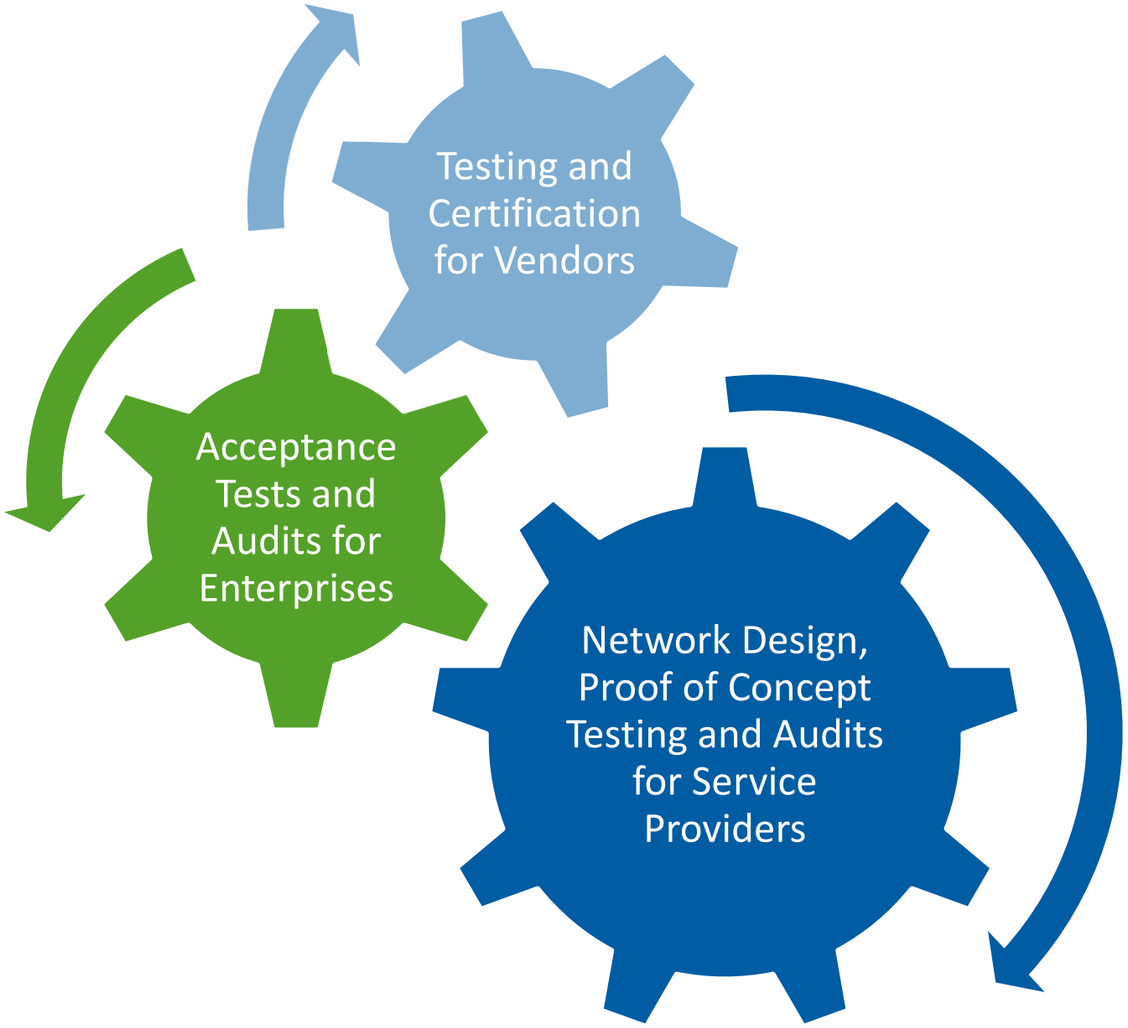
SRv6 Multi-Vendor Interoperability Test Status

Carsten Rossenhövel, CTO & Co-Founder, EANTC

IETF 118, November 6, 2023

EANTC
EUROPEAN ADVANCED NETWORKING TEST CENTER

About the European Advanced Networking Test Center



- State of the art testing expertise focusing on innovative telecom technologies
- Emulating fully realistic scenarios representative for today's production networks
- EANTC is 100% independent and vendor-neutral
- Adhering to highest quality standards and actively participating in test methods standardization

redefine the possible log in. berlin.

Tested by EANTC 2023

EANTC

Interoperability Event at MPLS SDN 2023 – Goals

Advance multi-vendor interoperability of service provider transport network solutions

Use cases:

- Enterprise & cloud data center services and interconnection
- 5G x-haul network transport

