Spirent AION

Spirent TestCenter SDN Bundle

Overview

Spirent AION is a flexible licensing 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.

Software-Defined Networking (SDN) Bundle

Software-Defined Networking (SDN) promises to improve the elasticity and agility of networks, enabling service providers to rapidly respond to customer demands for new services. These promises need to be put to the test. In addition, the challenges posed by SDN networks on maintaining reliability, improved scalability and security need to be analyzed and tested.

Critical SDN test objectives include:

- Programmability—interoperability in multi-vendor environments
- Scalability—program millions of traffic engineering paths
- Performance - time needed to program millions of paths
- Reliability - quick recovery from failures
- Redundancy and high availability - verify load sharing and state synchronization
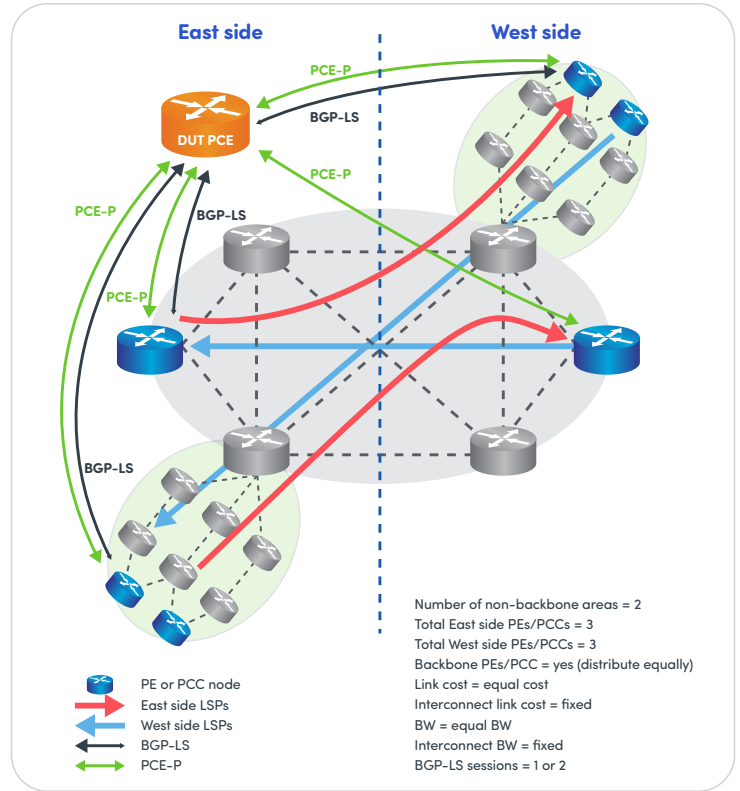- Security—handle malicious and DDoS attacks

Path Computation Element Communication Protocol (PCEP) provides an evolutionary approach to provide centralized SDN functionalities so that core SP network requirements such as provisioning TE service paths, SLA maintenance, fast fail-over convergence, fault-OAM capabilities can be satisfied at the same time.
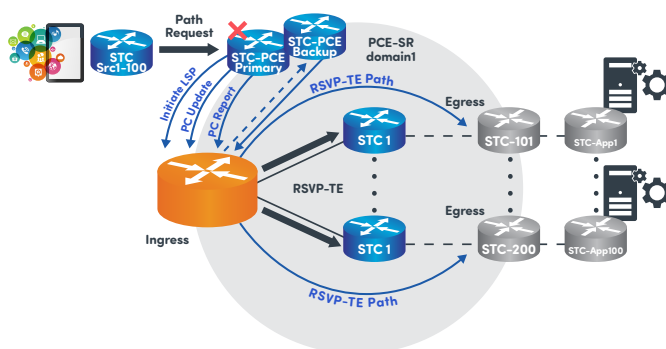
- **Realistic Network Emulation—** emulate complex, real world network topologies and functional, scalability, performance, high availability and failover convergence of SDN networks under typical and extreme traffic load conditions

- **Comprehensive SDN Protocol Support—**for PCEP, BGP-LS, BGP Flowspec, Segment Routing and SRv6 protocol emulation with the capability to create comprehensive test scenarios for dynamic and large service provider networks

- **Increased Productivity— c**onfiguration wizards allow quick setup of large-scale test topologies, complex test scenarios can be easily automated using interactive PECP, BGP-LS, segment routing commands via Command Sequencer

- **Cost-Effective Solution—** comprehensive SDN protocol emulation suite in a single, affordable package

Spirent PCEP Emulation provides the ability to emulate PCE Controller and PCE Client (PCC) and enables functional, scalability, performance and interoperability testing of PCE protocol. It allows the user to test complex scenarios such as high availability and failover-convergence for PCE. It is part of the Spirent SDN test solution that consists of other SP-SDN protocols such as BGP-LS and BGP Flowspec. Together with Segment Routing, these protocols provide the capability to create comprehensive test scenarios for the dynamic and large service provider networks.

BGP-LS becomes important when LSP paths cross multiple routing domains or when IGP routing information is required by external entities such as Application-Layer Traffic Optimization (ALTO) or PCE servers for optimized path computation. In both these scenarios IGP protocols are unsuitable for distributing the routing information (including traffic engineering information) appropriately. Recent adoption of SP-SDN protocols has fueled the BGP-LS deployment and hence the need to test scalability and performance of BGP-LS in scenarios where BGP-LS implementations interoperate or co-exist with other SP-SDN protocols such as PCEP and segment routing.

