Spirent AION

Spirent

Spirent TestCenter Broadband Access Standard and Advanced Bundles, Carrier Ethernet Bundle

Overview

Spirent AION is a flexible delivery platform that enables users to achieve improved deployment and provisioning for all their cloud and network testing needs. It is designed to deliver ultimate flexibility in how Spirent TestCenter platforms are purchased and utilized.

The extended platform combines a wealth of industry-leading test solutions with a flexible licensing architecture to support a wide range of next-generation solution-based domain applications.

AION offers a centralized management hub to help leverage software and hardware functionalities across all lab users and locations for a simplified management and decision-making process:

- **Flexible purchasing options** available via subscription, consumption-based, and perpetual plans, with the ability to license different bandwidth, scale, and protocol bundles.
- **Flexible deployment options** offered include cloud-delivery, on-prem, and laptop-hosted licensing services.

Enhanced user serviceability delivers always-on platform services from auto-discovery and inventory management to user and workspace administration, notifications, and log aggregation.

Broadband Access Standard Bundle

Spirent TestCenter Broadband Access Bundle enables customers to emulate millions of subscribers using different services across multiple ports. It simplifies large-scale test configurations to identify issues involving equipment selection, setting competitive Service Level Agreements (SLAs) and planning growth with confidence. It helps determine QoS per subscriber at different subscriber capacities and to determine capacity at a set QoS bandwidth and it can simulate typical or extreme subscriber traffic load conditions for minutes, hours or days, and evaluate key performance parameters of aggregation devices under controlled conditions. For Triple Play testing, this package supports testing of multiple services per subscriber.

PPPoX is one of the most widely deployed protocols for broadband subscriber authentication and session management. Stability and performance of PPPoX is critical to many service providers' IPTV and data services. **Spirent Broadband Access PPPoX** test solution helps Service Providers and Network Equipment Manufacturers validate subscriber scalability, performance and functionality of access servers and relay agents.
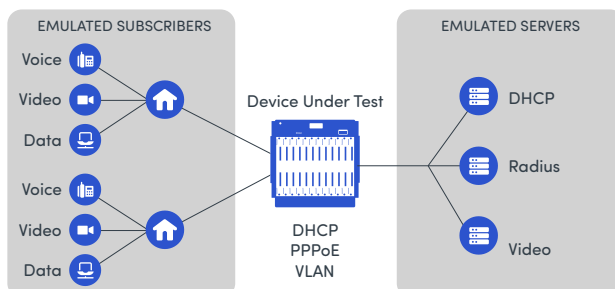
- **Enhanced Realism—**Spirent TestCenter Access test solution emulates real world broadband subscriber behaviors, Triple Play services, and failure scenarios

- **Improved Testing Capacity—** accomplish more in less lab space with the highest number of emulated subscribers and user planes per port and port density

- **Reduced Test Time—**set up tests quickly and easily to validate system performance in realistic, unstable environments rather than an environment optimized for pure performance

- **Detailed Analysis—**Data plane analysis down to the subscriber, service and stream to quickly identify and resolve performance issues that occur in only a small number of subscribers when supporting tens of thousands of subscribers

Broadband Access DHCP test solution enables service providers and network equipment manufacturers to quickly test the subscriber scalability and performance of access networks, DHCPv4, DHCPv6 and DHCP-PD servers and relay agents. Allocation of IP addresses is critical in any network design. The most common method used for issuing IP addresses is through Dynamic Host Configuration Protocol (DHCP). When rolling out next generation access networks and services, many service providers are moving to DHCP for address assignment. Combining authentication and other security measures with DHCP simplifies the provisioning of services like VoIP and IPTV with minimal overhead. To ensure devices like residential gateways, relay agents and DHCP servers are working correctly, network equipment manufacturers and service providers must test their performance and functionality.

