

DetNet SRv6 Data Plane Encapsulation

draft-geng-dp-sol-srv6-00

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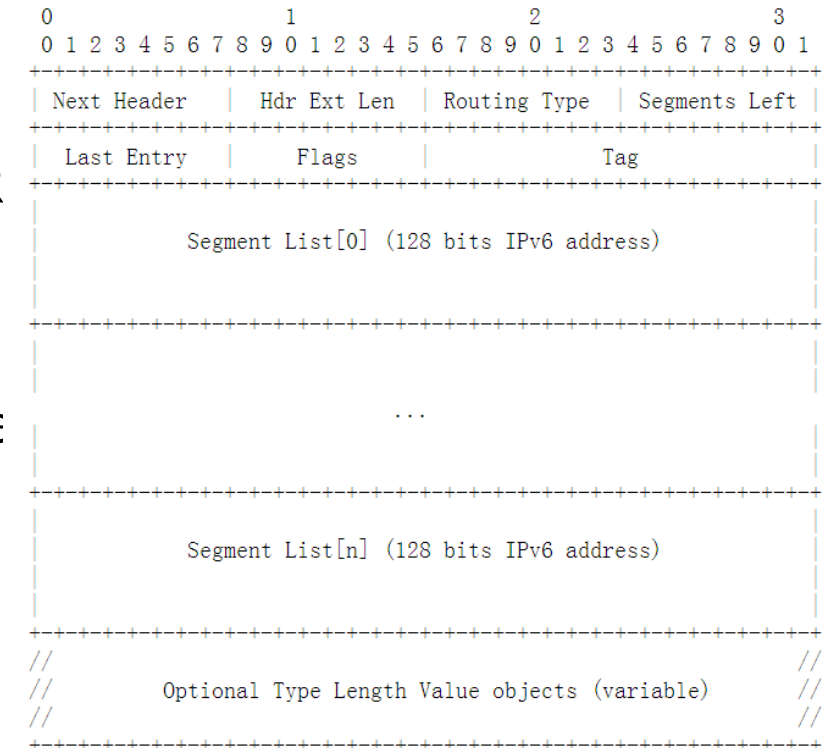
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DetNet SRv6 Data Plane Solution Requirement

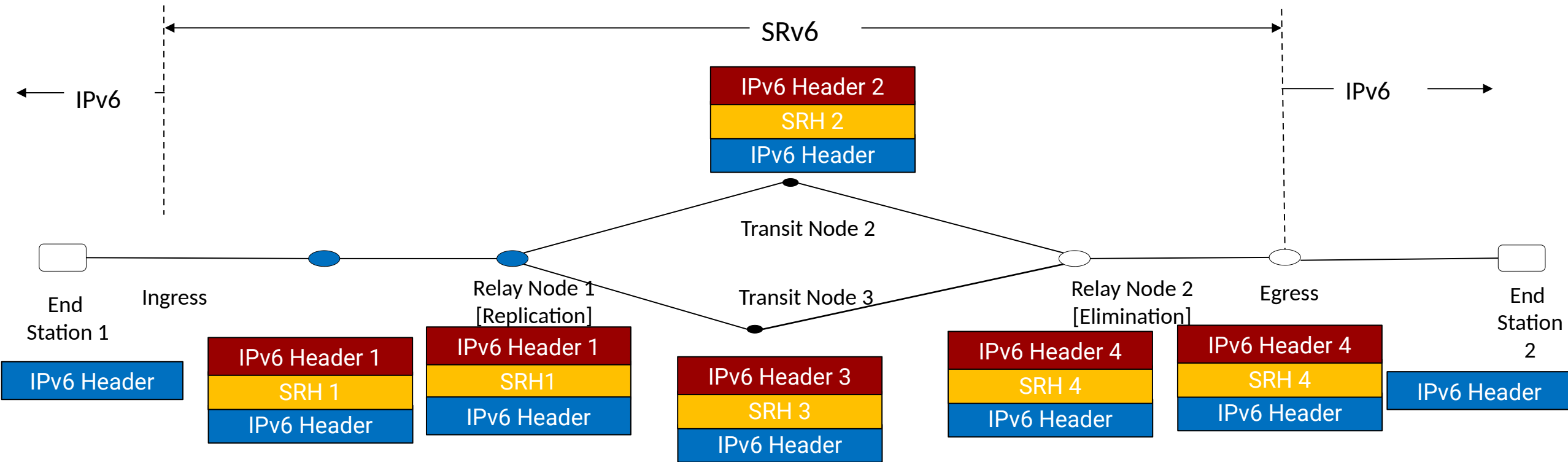
- A method of identifying the SRv6 payload type; (e.g.: DSCP)
- A suitable explicit route to deliver the DetNet flow ; (e.g.: Segment List in SRH)
- A method of indicating packet processing, such as PREOF; (detailed in next slides)
- A method of identifying the DetNet flow; (detailed in next slides)
- A method of carrying DetNet sequence number; (detailed in next slides)
- A method of carrying queuing and forwarding indication to do congestion protection; (detailed in next slides)

