MPLS-based Service Function Path (SFP) Consistency Verification

draft-lm-mpls-sfc-path-verification-00

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Background

Service Function Chain (SFC)

MPLS-based Forwarding Plane for (SFC)

- SR-MPLS Service Programming: each SF is associated with an MPLS label, an SFP can be encoded as a stack of MPLS labels and pushed on top of the packet. [*draft-ietf-spring-sr-service-programming*]

- MPLS-based Network Service Header (NSH): a basic unit of representation is used, which comprises two MPLS labels, one carries a label to provide a context within the SFC scope, and the other carries a label to show which SF is to be enacted. [*RFC8595*]
SFC Basic Unit FEC Sub-TLV for MPLS-based NSH

Route Distinguisher (RD): defined in SFIR Route Type specific NLRI [draft-ietf-bess-nsh-bgp-control-plane].

SF Type: It is defined in [draft-ietf-bess-nsh-bgp-control-plane] and indicates the type of SF, such as DPI, firewall, etc.
An MPLS SFC validation request/reply is an MPLS echo request/reply that includes an SFC validation TLV.

SFC Information Sub-TLV: MUST NOT be included in an MPLS SFC validation request.
SFC Info Sub-TLV for SR-MPLS-based Service Programming

Figure 3: SFC Info Sub-TLV for SR-MPLS-based Service Programming

SFF Label: represents the SID of the SFF

SF Label: represents the service SID of the SF or SR proxy

SF Type: indicates the type of SF, such as DPI, firewall, etc.

SR Proxy Type: It is defined in [draft-ietf-spring-sr-service-programming] and indicates the type of SR proxy if it exists.
SFC Info Sub-TLV for MPLS-based NSH

SFC-FWD Type: indicates the forwarding type of the data plane, and has the following values:

0x10: MPLS-based NSH label swapping
0x11: MPLS-based NSH label stacking

SFC context Label: The meaning of the SFC context label depends on the SFC-FWD Type.

SF Label: The meaning of the SF label depends on the SFC-FWD Type.

SF Type: It is defined in [I-D.ietf-bess-nsh-bgp-control-plane] and indicates the type of SF, such as DPI, firewall, etc.
Theory of Operation

- SFFs are responsible for MPLS echo request processing: the packet processing functions supported by most SFFs are limited.

- An SFF Sends an SFC echo request to the control plane when:
  - the receiver is the terminal SFF for an SFP
  - MPLS TTL expiration: RFC8595, "when an SFF receives a packet from any component of the SFC system, it MUST discard any packets with TTL set to zero". To trace SFC, it should be changed to allow punting the packet to the control plane though under throttling control.

- Upon receiving the SFC validation request
  - SR Service Programming: an SFF parses through the label stack until the next label is not a local service SID to get all the SFs attached to the SFF
  - MPLS-based NSH: an SFF checks the MPLS label stack to get all the locally attached basic units for SFC

- The SFF sends back a reply message, including SFF and SF information recorded in SFC info sub-TLV

- After all SFFs on the SFP send back MPLS echo reply, the sender collects information about all traversed SFFs and SFs on the rendered service path (RSP)
Summary

- extensions to MPLS LSP ping [RFC8029] mechanisms
- a new FEC Sub-TLV for MPLS-based NSH
- a new SFC validation TLV including:
  - SFC Info Sub-TLV for SR-MPLS-based Service Programming
  - SFC Info Sub-TLV for MPLS-based NSH
- an update of RFC 8595 (MPLS-based NSH)
Next Steps

• Request feedbacks and comments
• Which WG is the appropriate place to work on the draft, MPLS or SRPING?
Thank You!