Focus on innovations in EVPN, Segment Routing, SDN, and Clock Synchronization

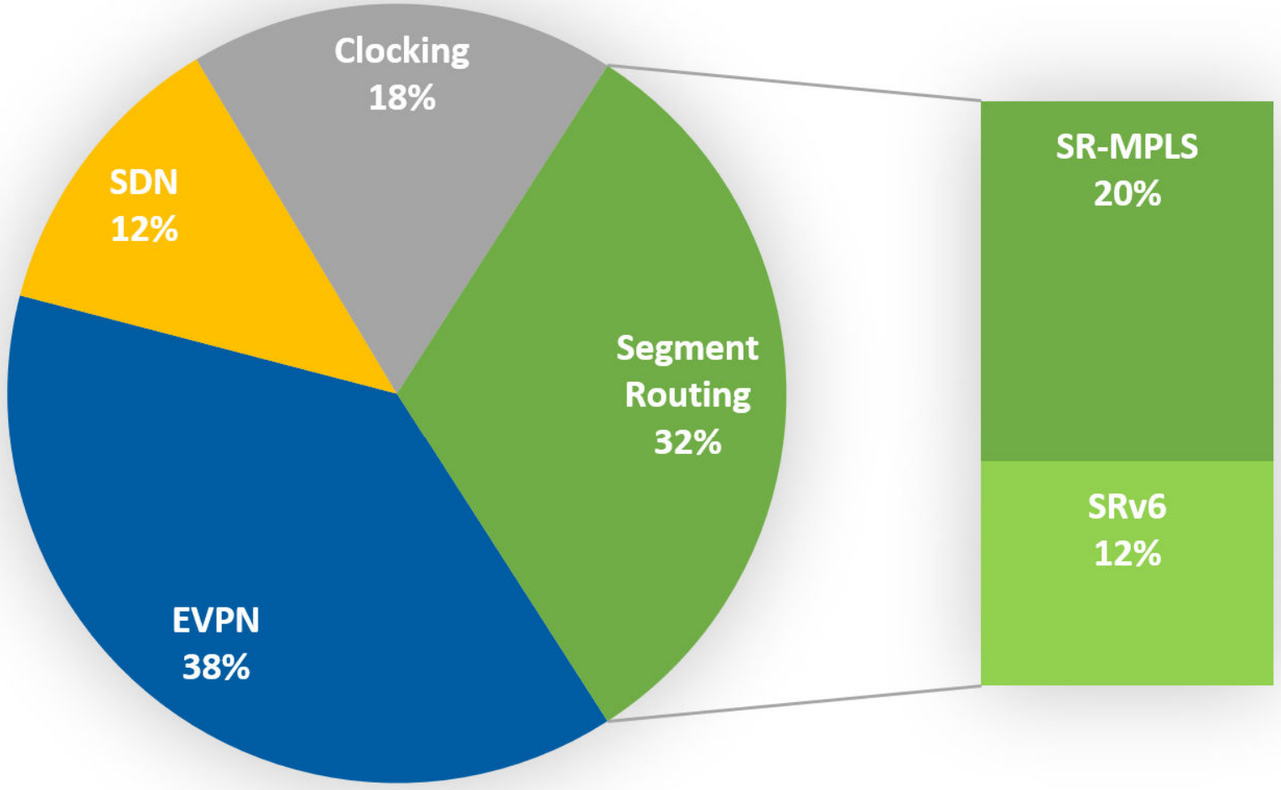
Test Setup at MPLS SDN Conference (Paris) in April

Participating Vendors and Devices

7050 7280Rx	8201 ASR 990x Crosswork NCS 540 NCS 57x1 IOS XRd	Aruba CX83xx Aruba CX9300 Aruba CX10000	IxNetwork
			TimeProvider 4100
UfiSpace S9600 UfiSpace S9710		NCE NetEngine 8000 F8 NetEngine 8000 M4	7750 SR-1 Network Services Platform (NSP)
		E810-QCDA2T E810-XXVDA4T	BF2556X-1T
Paragon-neo/-X Sentry SNE	6273 667x	ACX7024 ACX7100 MX204 Paragon Pathfinder PTX10001-36MR QFX51x0	NPT-2100A
5166			STC

