Segment Routing for Redundancy Protection

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

Xuesong Geng (gengxuesong@huawei.com)
Mach Chen (mach.chen@huawei.com)
Fan Yang (shirley.yangfan@huawei.com)
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

IETF 109 - Nov 2020 - Virtual - SPRING WG
Next Step

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