Overview of SRv6

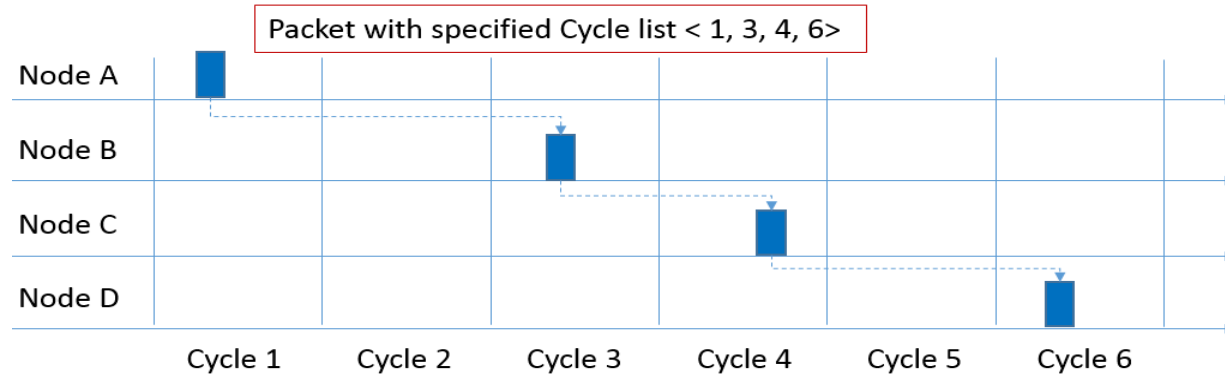
- SRH
 - Segment Routing can be applied to the IPv6 data plane using a new type of Routing Extension Header, which is SRH;
- Segment List
 - The Segment List is encoded starting from the last segment of the SR Policy, which can steer the packet through a n indicated path;
- Optional TLVs
 - TLVs behind the Segment List;
- Network Programming
 - Each segment in Segment List can be an instruction, which represents a function to be called at a specific location in the network;