Layer 2 Tunneling Protocol (L2TP) is used to support Virtual Private Networks (VPNs) or as part of the delivery of services by ISPs. Layer 2 Tunneling Protocol (L2TP) is used to tunnel PPPoE subscriber sessions to domains. L2TPv3 supports multi-protocol tunneling and provides additional security features, improved encapsulation, and the ability to carry data links other than simply Point-to-Point Protocol (PPP) over an IP network. L2TPv3 provides the flexibility and scalability of IP with the privacy of Frame Relay and ATM. Stability and performance of L2TP is critical to many Service Providers and data services.
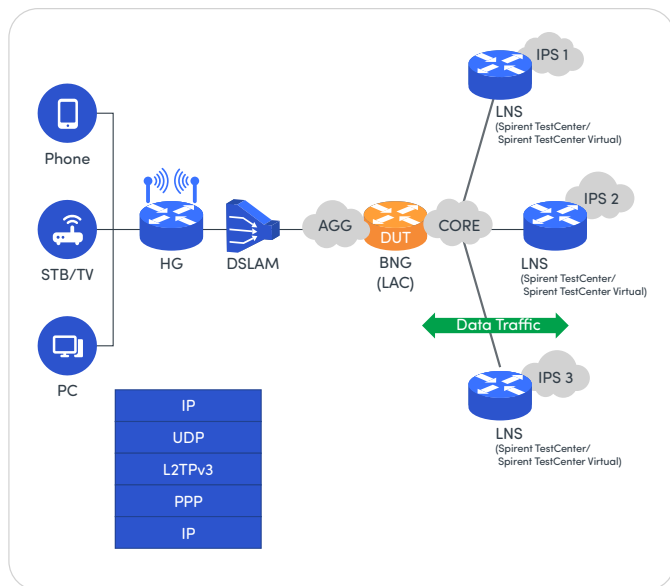
Broadband Access L2TP test solution enables users to emulate thousands of L2TP sessions using different services across multiple ports:

- Users can combine it with PPPoX base package to test DSLAM type devices initiating incoming calls to the LAC.
- Service Providers can emulate multiple LNS instances, one per customer and test fast scale up for optimal utilization of hardware resources.
- L2TP used along with the Topology Emulation feature (DBD) allows user to easily create test scenarios such as DHCP over PPPoL2TP or PPPoL2TP, etc.
- L2TP Stability Wizard lets you quickly set up and tear down PPPoL2TP sessions while optionally running traffic over them.

IPTV is a primary component of Triple Play services (voice, video and data). IPTV provides television content and other services such as Video on Demand (VoD) to broadband subscribers via IP.

One of the most important features of any IPTV service is "channel zapping," the ability for the subscriber device to change channels rapidly. It is extremely important to determine just how much time users wait for video (channel gap) and/or if there are multiple IPTV streams at the same time (channel overlap). Both of these parameters will affect the users' Quality of Experience (QoE).

The greatest concern in any deployment of an IPTV service is the impact on the network. Since it is IP based, there could be hundreds if not thousands of video channels crossing the network, consuming gigabytes of bandwidth and affecting other services. A single HD IPTV channel could be 8 Mbps, and many providers are planning on at least 4 set top boxes (STB) in a single house, resulting in total potential downstream traffic of up to 32 Mbps per subscriber.

Service Providers and Cable Providers need to test IPTV quality of experience, STB scalability and network performance. **Spirent Broadband Access IPTV** test solution fulfills these needs by:

- Determining the impact that hundreds or thousands of channels have on the network
- Evaluating key performance parameters such as channel gap and channel overlap of STBs and other multicast devices
- Stressing the backplane of edge aggregation devices with thousands of clients changing channels across hundreds of ports
- Benchmarking against ideal environments with test equipment generating the traffic on real world servers
- Troubleshooting channel or video quality issues through analysis of extensive reports and channel buffers

Broadband Access Advanced Bundle

Control plane user plane separated BNG (CUSP) architecture is introduced to provide centralized session management, flexible address allocation, high scalability for subscriber management capacity, and cost-efficient redundancy. A control plane and user plane separated BNG is made up of a Control Plane (CP) and a set of User Planes (UPs). The Control Plane is a user control management component which manages UP's resources such as user database and user's Quality of Service (QoS) policy, for example, the access bandwidth and priority management. Control Plane could be virtualized and centralized. The User Plane Management module in the BNG control plane centrally manages the distributed UPs (e.g. load balancing), as well as the setup, deletion, update, and maintenance of channels between control planes and user planes. The User Plane (UP) is a network edge and user policy implementation component. It can support the forwarding plane functions on traditional BNG devices, such as traffic forwarding, QoS, and traffic statistics collection. Several interfaces are involved to support communication between the CP and UP. The CP and UP use service interface to establish VXLAN tunnels with each other and transmit PPPoE and IPoE control plane packets over the VXLAN tunnels. The CP uses control interface to deliver service entries, and the UP uses the control interface to report service events to the CP.

