

# TestCenter™

## Segment Routing Emulation

### Overview

Segment Routing is based on source routing. The key motivation behind Segment Routing is to reduce the complexity that exists in today's network nodes due to MPLS control plane.

Segment Routing obviates the need for MPLS control plane by using IGP protocols such as OSPF, ISIS, and BGP to distribute the forwarding labels or segment IDs. As a result, only the ingress node needs to maintain the state for the traffic flows but the MPLS forwarding plane can be re-used for forwarding traffic using segment routing labels.

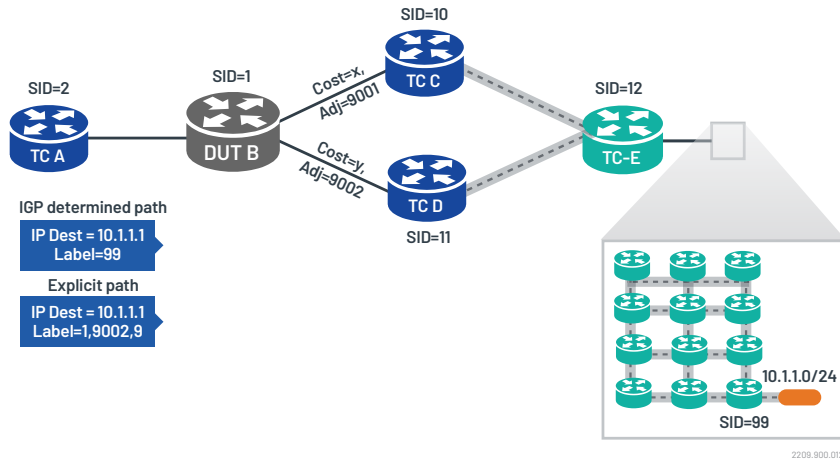
Since the forwarding state of the traffic flow is in the segment routing header of the packet, it paves the way for network programmability or SDN functionality with less disruptive changes to the existing network. Policies may be defined administratively at the ingress node or dynamically using a centralized SDN controller.

Segment Routing is an evolutionary approach towards SDN and reducing complexity in the existing network nodes, in addition to testing the scalability, functionality, performance of the protocol implementation, it is important to verify the interoperation between SR and non-SR capable network nodes.

VIAVI Segment Routing Emulation enables functional, scalability, performance, and interoperability testing of the Segment Routing protocol. The solution supports OSPF, ISIS, and BGP extensions for Segment Routing.

### Features

- **Realistic Network Emulation** – emulate complex, real world network topologies and functional, scalability, performance, high availability, and failover convergence of Segment Routing networks under typical and extreme traffic load conditions
- **Comprehensive Testing** – verify control plane topology setup, test load balancing, traffic isolation, interworking between segment routing and non-segment routing devices
- **Increased Productivity** – configuration wizards allow quick setup of large-scale test topologies, complex test scenarios can be easily automated using segment routing commands via Command Sequencer
- **Cost-Effective Solution** – scalability testing for maximum number of segments per node and benchmarking number of VRFs, PEs for VPN over segment routing test scenarios



Segment Routing Test Topology

This package is an integrated component of VIAMI TestCenter and works with other TestCenter components. Segment Routing protocols can be combined with SDN, Routing and Switching, Access or Data Center protocols.

## Benefits

- Service Providers & Enterprises can test their Segment Routing implementations & help them transition to the new paradigm of Software-Defined Networking (SDN)
- Verify control plane topology setup using Segment Routing
- Test Load balancing using anycast segments and ECMP
- Test traffic isolation for VPN over Segment Routing
- Verify interworking of SR and non-SR capable devices
- Scalability testing for maximum number of segments per node and benchmarking number of VRFs, PEs for VPN over SR test scenarios
- Verify fast re-route using LFA (Loop Free Alternate)
- Measure convergence and reversion time on node or link failure

## Features/Support

- OSPF, ISIS, & BGP extensions for segment routing
- OSPFv3, ISIS & BGP extensions for SRv6 BE and TE policy
- Data plane traffic binding with segment routing and SRv6 control plane
- Segment routing based L3VPN and EVPN service
- SRv6-based BGP L3VPN, EVPN, and Internet services
- BGP and ISIS SRv6 “micro segment” (uSID for short) and G-SID with compressed SRv6 segment list
- Generalized SRv6 with BGP, IGP and OAM
- IGP (ISIS, OSPFv2 and OSPFv3) flexible algorithm
- IGP (ISIS and OSPFv2) application-specific link attributes
- BFD and S-BFD for SRv6 BE and TE policy
- Segment routing network resi-liency include TI-LFA & S-BFD
- TI-LFA over SRv6 BE & policy
- Interworking of segment routing and non-SR capable devices
- Verify interworking of segment routing and SRv6
- Thousands of PE /P routers and CE devices, tens of thousands of SRv6 policy tunnels and millions of IP/VPN/EVPN routes
- Up to 16 SR in SRH
- Interactive commands to age or advertise segment routing information
- Auto generating segment routing objects and TLVs in the IGP protocol wizards
- Segment routing LAN Adj SID
- Segment routing ISIS mapping server TLV
- Segment routing with up to 20 Label stack with SR MPLS labels
- Segment routing with L2VPN (VPLS, VPWS (martini) and L3VPN (6PE/6VPE) wizards
- Wireshark dissector for segment routing objects and TLVs
- Ping and Trace Route over SRv6 TE
- BGP and IS-IS extension for Multicast SRv6
- BFD, S-BFD, U-BFD for SRv6 BE and TE