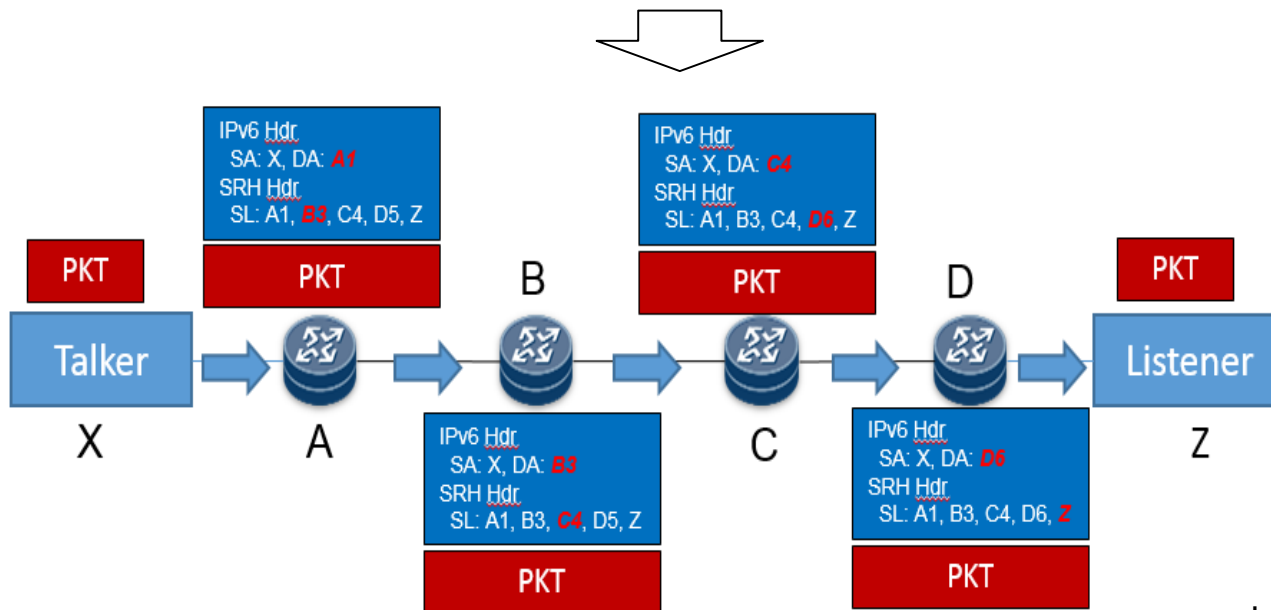
SRv6 Based PREOF



SRv6 based Bounded Latency



- Specify the “sending time cycle” of each packet
- Make sure each packet be sent out within the specified cycle
- Hence guarantee the E2E bounded latency



- SID identifies the “sending cycle”;
- No per-flow states maintained at intermediate and egress nodes , naturally support flow aggregation scale to large network, easy to deploy;

- $E2E\ Jitter \leq 2 * cycle$
- $E2E\ Bounded\ Latency = (2 * Cycle + process\ delay) * hops + link\ delay$