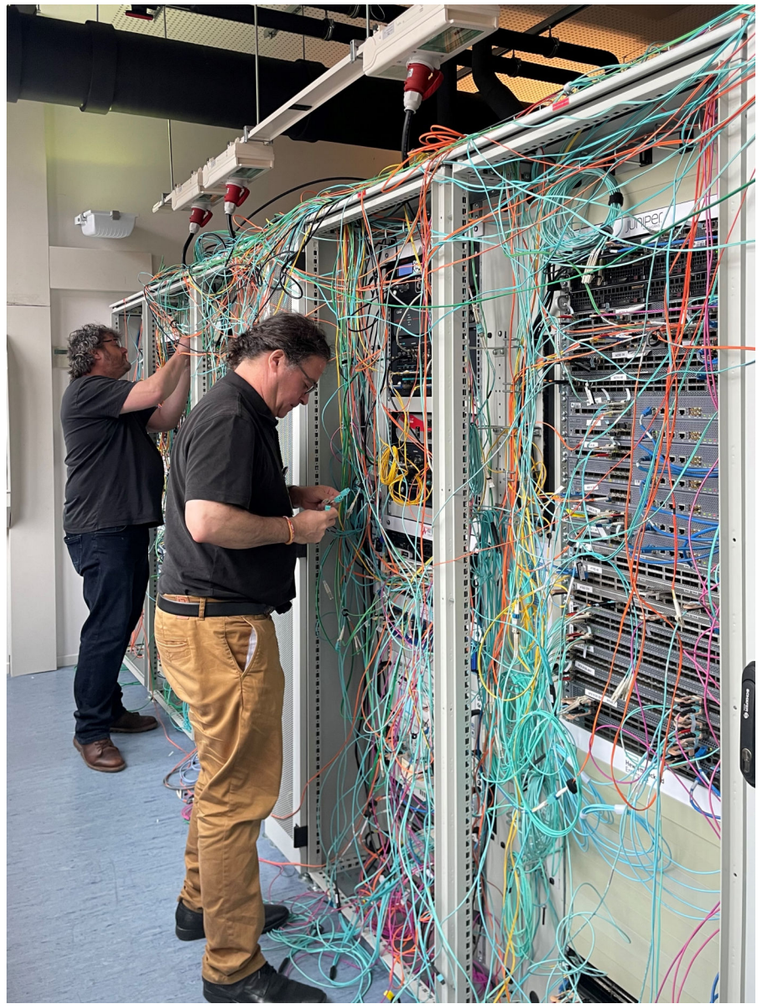
Event Overview

- 5 months of preparation with detailed test case planning
- 2 weeks of hot staging with all vendors in Berlin
- 80 participants on-site & remote
- 1,232 results validated by multi-vendor peers and EANTC
- 97 devices under test by 17 vendors in 6 test areas
- 61 complex interoperability test cases