Broadband Access Advanced Bundle emulates up to 200 CUSP user planes and 100K subscribers per test port, and exchange CUSP messages and PPPoE/IPoE control plane packets over VXLAN GPE tunnels with the DUT (device under test) control plane.
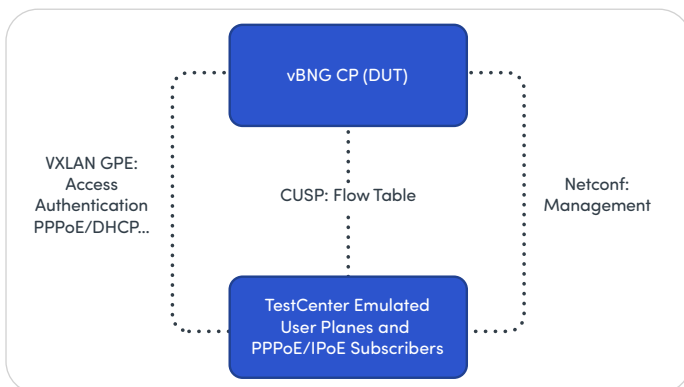
Carrier Ethernet Bundle

Carrier Ethernet Bundle provides comprehensive protocol emulation necessary for functional, interoperability and performance testing of Ethernet Operations, Administration and Maintenance (EOAM) procedures in routers and switches as specified in IEEE802.1ah, IEEE 802.1ag, and ITU-T Y.1731.
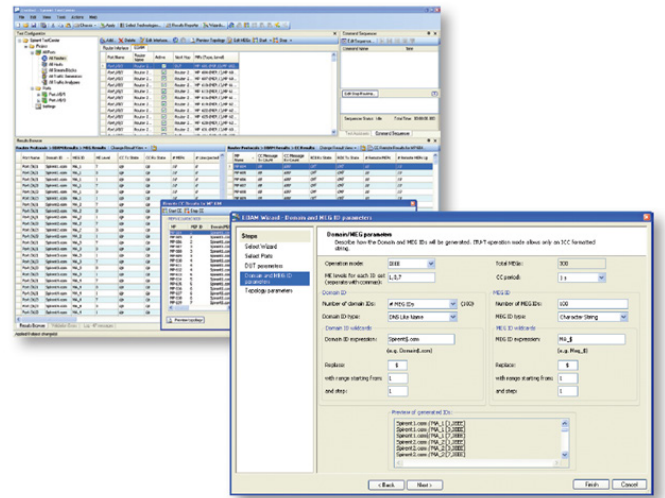
The solution allows users to create large emulated Carrier Ethernet networks from a single test system. Each node in the emulated network can be used to generate and respond to EOAM messages to provide functional or performance testing in a controlled lab environment. It tracks comprehensive EOAM per port, MA and node statistics for quickly validating and troubleshooting devices or systems under test. Highlights include:

- Verify EOAM Connectivity Fault Management (IEEE 802.1AG or ITU-T Y.1731) implementations over 1G, 10G, 25G, 40G, 50G, 100G or 400G interfaces.
- Verify EOAM Performance Monitoring (ITU-T Y.1731) implementations over 1G, 10G, 25G, 40G, 50G, 100G or 400G interfaces.
- 3.3 ms ETH-CC interval supported simultaneously on up to 300 MEPs (Maintenance End Points) on the same port.
- Validate device under test (DUT) intermediate and endpoint behavior as message initiator or responder to Continuity Check, Link Trace, Loopback, Delay Measurement and Loss Measurement messages.
- Test DUT CCM database collection and reporting
- Validate DUT's ability to participate in large emulated maintenance associations with test system scale that supports thousands of emulated end points and MAs per port

