SRH Extension for Redundancy Protection

draft-geng-spring-sr-redundancy-protection-02
draft-geng-6man-redundancy-protection-srh-00

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What is Redundancy Protection?

• Service Protection comes from Deterministic Networking (DetNet)
• New requirement for providing strict E2E reliability SLA guarantee to services, e.g. cloud VR, cloud game, HDV applications
• Definition
  • is one of the mechanisms to achieve service protection
  • follows the principle of PREOF (Packet Replication/ Elimination/Ordering Function)
• Example scenario:

```
+-----+R3+-----+
+----+    +----+  +----+
--------|R1|--------|Red|--------|Mer|--------|R2|--------
+----+    +----+  +----+
+-----+R4+-----+
```
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

• **Merging Segment:**
  - to perform the packet elimination and ordering (optional) function on Merging Node
  - in case of SRv6, new behavior End.M is defined

• **Flow ID and sequence number:**
  - Flow Identification: to identify a unique flow
  - Sequence Number: to identify the packet sequence within one flow
  - Extend SRH optional TLV to encapsulate them

• **Redundancy Policy:**
  - Redundancy Policy is a variant of SR policy
  - includes more than one ordered lists of segments between Redundancy Node and Merging Node
  - all the ordered lists of segments are used at the same time
Redundancy Protection Process

Take SRv6 as an example:

- **SDN Controller**
  - SR-Policy
  - SL[R2,M,R,R1] assigns Flow ID
  - Service data
  - IPv6Hdr 1<R1,M,R,R1>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **Redundancy Node**
  - IPv6Hdr 1<R,R,R3>
  - SRH[R3]
  - IPv6Hdr 1<R,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **Merging Node**
  - IPv6Hdr 1<R3,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data
  - IPv6Hdr 1<R4,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **R1**
  - Service data
  - IPv6Hdr 1<R1,R,M,R,R1>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **R2**
  - Service data
  - IPv6Hdr 1<R2,R,M,R,R1>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **R3**
  - Service data
  - IPv6Hdr 1<R3,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **R4**
  - Service data
  - IPv6Hdr 1<R4,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **R**
  - Service data
  - IPv6Hdr 1<R,M>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **M**
  - Service data
  - IPv6Hdr 1<M,R2>
  - SRH[R2,M,R,R1]
  - TLV(FI,SN)
  - Service data

- **SRv6**
  - Service data
  - IPv6Hdr 1<M,R2>
  - Service data

- **Redundancy Policy**
  - SL[R2,M,R,R1]
  - Flow ID
  - drop the redundancy packet
  - generates seq num
  - assigns Flow ID

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Flow ID and Sequence Number Encapsulation

SRH Encapsulation in draft-geng-6man-redundancy-protection-srh-00

A TLV is defined to carry flow ID and sequence number

- Flow Identification: 32 bits, to identify a unique flow
- Sequence Number: 32 bits, to identify the packet sequence within one flow
Next Step

• Refine the overall solution and SRH encapsulation
• Comments and discussions in mailing list
• Seek for collaborations
  • Scalability discussion of flow ID and sequence number
  • Segment specification in SR-MPLS data plane