing feature—which can also operate over the DSL interface—further enhances the field technician's ability to verify DNS operation. By performing this test using the test set, it eliminates the need for the field technician's laptop to be carried in the field yet still provides a visual confirmation to the customer that their service is fully operational.

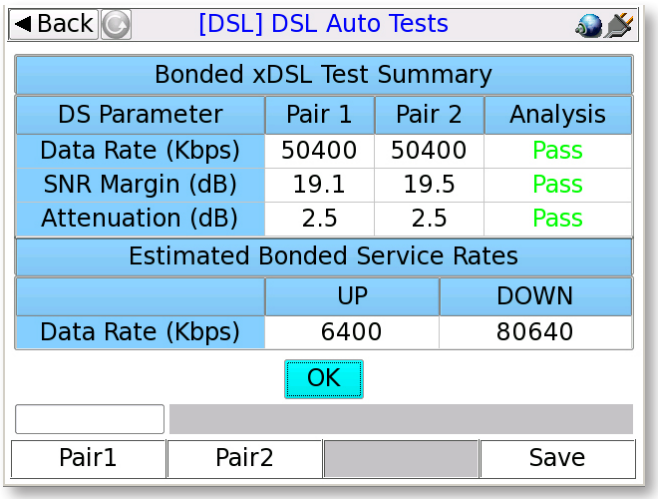
Tech-X Flex employs an active web browser which allows web links to be clicked and data entered into web pages which further removes the need for the technician to carry a laptop to configure CPE devices for example.

BONDED XDSL

This test feature provides a simulated analysis of a bonded xDSL line, a line where two pairs are used to transport separate "halves" of a single DSL service. In this architecture, the two signals are aggregated at each end, providing a much higher bandwidth than would be possible with one pair alone. The Bonded xDSL feature allows the user to establish company specific pass/fail thresholds to ensure Bonded pairs meet the required services parameters.

Upon completion of the Bonded xDSL test, the Tech-X Flex provides an analysis of each pair and estimates of the upstream and downstream data rates that can be achieved on the bonded pairs.