Results per Test Area

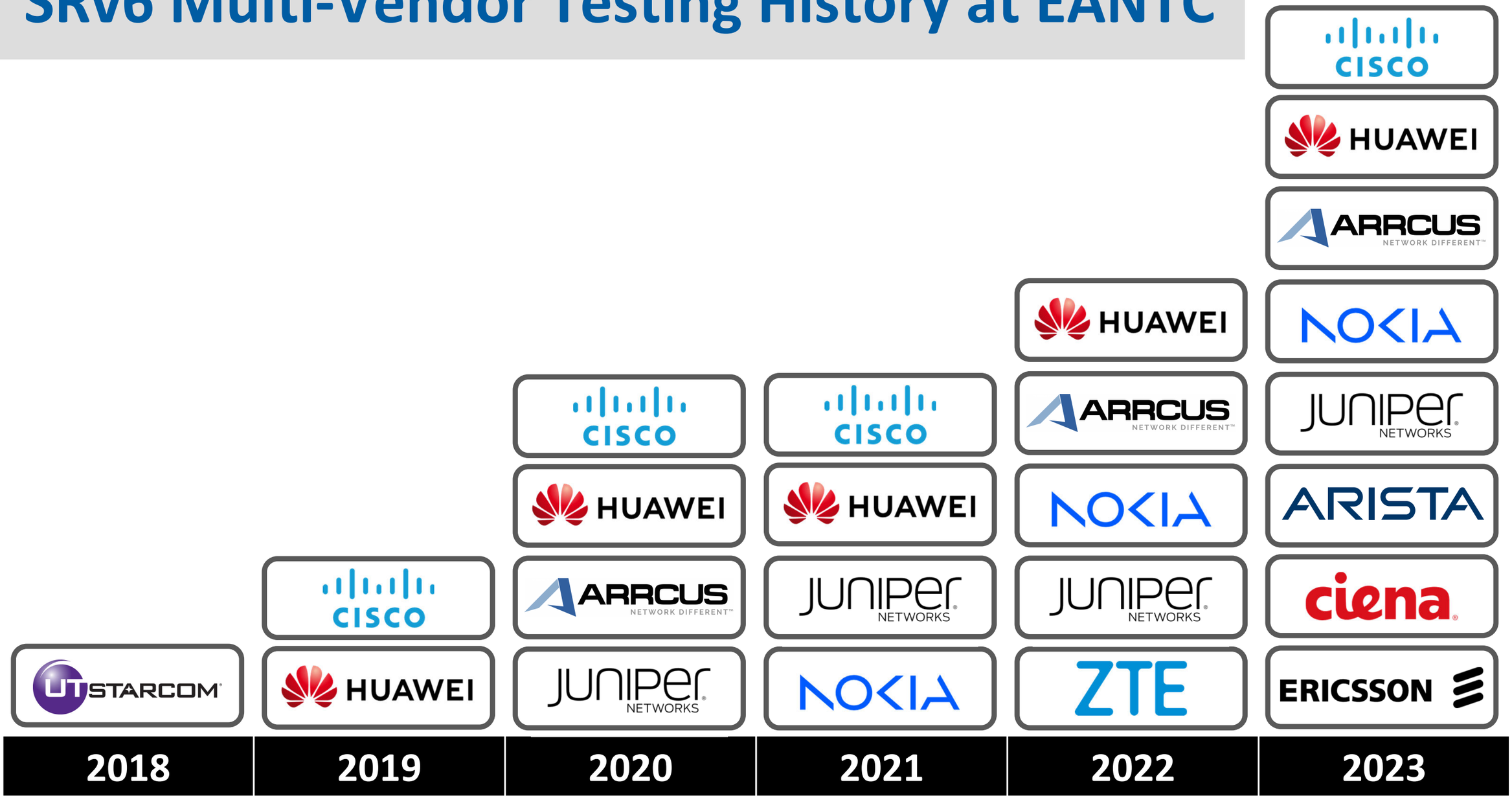
Hot Staging Impressions



SRv6 – Overview

- The source node determines paths through the network
  - **Calculates** a list of segments (IPv6 addresses)
  - Based on routing information available at the source node
  - Path is **conveyed as "SIDs"** (segment IDs) in each packet header
- SRv6 provides network programming capabilities
  - Allowing for actions to be applied to the traffic
- Enables seamless transport networks
  - Spanning long-haul, metro, and data center/cloud environments
  - Eliminates the need for gateways between MPLS, VXLAN, etc.
- Micro Segment (µSID) instructions have been added to the SRv6 architecture, improving scalability and MTU efficiency