<https://tools.ietf.org/html/draft-chen-detnet-sr-based-bounded-latency>

Next Step

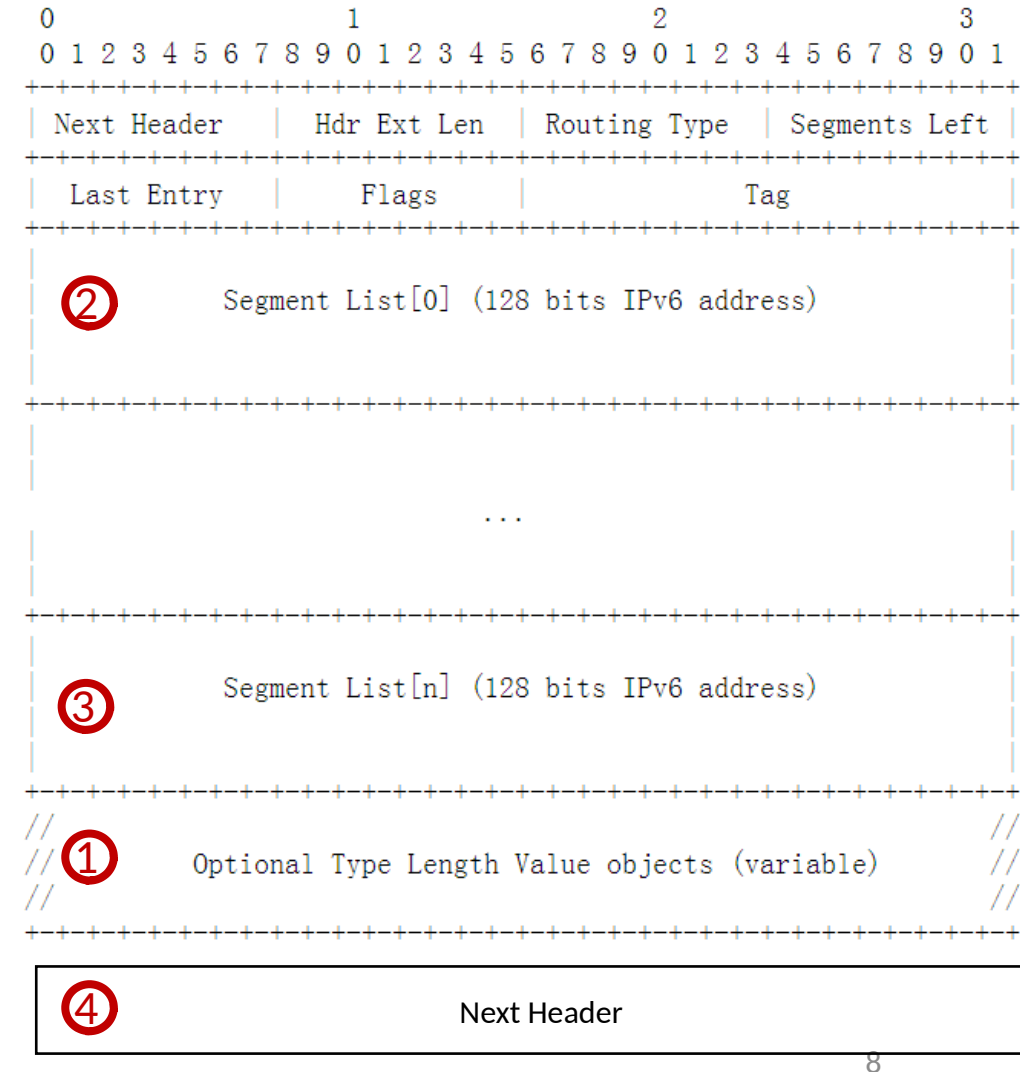
- Do we want to work on SRv6 based DetNet data plane solution?
- Keep refining the document according to WG comments and feedbacks.
- Seek collaboration on this work.

