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SRv6 Migration Scenarios
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Abstract

SRv6 forwarding plane requires devices to support processing newly defined Segment Routing extension header. All devices in the network may not be capable of processing this new header and may require gradual upgrade. This document specifies mechanisms that to deploy features such as TI-LFA, in the presence of SRH incapable devices in the network.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

Segment Routing for IPv6 defines new Segment Routing extension header as defined in [RFC8754]. Legacy devices may not be capable of processing the SRH. This poses challenges in deploying features such as TI-LFA, that require anchor nodes to support processing SRH.

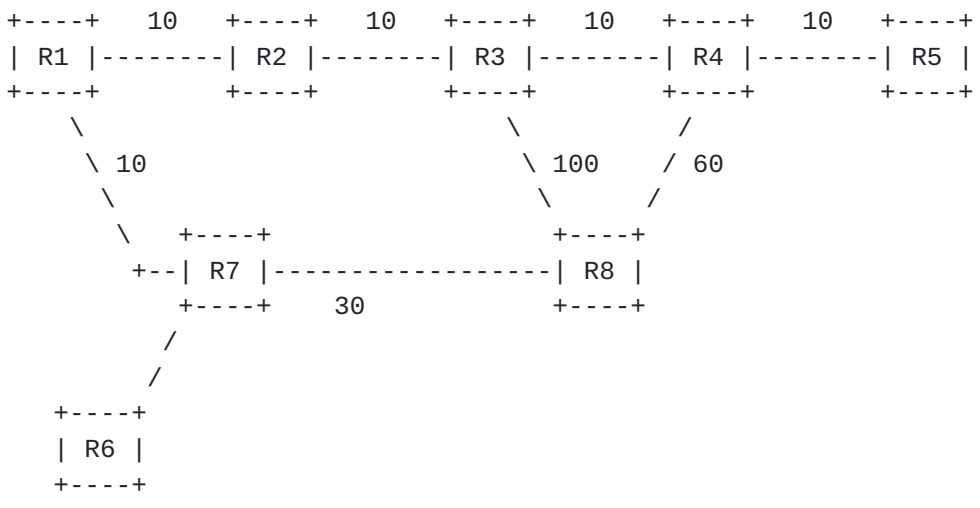

Figure 1: Example topology with locators

Consider the topology diagram above. On R1, The primary path to R5 is R1->R2->R3->R4->R5. The TI-LFA backup path is R1->R7->R8->R4->R5 where R8 is the anchor node.The TI-LFA backup path consists of one SID in SRH in case of classic SRH [RFC8754] or one additional SID in the micro-SID container [I-D.filsfils-spring-net-pgm-extension-srv6-usid]. If device R8 is not capable of processing SRH or the micro-SID instructions, the TI-LFA backup path cannot be installed as R8 does not advertise a END SID or uN SID.

2. TI-LFA with Encapsulation mode

TI-LFA with encapsulation mode imposes an additional IPv6 header on the packet. This additional header is decapsulated on the anchor node and lookup done for the inner packet. Many legacy devices are capable of decapsulating IPv6 header and lookingup inner packet and forward. The legacy device shuold advertise a SID behaviour which implies decapsulation and lookup only. Currently defined SIDs END and END.X from [RFC8986] and un/uA defined in [I-D.filsfils-spring-net-pgm-extension-srv6-usid] also imply support for NEXT operation which legacy devices cannot support.

The END.DT6 and END.DX6 SIDs specify decapsulation and lookup. Reusing these SIDs and advertising them in IGPs have below disadvantages

- Pure transit nodes will also have to advertise these SIDs where there are no service routes. This may give false impression that the transit node is advertising service routes.

- It is much easier to debug TI-LFA which uses END/END.X uN/uA with new flavor rather than using SIDs defined for advertising Services.

- When the platform capability is upgraded, its operationally easier to advertise the ‘END with decap_only’ with END/uN and ‘END.X with decap_only’ with END.X/UA SIDs respectively.

3. Decap_only Flavor

This document proposes a new flavor for the END/END.X and un/uA SIDs named decap_only. SIDs with decap_only flavor MUST be used as last SID in the SRH or as last SID in the last SID container.

Nodes computing TI-LFA backup paths SHOULD use the decap_only flavored SIDs, if the backup path contains only one SID either END/uN or END.X/uA. The backup path MUST be installed by the computing node in the encapsulation mode where the incoming packet is imposed with additional IPv6 header on failure while exercising the backup path.

4. Backward Compatibility

TBD

5. Operational Considerations

TBBD

6. Security Considerations

TBD

7. IANA Considerations

This document defines new SRv6 END Point behaviours

Code point	Behaviour	reference
TBD1	END with decap_only	This document
TBD2	END.X with decap_only	This document

Figure 2: IANA Cosepoints

8. Acknowledgements

9. Contributors

10. References

10.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC8754] Filsfils, C., Ed., Dukes, D., Ed., Previdi, S., Leddy, J., Matsushima, S., and D. Voyer, "IPv6 Segment Routing Header (SRH)", RFC 8754, DOI 10.17487/RFC8754, March 2020, <https://www.rfc-editor.org/info/rfc8754>.

[RFC8986] Filsfils, C., Ed., Camarillo, P., Ed., Leddy, J., Voyer, D., Matsushima, S., and Z. Li, "Segment Routing over IPv6 (SRv6) Network Programming", RFC 8986, DOI 10.17487/RFC8986, February 2021, <https://www.rfc-editor.org/info/rfc8986>.

10.2. Informative References

[I-D.filsfils-spring-net-pgm-extension-srv6-usid] Filsfils, C., Camarillo, P., Cai, D., Voyer, D., Meilik, I., Patel, K., Henderickx, W., Jonnalagadda, P., Melman, D. T., Liu, Y., and J. Guichard, "Network Programming extension: SRv6 uSID instruction", Work in Progress, Internet-Draft, draft-filsfils-spring-net-pgm-extension-srv6-usid-15, 12 June 2023, <https://datatracker.ietf.org/doc/html/draft-filsfils-spring-net-pgm-extension-srv6-usid-15>.

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