SRv6 Multi-Vendor Testing History at EANTC



EANTC Test Coverage for SRv6 in 2023

Routing Basics

- BGP Global Routing Table
- µSID

Services

- L3VPN
- EVPN

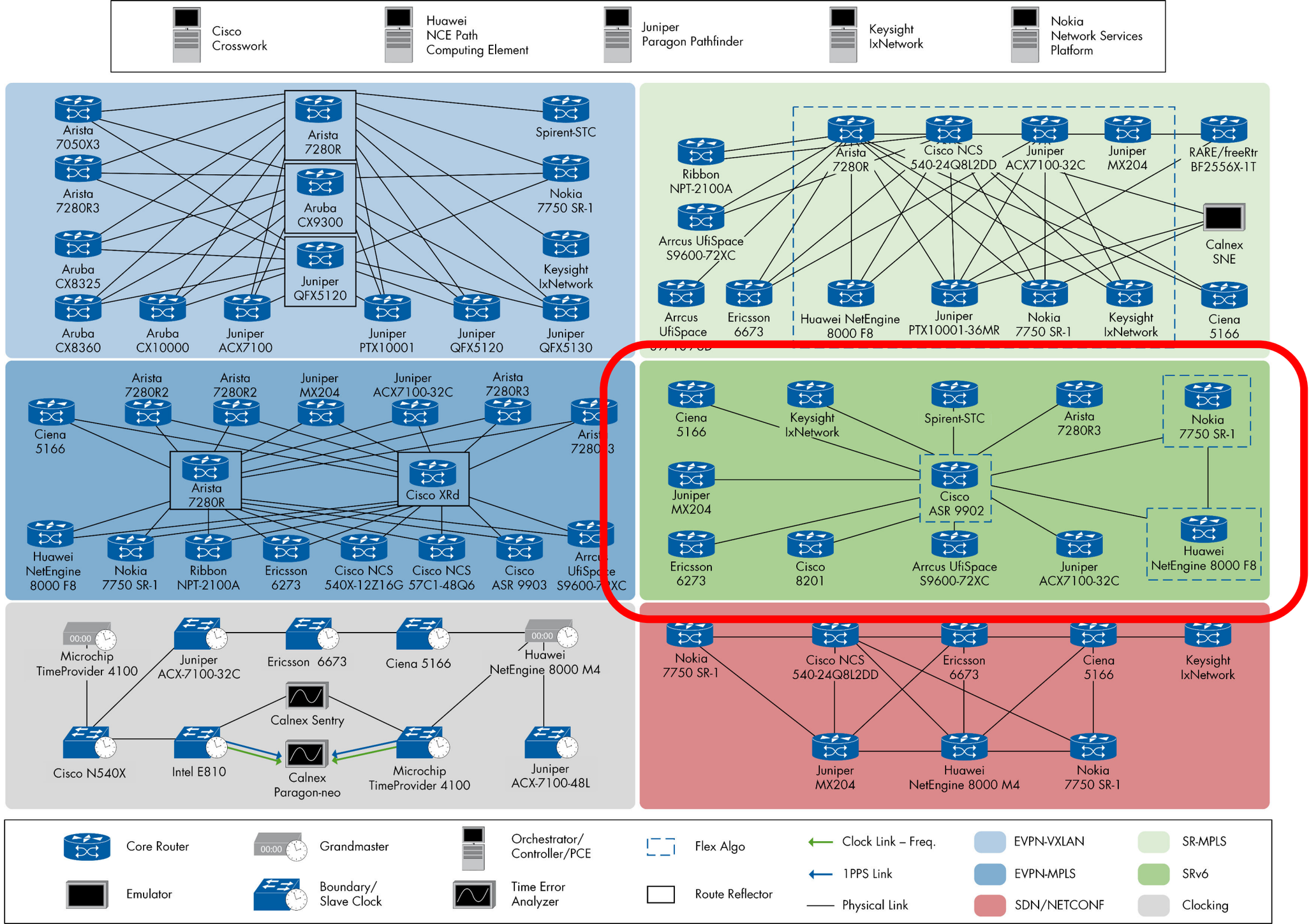
Resiliency

- Loop-Free Alternate (TI-LFA)
- Unreachable Prefix Announcement

Constraint-Based Routing

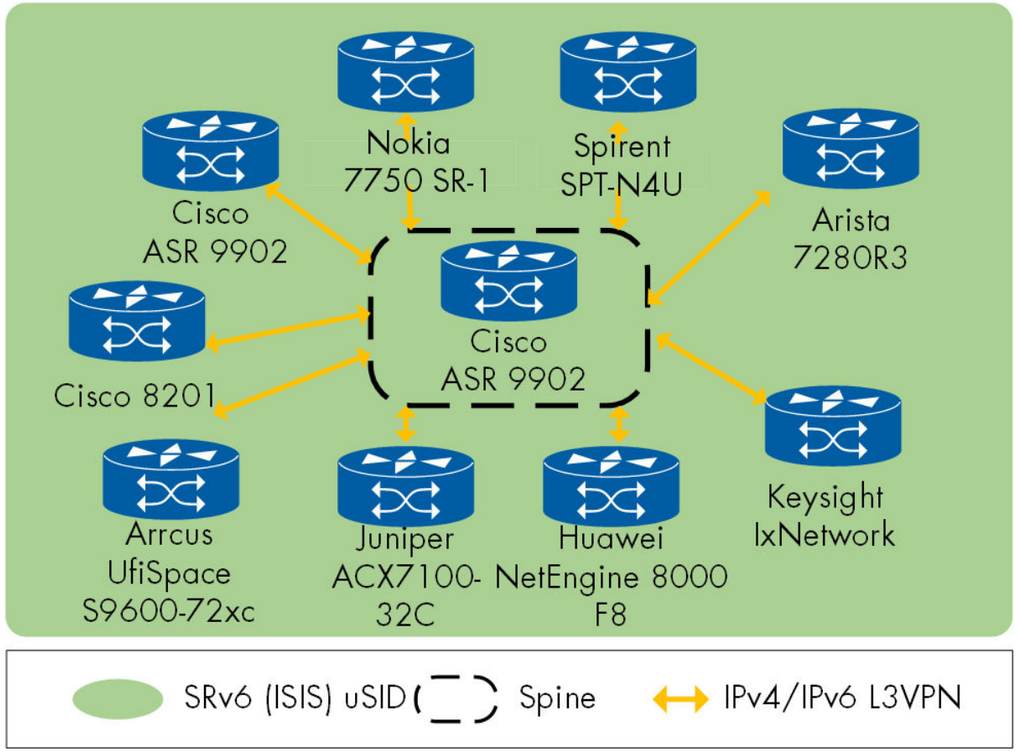
- Traffic Engineering Policies
- FlexAlgo

Test Bed Topology



Tests of SRv6 BGP-based Overlay Services

- L3VPN over SRv6 (µSID, Full SID)
  - Following draft-ietf-spring-srv6-srh-compression
- BGP IPv4/IPv6 Global Routing Table (µSID)
- EVPN VPWS over SRv6
  - Single Homing/Multi-Homing (µSID, Full SID)
- EVPN Route Type-5 (µSID)
- EVPN E-LAN (µSID)
- All seven router implementations interoperated regarding their essential SRv6 overlay services (RFC 9252)



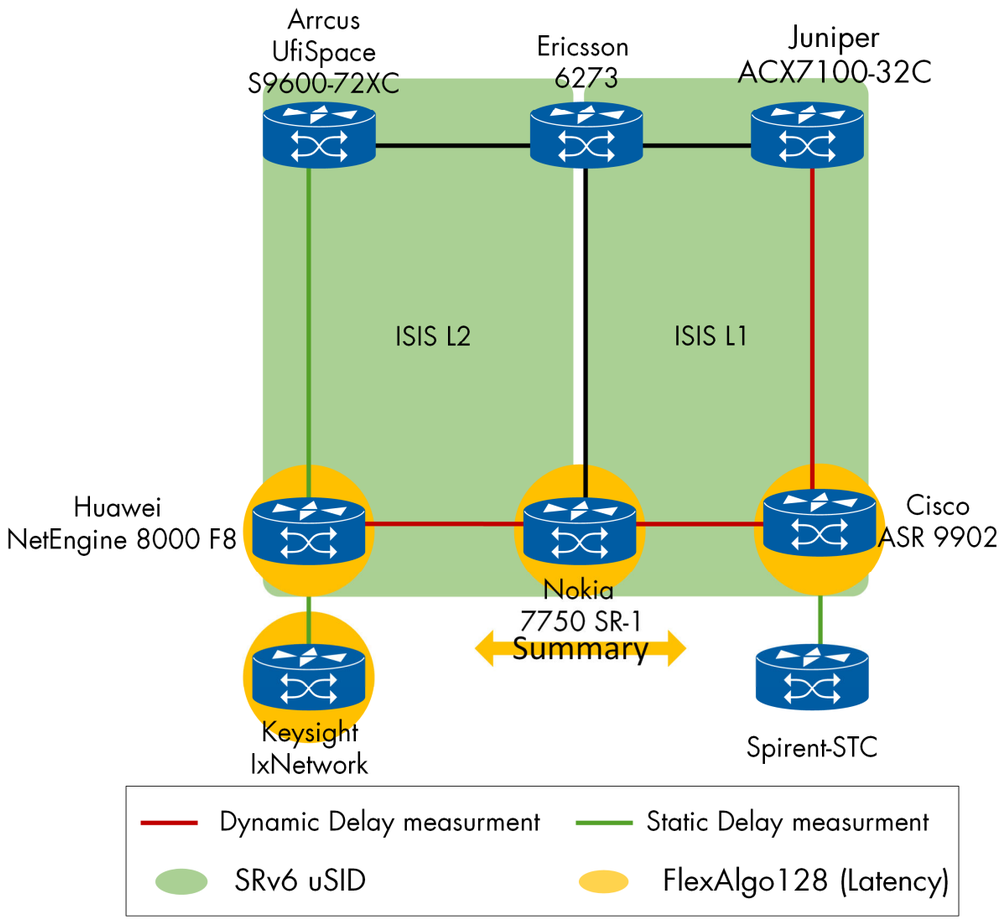
Summarization of Flex Algo Locators over SRv6

