Benchmarking Methodology for IPv6 Segment Routing

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IETF 118 Update

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Problem:
Segment Routing (SR) (RFC 8402) leverages the source routing paradigm and can be applied to the IPv6 data plane (SRv6). However, there is no standard method defined to compare SRv6 packet forwarding capabilities of network devices.

Solution:
The document complements RFC 5695 and RFC 5180 by defining a methodology for benchmarking SRv6. It builds upon RFC 2544, RFC 5695, RFC 5180, and RFC 8402. RFC 4814, RFC 8219, and RFC 9004 are included for refinement of some specific points.
For SRv6, new tests are added to characterize an **SRv6 Source Node**, an **SRv6 Segment Endpoint Node**, a **Transit Node**

- **SR source node** processing: insertion of the SRH, with SIDs stored in reverse order, and setting of the IPv6 DA as the first SID of the SR Policy.
- **SR segment endpoint node** processing: detection of the new active segment, modification of the IPv6 DA of the IPv6 header, and forwarding of the packets.
- **SR transit node** processing: forwarding of the packets containing the SR header. In SRv6 the transit nodes do not need to be SRv6 aware.

The overall procedure defines several **extensions to RFC 5695**:
- Test SID list longer than 1 SID (2 are recommended, many are optional)
- H.Encaps behavior is recommended, H.Encaps.XXX are possible
- End.X behavior to emulate traffic engineering scenario is recommended
- All flavors are recommended (PSP, USP, USD)
- Extensions for Reporting Format
- At least one protocol for the SID population is recommended (ISIS or OSPF or SR Policy)
Draft’s History

• Version -00 submitted on March 2022
• Version -01 presented at IETF 113 – Initial test methodology discussed
• Version -02 presented at IETF 114 – Incorporated comments from the chairs and the mailing list to review the test setup and methodology, trial duration, reset methodology, address randomization, and many others
• Versions -03 and -04 submitted in October 2022 and presented at IETF 115 – Included further comments on longer list of flavors (PSP, USD, USP), test on transit node decapsulation, header behavior specification, readability improvements, etc
• Version -05 submitted on February 2023 – Addressed comments on allowing a longer list of SID as an optional test. Bruno joined as coauthor.
• Version -06 uploaded on March 2023 and presented at IETF 116.
• Version -08 incorporates almost all relevant text from referenced RFC to be the single document to read (except buffering tests that is too long to copy from RFC 9004)
Outstanding issues

After IETF118 publication deadline but before IETF 118
Bruno has requested good proposals:

• New test specifically to understand the “flow label” support for ECMP
• Recommendation to stress the DUT to understand the maximum SID list supported
• Decrease duplications between section 1 (Introduction) and section 2 (SRv6 forwarding)

Would be implemented in the next version
Next Steps

• As requested at IETF 116-117, we think the draft is stable enough for WG adoption.

• Formal request for adoption after IETF 117 has given a few positive replies

• A WG adopted document would help the draft to get more attention from companies doing tests.

• 3rd party tests are also desired before it would become RFC.

Thank you