Features and Benefits

Broadband Access Bundle

- Emulate up to 128K PPPoE or IPoE subscribers per port

- Emulate up to millions of PPPoE or IPoE subscribers per chassis

- Support both PPPoX server and client mode

- Support IPCPv4 and IPCPv6 simultaneous on same port

- Support DHCPv4, DHCPv6 and DHCP-PD

- Support both DHCP server and client mode

- Support up to 1024 emulated DHCP servers per port

- DHCP Init-Reboot provides faster binding for roaming subscribers with valid lease

- Support multiple addresses per device, using IAID value and IA_NA & IA_PD options in DHPCv6/PD

- Support DHCP over L2GRE tunneling using device behind device functionality

- Support both L2TPv2 and L2TPv3

- Support both LAC and LNS emulation

- Support multiple LNS per port including dual-stack LNS on a single port

- Validate 32-bit session (L2TPv3) & tunnel ID and tunnel authentication over entire message

- Emulate complex subscriber & DSLAM topologies 'behind' L2TPv3 tunnels

- L2TP stability wizard lets you configure session/tunnel stability tests within minutes

- Access over LDP VPLS and Access over BGP VPLS Wizards allow the user to easily configure complex scenarios such as L2TP over LDP VPLS or PPPoL2TP over LDP VPLS

- Support encoded as well as hidden L2TP AVPs and access line AVP extensions for L2TP

- Support encoding the originating number for incoming calling number

- Requests (Connect Speed Update Request: CSURQ) can be setup to be sent on-demand or

- automatically at regular intervals

- Support testing multiple tunnel types: PW, L2VPN, PPP, IPv6

- Support L2TPv3 over IP and UDP

- Support PPP over L2TPv3 over UDP/TCP

- Support Layer 2 VPN tunneling - Ethernet, VLAN and QinQ pseudowires (PW) over L2Tpv3

- Support IPv4 or Ipv6 over Ethernet over L2TPv3

- Support reliable delivery of L2TP control messages

- Support L2TP control message authentication

- Create traffic patterns to test Triple Play

- Set VLAN and QoS settings for subscribers

- Detailed analysis: upstream, downstream and peer-to-peer analysis per subscriber or port

- Interactive feature allows functional and negative testing including connecting and disconnecting groups of subscribers

- Support custom PPPoX , DHCP, and L2TP option editor

- Support auto retry failed or disconnected sessions

- Integrated protocol counters allows user to track protocol messaging

- Analyze and chart detailed results in real time or export to HTML or PDF

- Duplicate and copy/paste feature allows quick setup of many host blocks

- Easily create large-scale tests with features such as duplicate and copy/paste

- Powerful Command Sequencer enables realistic scenarios and session flapping, and provides integrated control plane connect and disconnect and data plane events, allowing users to view the result of a control plane event graphically in real time

- Integrated capture feature allows users to capture and decode control plane and data plane traffic, enabling deep functional troubleshooting

- Support IGMPoPPPoE, IGMPoPPPoEoQnQ, IGMPoPPPoEoVLAN, IGMPoDHCP, IGMPoDHCPoQnQ, IGMPoDHCPoVLAN, IGMP/MLDoQnQ, IGMP/MLDoVLAN

- Emulate thousands of IPTV subscribers per port who are changing channels

- Create different client profiles for measuring the impact of IPTV subscribers channel zapping/surfing

- Identify the min/max/avg of when there is no traffic (gap) or when there are two channels at once (overlap)

- Detailed graphical results of statistics such as min/max/avg channel change

Features and Benefits (cont'd)

Broadband Access Advanced Bundle

- Emulate up to 200 CUSP user planes per port
- Emulate up to 100K PPPoE or IPoE subscribers per test port and 20M PPPoE or IPoE subscribers per system
- Support both IPv4 and IPv6 transport