Combination of two test topics

- SRv6 route summarization reduces the number of routes exposed to access equipment
- Flexible Algorithm enables multi-plane networks

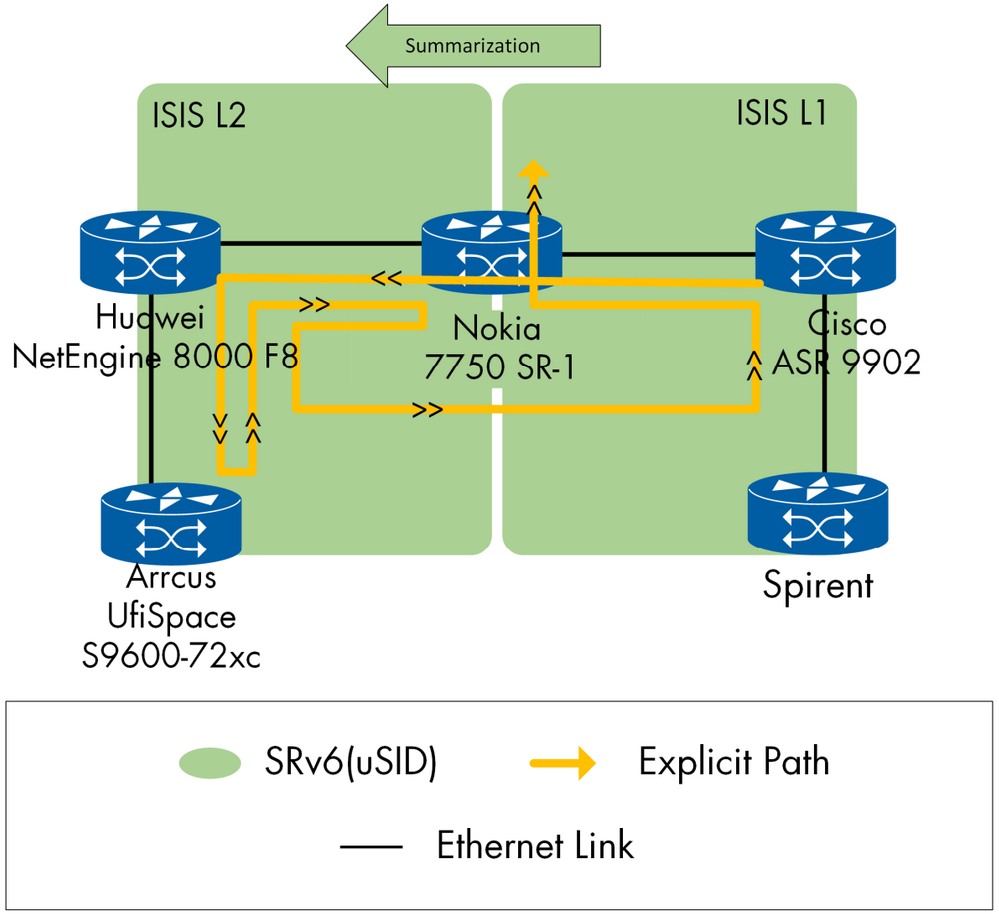
Successful results

- Verified summarized locators in the FlexAlgo
- Evaluated FlexAlgo performance using the delay metric



