Segment Routing for Redundancy Protection

draft-geng-spring-sr-redundancy-protection-00

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IETF 109 - Nov 2020 - Virtual - SPRING WG

History

- IETF 104, DetNet WG, DetNet SRv6 Data Plane Encapsulation, *draft-geng-dp-sol-srv6-00*
- IETF 105, DetNet & 6man WG, DetNet SRv6 Data Plane Encapsulation, *draft-geng-dp-sol-srv6-01*
- IETF 106, DetNet WG, SRv6 for Deterministic Networking (DetNet) *draft-geng-spring-srv6-for-detnet-00* ,

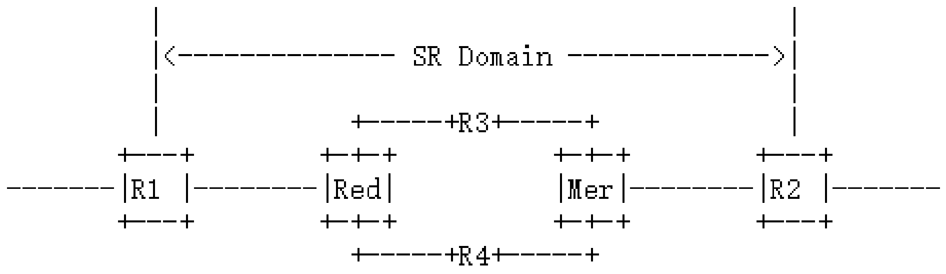
  DetNet SRv6 Data Plane Encapsulation, *draft-geng-dp-sol-srv6-01*

What is Redundancy Protection?

- Origin1: Service Protection from Deterministic Networking (DetNet)
- Origin2: New Requirement for Network
  - Strict SLA Guarantee: E2E Reliability
- Definition
  - is one of the mechanisms to achieve service protection
  - follows the principle of PREOF (Packet Replication/ Elimination/Ordering Function)
  - this document extends the capabilities in SR paradigm to support redundancy protection

Example Scenario of Redundancy Protection in SR

The process of redundancy protection when a flow is sent into SR domain:



1) R1 receives the flow and encapsulates with segments to steer the flow to destination R2;
2) When the packet flow arrives in Redundancy Node, one flow is replicated to two copies with the flow identifier and sequence number;
3) Two replicated flows go through different paths till Merging Node; The first received packet of the flow is transmitted from Merging Node to R2, and the redundant packets are eliminated;
4) No packet loss when one of the path fails;
5) If packet arrives out of order, Merging Node may perform the reordering function (optional);

Segment to support Redundancy Protection

- **Redundancy Segment:**
  - to perform the packet replication function on Redundancy Node
  - associated with a Redundancy policy (a variant of SR Policy) to steer the flow
  - in case of SRv6, new behavior End.R is defined
  - encapsulates the necessary meta data
- **Merging Segment:**
  - to perform the packet elimination and ordering (optional) function on Merging Node
  - in case of SRv6, new behavior End.M is defined
  - remove the meta data
- Meta Data:
  - Flow Identification: to identify a unique flow
  - Sequence Number: to identify the packet sequence within one flow
- Redundancy Policy:
  - includes more than one ordered lists of segments between Redundancy Node and Merging Node
  - the last segment of the ordered list is always Merge Segment

Redundancy Segment

- End. R behavior:

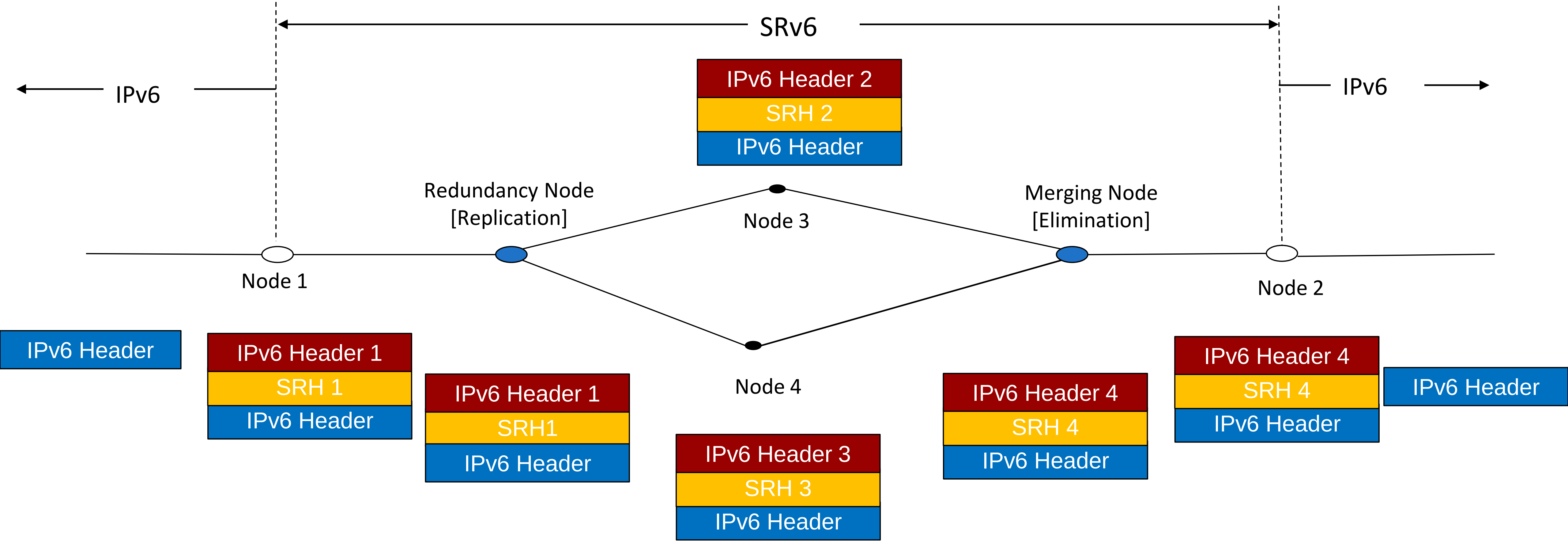
```
S01.   IF NH=SRH & SL>0 THEN
S02.         Create two new outer IPv6+SRH headers: IPv6+SRH-1 and IPv6+SRH-2;
             insert the policy-instructed segment lists in SRH-1 and SRH-2;
             add Flow Identification and Sequence Number into SRH-1 and SRH-2
S03.         Remove the incoming outer IPv6+SRH header
S04.         Create a duplication of the incoming packet
S05.         Encapsulate the original packet into IPv6+SRH-1 header
S06.         Encapsulate the duplicate packet into IPv6+SRH-2 header
S07.         Set IPv6 SA as the local address of this node
S08.         Set IPv6 DA of IPv6+SRH-1 to the first segment of SRv6 Policy in of SRH-1 segment list
S09.         Set IPv6 DA of IPv6+SRH-2 to the first segment of SRv6 Policy in of SRH-2 segment list
S10.   ELSE
S11.         Drop the packet
```

Merging Segment

- End. M behavior:

```
S01.   IF NH=SRH & SL>0 & "the packet is not a redundant packet" , THEN
S02.         Do not decrement SL nor update the IPv6 DA with SRH[SL]
S03.         Create a new outer IPv6+SRH-3 header
S04.         Insert the policy-instructed segment list in the newly created SRH-3
S05.         Remove the incoming outer IPv6+SRH header
S06.         Set IPv6 DA of IPv6+SRH-3 to the first segment of SRv6 Policy in SRH-3 segment list
S07.   ELSE
S08.         Drop the packet
```

SRv6 Based PREOF



Next Step

- Collect Feedback from SPRING
- Comments and discussions in the mailing list
- Seek for collaboration

Thanks