Carrier Ethernet Bundle

- Comprehensive, real time EOAM protocol counters for interactive testing and troubleshooting
- Generate and analyze EOAM messages for thousands of emulated MEPs
- Topology preview for visualizing emulated nodes and their connectivity to other nodes
- Summarized counters and information with drill-down statistics for problem identification and analysis
- Tracks message counts, timeouts and unexpected messages for all emulated nodes
- View detailed Link Trace path information
- Test configuration wizard for quick setup of multi-node, multi-MA/MEG topologies, including MAID/MEG ID stepping/iteration
- Supports EOAM messaging over single or stacked VLANs
- Easy to use Optional TLV editor
- Chain up to 254 MIPs for Link Trace testing
- Operates in IEEE or ITU-T mode

Technical Specifications

Parameter	Description
Broadband Access Bundle	
PPPoX	
RFC 1332	The PPP Internet Protocol Control Protocol (IPCP)
RFC 1334	PPP Authentication Protocols
RFC 1570	PPP LCP Extensions
RFC 1661	The Point-to-Point Protocol (PPP)
RFC 1877	PPP Internet Protocol Control Protocol Extensions for Name Server Addresses
RFC 1662	PPP in HDLC-like Framing
RFC 1994	PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2364	PPP Over AAL5
RFC 2472	IP Version 6 over PPP
RFC 2516	A Method for Transmitting PPP Over Ethernet (PPPoE)
RFC 4241	A Model of IPv6/IPv4 Dual Stack Internet Access Service
RFC 5072	IP Version 6 over PPP
TR-101	DSL Forum TR-101
DHCP	
RFC 2131	Dynamic Host Configuration Protocol
RFC 2132	DHCP Options and BOOTP Vendor Extensions
RFC 3046	DHCP Relay Agent Information Option
RFC 3118	Authentication for DHCP Messages
RFC 3203	DHCP reconfigure extension
RFC 3315	Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
RFC 3363	Representing Internet Protocol version 6 (IPv6) Addresses in the Domain Name System (DNS)
RFC 3527	Link Selection sub-option for the Relay Agent Information Option for DHCPv4
RFC 3633	IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6
RFC 3646	DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
RFC 3736	Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 4580	Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Subscriber-ID Option
RFC 4649	Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Remote-ID Option
RFC 4862	IPv6 Stateless Address Autoconfiguration
RFC 5107	DHCP Server Identifier Override Suboption
RFC 6221	Lightweight DHCPv6 Relay Agent
L2TP	
RFC 2661	Layer Two Tunneling Protocol – Version 2
RFC 3931	Layer Two Tunneling Protocol – Version 3
RFC 5515	Layer 2 Tunneling Protocol (L2TP) Access Line Information Attribute Value Pair (AVP) Extensions
ANCP	
RFC6320	Protocol for Access Node Control Mechanism in Broadband Networks
draft-lihawi-ancp-protocol-access-extension-00	Access Extensions for the Access Node Control Protocol
draft-wadhwa-gsmp-l2control-configuration-02	GSMP extensions for Access Node Control Mechanism
Broadband Access Advanced Bundle	
CUSP	
RFC 8772	The China Mobile, Huawei, and ZTE Broadband Network Gateway (BNG) Simple Control and User Plane Separation Protocol (S-CUSP)
draft-ietf-nvo3-vxlan-gpe-11	Generic Protocol Extension for VXLAN (VXLAN-GPE)
Carrier Ethernet Bundle	
Ethernet OAM	
IEEE 802.3ah	Ethernet Link OAM
IEEE 802.1ag	Connectivity Fault Management
ITU-T Y.1731	**Fault Management and Performance Monitoring**

Ordering Information

Product Number	Description
AON-PB-ACCESS*	AION Broadband Access Bundle
AON-PB-ACCESS-ADV**	AION Broadband Access Advanced Bundle
AON-PB-CARRIER-ETH***	AION Carrier Ethernet Bundle

*   *Requires AION Routing & Switching Bundle (AON-PB-RTSW)*

** *Requires AION Routing & Switching Bundle (AON-PB-RTSW) and AION Broadband Access Bundle (AON-PB-ACCESS)*

*** *Requires AION Routing & Switching Bundle (AON-PB-RTSW) and AION Multiprotocol Label Switching Bundle (AON-PB-MPLS)*

spirent™