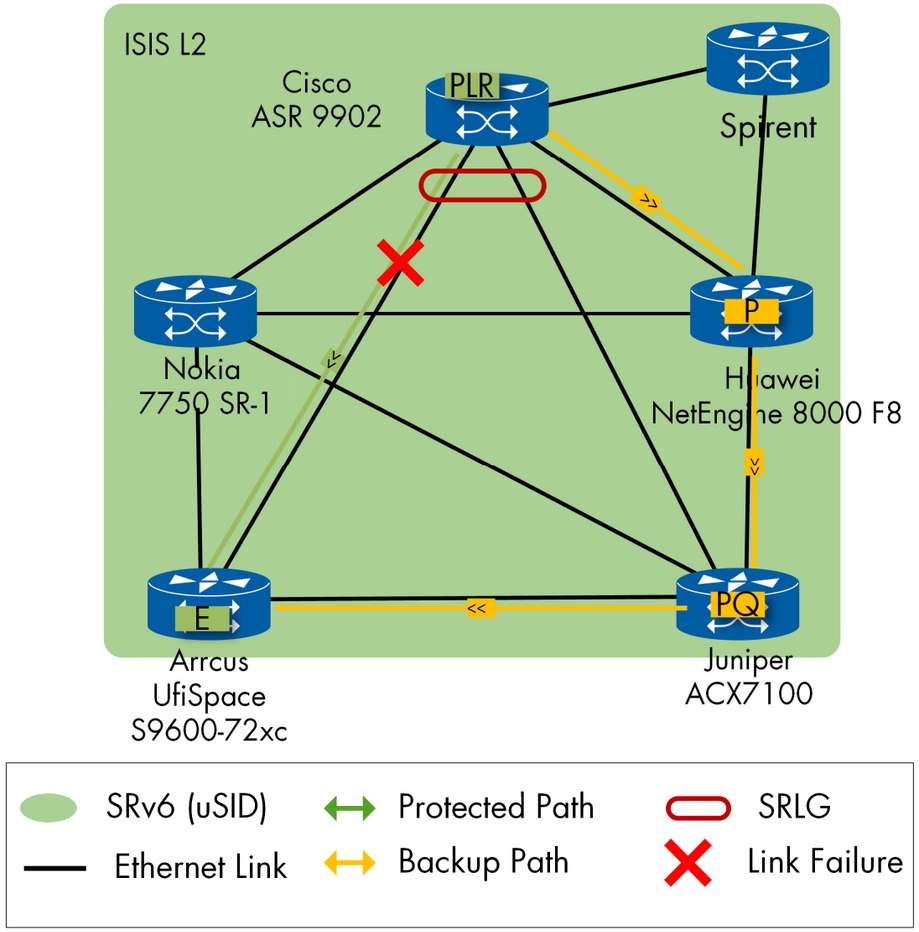
SRv6 Traffic Engineering Policies

- We verified controlling traffic flow using a policy containing a list of segments
- Tests were carried out with µSID and Full SID



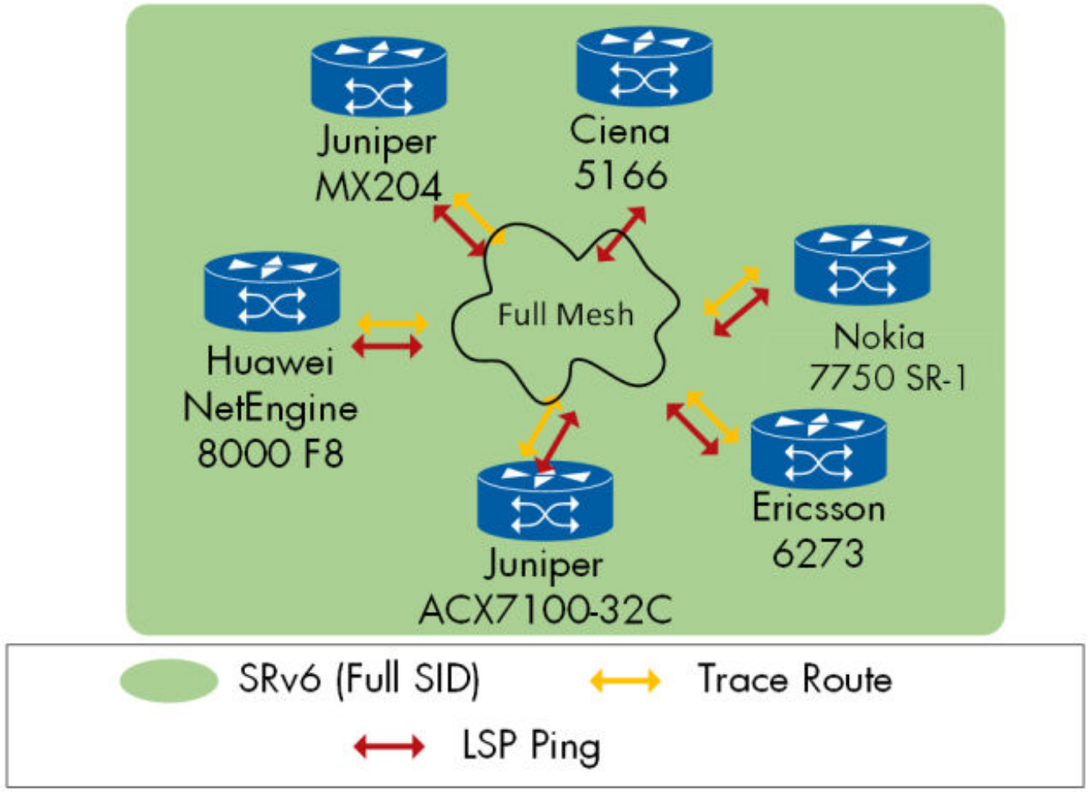
High Availability

- Validated TI-LFA (Topology-Independent Loop-Free Alternate) with µ-loop avoidance and later with local SRLG for µSID
- Successful failover cases ranged between 2 ms to 33 ms
- Tests were carried out with µSID and Full SID