Thanks

DetNet SRv6 Data Plane Solution

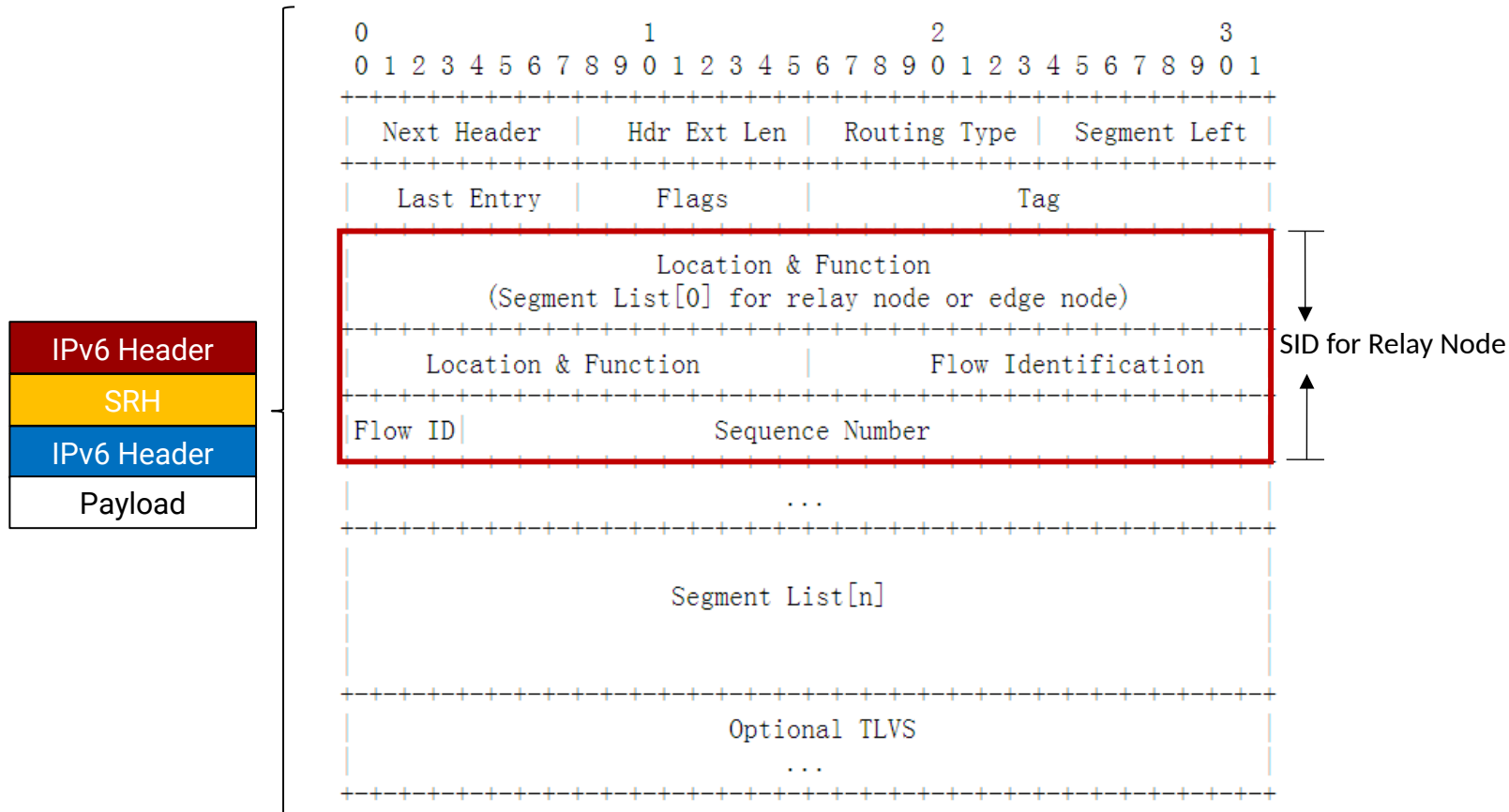
Flow Identification(20bits) and Sequence Number(28bits) are carried in:

- **Option1:** SRH TLVs
- **Option2 :** arguments in the SID for Relay Node
- **Option3:** DetNet SID in segment list
- **Option4:** DetNet SRH inside the SRH



SRv6 Data Plane Solution Option1-Encapsulation

- Flow Identification(20bits) and Sequence Number(28bits) are carried as arguments in the SID for Relay Node



- Location & Function: the 80 most significant bits that are used for routing
- Flow Identification: 20 bits, which is used for DetNet flow identification in the DetNet relay node;
- Sequence Number: 28 bits, which are used for dis crime packets in the same DetNet flow;