## Technical Specifications

<b>Segment Routing</b>	
RFC 8665	OSPF Extensions for Segment Routing
RFC 8666	OSPFv3 Extensions for Segment Routing
RFC 8667	IS-IS Extensions for Segment Routing
draft-ietf-isis-segment-routing-msd-15	Signaling MSD (Maximum SID Depth) using IS-IS
RFC 8669	Segment Routing Prefix Segment Identifier Extensions for BGP
draft-ietf-lsr-flex-algo-16	IGP Flexible Algorithm
draft-ietf-idr-segment-routing-te-policy-14	Advertising Segment Routing Policies in BGP
RFC 8919	IS-IS Application-Specific Link Attributes
RFC 8920	OSPF Application-Specific Link Attributes
draft-cheng-spring-mpls-path-segment-00	Path Segment in MPLS Based Segment Routing Network
draft-ietf-mpls-spring-lsp-ping-02	Label Switched Path (LSP) Ping/Trace for Segment Routing Networks Using MPLS Dataplane
<b>SRv6</b>	
RFC 8986	Segment Routing over IPv6 (SRv6) Network Programming
draft-previdi-isis-ipv6-prefix-sid-01	Segment Routing IPv6 Prefix-SID
draft-li-ospf-ospfv3-srv6-extensions-07	OSPFv3 Extensions for SRv6
draft-ietf-6man-segment-routing-header-14	IPv6 Segment Routing Header (SRH)
draft-ietf-lsr-isis-srv6-extensions-17	IS-IS Extensions to Support Routing over IPv6 Dataplane
draft-bonica-6man-comp-rtg-hdr-08	The IPv6 Compact Routing Header (CRH)
draft-ietf-bess-srv6-services-15	SRv6 BGP based Overlay Services
draft-filsfils-spring-net-pgm-extension-srv6-usid-10	Network Programming extension: SRv6 uSID instruction
CMCC xxx	General Technical Requirements for Generalized SRv6
RFC9259	Operations, Administration, and Maintenance (OAM) in Segment Routing over IPv6 (SRv6)

## Ordering Information

Part Number	Description
BPK-1317A	Segment Routing for OSPFV2 Base Package A
BPK-1318A	Segment Routing for ISIS Base Package A
BPK-1329A	Segment Routing for BGP Base Package A
BPK-1341	Segment Routing LSP PING Base Package
BPK-1345	Segment Routing V6 for IS-ISV6 Package
BPK-1346	Segment Routing V6 for OSPFV3 Package
BPK-1347	Segment Routing IS-ISV4 L2-Bundle Package
BPK-1348	Segment Routing V6 Based VPN Package
BPK-1365	Flex-Algo for ISIS-SR Package
BPK-1366	FLEX-ALGO OSPF-SR Package
BPK-1377	OSPFV3 Extensions for Segment Routing Base Package (MPLS)
BPK-1397	BFD AND Sbfd FOR SRv6 Policy
BPK-1398	Segment Routing V6 Ping Base Package
BPK-1399	Segment Routing V6 Traceroute Base Package
BPK-1400	BFD and Sbfd for SR MPLS
BPK-1401	Multicast Segment Routing V6 for IS-IS Base Package
BPK-1402	Multicast Segment Routing V6 for BGP Base Package
BPK-1403	Ping for Multicast Segment Routing V6 Base Package
BPK-1404	Traceroute for Multicast Segment Routing V6 Base Package
SPK-1131	Segment Routing for OSPFV2 and ISIS Test Solution
SPK-1131A	Segment Routing for OSPFV2, ISIS and Bgp Test Solution
SPK-1211	FLEX-ALGO for ISIS & OSPF Package
SPK-1216	Multicast Segment Routing V6 for IS-IS and BGP Test Solution
SPK-1217	Segment Routing V6 and SDN Basic Test Solution
SPK-1218	Segment Routing V6 and SDN Advanced Test Solution
TPK-1084	SR-TE Convergence Methodology Test Package



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