East side   West side

PCE-P
BGP-LS
DUT PCE
PCE-P
PCE-P
BGP-LS
PCE-P
BGP-LS

PE or PCC node
East side LSPs
West side LSPs
BGP-LS
PCE-P

Number of non-backbone areas = 2
Total East side PEs/PCCs = 3
Total West side PEs/PCCs = 3
Backbone PEs/PCC = yes (distribute equally)
Link cost = equal cost
Interconnect link cost = fixed
BW = equal BW
Interconnect BW = fixed
BGP-LS sessions = 1 or 2

Features and Benefits

- PCEP emulation support both PCE and PCC modes
- Support for Stateful PCE and PCE Initiated LSPs
- Support capability negotiation
- Support Request/Reply messages
- Support RSVP-TE LSP protection and auto bandwidth scaling
- Support SR-TE LSP with SR ERO and SR RRO sub-TLV
- Support SR-TE LSP with SRv6 ERO and SRv6 RRO sub-TLV
- Ability to configure PCEP session parameters
- Support ERO, RRO, Metric, Bandwidth, SRP, LSP and LSP Attribute Objects
- Support LSP Path Verification using ERO/RRO mapping
- Support Custom PECP TLVs
- Support PCEP Stateful IPv4 P2MP LSP
- Verify PCE path selection and path optimization within constraints and on network failure
- Support high availability test scenarios with STC emulating primary and backup PCE controllers, PCE Overloading and PCE not responding
- Support PCEP interactive commands such as sending report messages with mandatory and optional objects, remove LSPs, delegation or revoke delegation, sending update messages with the desired objects
- Auto-response as well as more granular control to message response using Command Sequencer

- Support negative testing. Ability to generate unknown messages, Illegal PDUs and TLVs
- Support emulation of complex IGP topologies using OSPF or ISIS behind the BGP-LS emulated router
- Advertise multi-domain or multi-area topologies using OSPF or ISIS via BGP-LS
- Support BGP router reflector mode and BGP client mode for BGP-LS emulation
- Ease of configuring large-scale test topologies for BGP-LS via the BGP wizard
- Support link state NLRI for link, node, IPv4/IPv6 prefix
- Support specifying TE parameters for OSPF and ISIS
- Support BGP capabilities for VPN and non-VPN AFI types
- Ability to peer with multiple IPv4 or IPv6 BGP-LS routers at the same time
- Support BGP-LS interactive commands such as withdraw or re-advertise link state NLRI
- Support BGP community and extended community support
- Wireshark dissector support for PCEP and BGP-LS messages objects and TLVs
- Easy automation for complex test scenarios using interactive PECP and BGP-LS commands available in Command Sequencer

Technical Specifications

Parameter	Description
PCEP	
RFC 5440	Path Computation Element (PCE) Communication Protocol (PCEP)
RFC 5521	Extensions to the Path Computation Element Communication Protocol (PCEP) for Route Exclusions
RFC 8231	Path Computation Element Communication Protocol (PCEP) Extensions for Stateful PCE
RFC 8232	Optimizations of Label Switched Path State Synchronization Procedures for a Stateful PCE
RFC 8281	Path Computation Element Communication Protocol (PCEP) Extensions for PCE-Initiated LSP Setup in a Stateful PCE Model
RFC 8408	Conveying Path Setup Type in PCE Communication Protocol (PCEP) Messages
RFC 8623	Stateful Path Computation Element (PCE) Protocol Extensions for Usage with Point-to-Multipoint TE Label Switched Paths (LSPs)
draft-ietf-pce-segment-routing-14	PCEP Extensions for Segment Routing
draft-ietf-pce-association-group-07	PCEP Extensions for Establishing Relationships Between Sets of LSPs
draft-ananthakrishnan-pce-stateful-path-protection-03	PCEP Extensions for MPSL-TE LSP Path Protection with stateful PCE
draft-sivabalan-pce-binding-label-sid-06	Carrying Binding Label/Segment-ID in PCE-based Networks
draft-tanaka-pce-stateful-pce-mbb-07	Make-Before-Break (MBB) MPLS-TE LSP restoration and re-optimization procedure using Stateful Path Computation Element (PCE)
draft-li-pce-sr-path-segment-04	Path Computation Element Communication Protocol (PCEP) Extension for Path Segment in Segment Routing (SR)
draft-cheng-spring-mpls-path-segment-00	Path Segment in MPLS Based Segment Routing Network
draft-ietf-pce-segment-routing-ipv6-06	PCEP Extensions for Segment Routing leveraging the IPv6 data plane
BGP LS	
RFC 7752	North-Bound Distribution of Link-State and Traffic Engineering (TE) Information Using BGP
draft-ietf-idr-bgp-ls-segment-routing-ext-11	BGP Link-State extensions for Segment Routing
draft-ietf-idr-bgpls-segment-routing-epe-15	BGP-LS extensions for Segment Routing BGP Egress Peer Engineering
BGP Flowspec	
RFC 5575	Dissemination of Flow Specification Rules
draft-ietf-idr-flow-spec-v6-08 -	Dissemination of Flow Specification Rules for IPv6

Ordering Information

Product Number	Description
AON-PB-SDN*	AION SDN Bundle

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

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