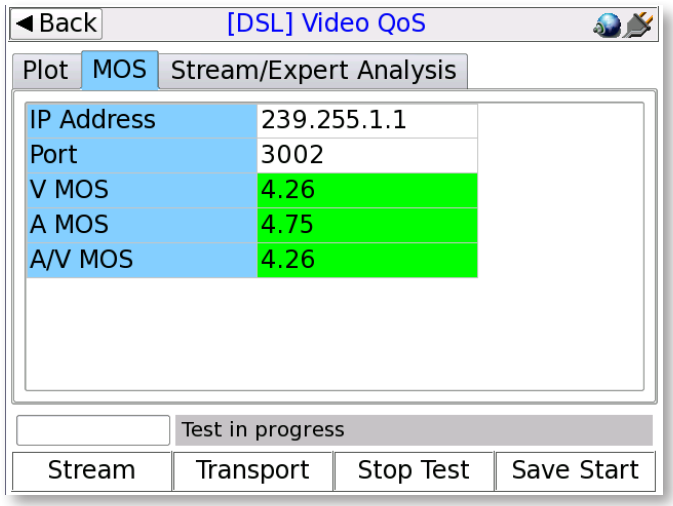


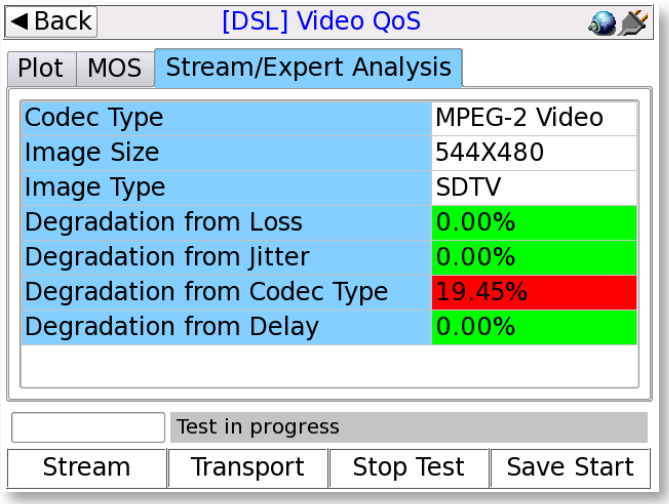
IP VIDEO ANALYSIS

The Tech-X Flex supports both Active and Passive Video Testing. In "Active" testing the test set emulates a multicast endpoint and performs all actions necessary to start and/or join the stream. Depending on the location of the test set, this type of testing can provide the most comprehensive view of the actual subscriber experience. "Passive" testing is the case, where the test set is connected between two existing endpoints and passively monitors the video traffic between them.

IP video testing support includes:

- Subjective quality assessment of viewer experience using MOS scores for audio and video
- Comprehensive statistics on multimedia transport streams using the Stream Expert Analysis
- Video channel change times





SPIRENT TECH-X FLEX

ADSL/VDSL2 TEST MODULE

TECHNICAL SPECIFICATIONS			
Line Modulations	• ANSI T1.413 Issue 2 • ADSL G.DMT (G.992.1/2 Annex A) • ADSL 2 (G.992.3/4 Annex A) • ADSL 2+ (G.992.5 Annex A)	• Reach-Extended ADSL 2 (G.992.3 Annex L) • G.Lite (G.992.2) • VDSL (G.993.1) • VDSL2 (G.993.2)	
Emulations	• xTU-R	• xTU-C	
IP Encapsulations	• PPPoE (RFC 2516) • PPPoA/LLC (RFC 2364)	• PPPoA/VC-Mux (RFC 2364) • Bridged Ethernet	
Authentications	• 802.1x		
IP Connectivity Tests	• ICMP Ping • TraceRoute	• Name Server Lookup • ISP Authentication	
ATM Connectivity Tests	• ATM F4 OAM Loopback	• ATM F5 OAM Loopback	
Line Results	• Data Mode • Line Format • DSLAM Vendor	• Modem State • Modem Error Condition • Output Power	
Up/Downstream Results	• Line Rate Actual • Line Rate Max • Line Rate Capacity • Fast Bit Rate • Interleaved Bit Rate • Noise margin (dB) • Attenuation (dB) • Link Uptime • Correctable FEC Errors • Uncorrectable CRC Errors	• Interleave Path HEC Errors • Loss of Signal • Severely Errored Seconds • Errored Seconds • Severe Errors • Loss (dBm) • Power • Signal Attenuation (dBm/Hz) • Received Blocks • Transmitted Blocks	• Corrected Blocks • Uncorrected Blocks • Interleaved Delay • Interleaved Depth • HEC Error Count • Total HEC Count • KL0 • Impulse Noise

ORDERING INFORMATION

PRODUCT NUMBER	PRODUCT NAME	PRODUCT DESCRIPTION
T5000	Tech-X Flex	With 10/100 Ethernet interface for IP Ping, Traceroute, DHCP/ Static Addressing
T5620	ADSL/VDSL2 Module	xTU-R sync for ADSL to VDSL2 services; also provides Graphical Analysis, ATM Loopback, ISP Authentication, IP Ping and IP Traceroute
T5006	DSL Expert Analysis	Automatic loop and in-home fault analysis and data rate impact. Requires T5620.
T5015	xTU-C Option	Enables xTU-C Emulation for ADSL thru VDSL2 sync. Requires T5620.
T5003	IP Video Option	Provides IP Video set-top box emulation with results such as VMOS, type of video codec, channel change time, packet loss, latency, jitter, out-of-order & Duplicate Packets, I/B/P frame counts, etc.

SPIRENT SERVICES

Spirent Global Services provides a variety of professional services, support services and education services—all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirent.com/gs or contact your Spirent sales representative.

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