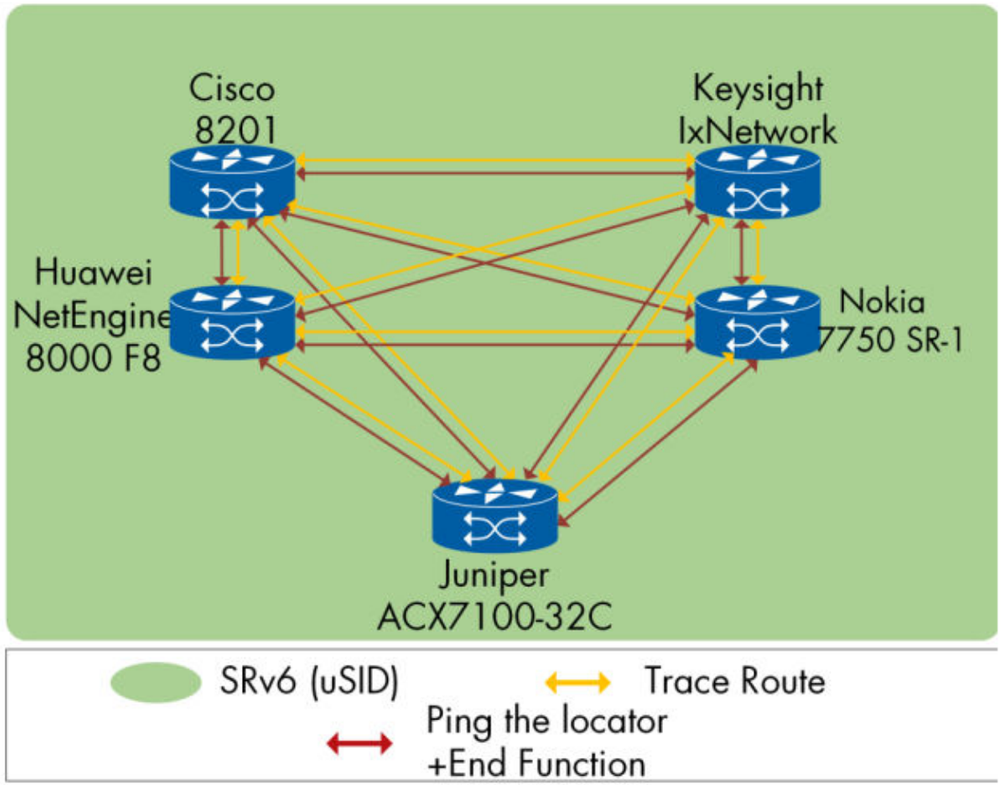


Basic SRv6 Operations (OAM)

- We validated ping and traceroute with full SIDs and µSIDs



Ping and traceroute using Full SID



Ping and traceroute using µSID

Conclusion

Eight router vendors successfully validated multi-vendor SRv6 interoperability in this year's event

All vendors support essential services such as L3VPNs over SRv6; only very few interop issues by newcomers

Five router vendors already implement SRv6 µSID compression in an interoperable way

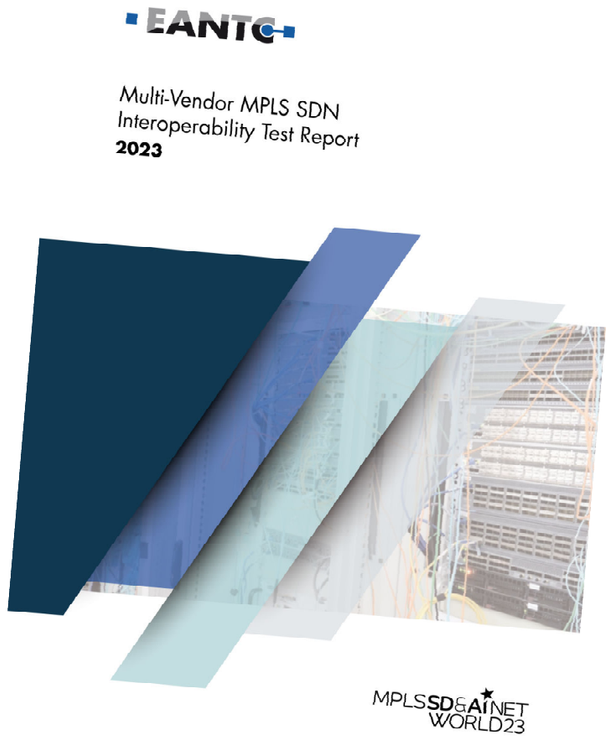
Leading vendors' implementations achieved advanced SRv6 function interoperability, including traffic engineering policies, FlexAlgo, route summarization and high availability

In the 6th year of SRv6 interop testing at EANTC, SRv6 popularity and readiness increased again

Test Report

Description of technologies, setups, vendor combinations, and results of the multi-vendor interoperability tests

- Vendor-independent summary by EANTC
- Based only on actual and validated results
- 64 pages explaining use cases and working demonstrations in detail
- Available at www.eantc.de



Thank you for your interest!

For further information, please contact us:

EANTC AG
Salzufer 14
10587 Berlin
Germany

Phone: +49.30.318 05 95-0
E-mail: info@eantc.de
Website: www.eantc.de

Follow us