SRv6 Data Plane Solution Option1-Replication Function

- End. B. Replication: Packet Replication Function

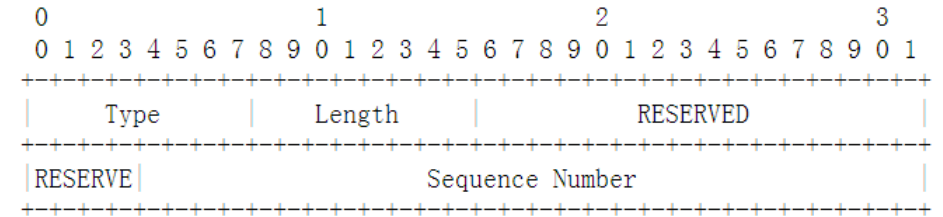
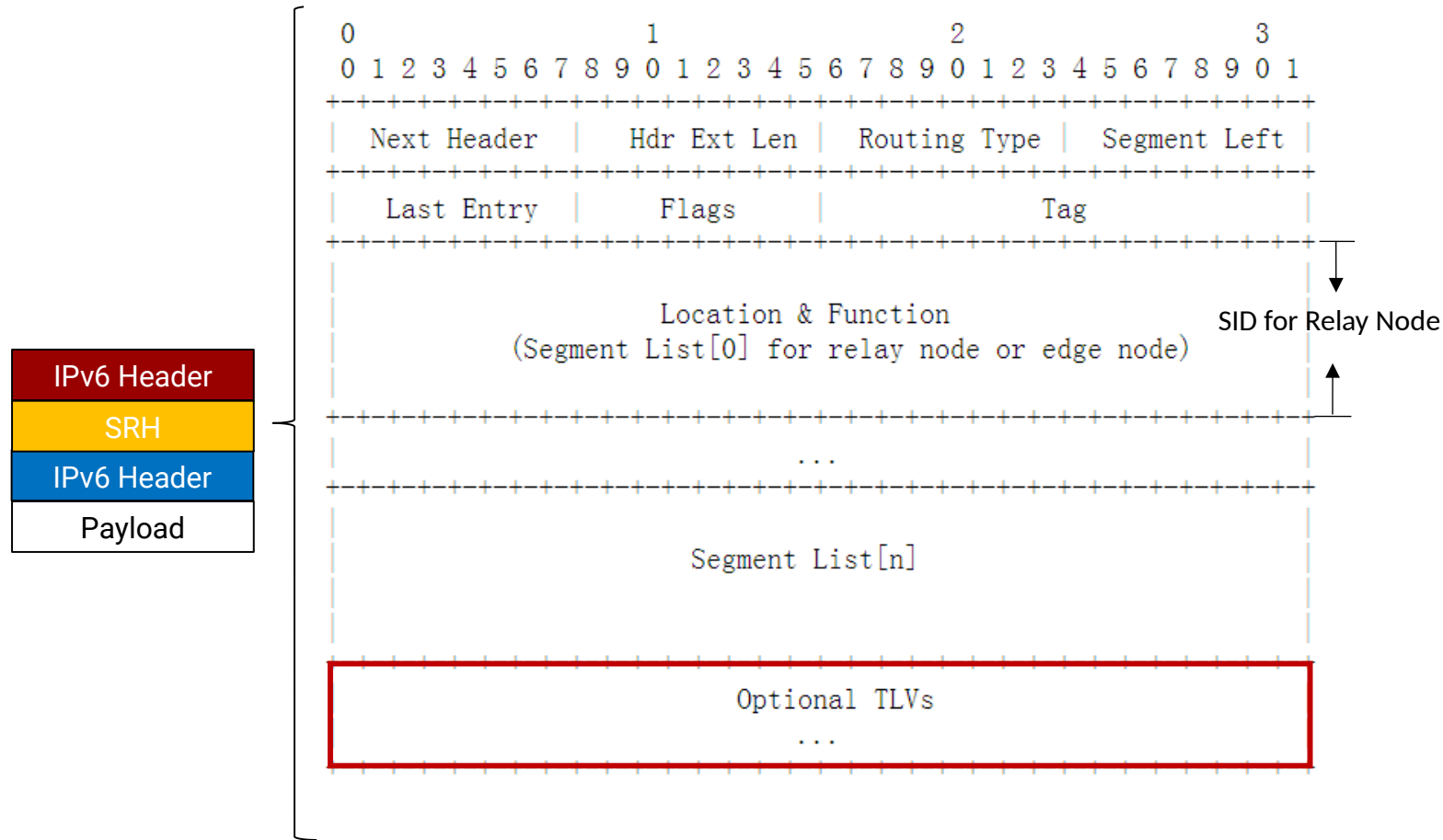
1. IF NH=SRH & SL>0 THEN
2. do not decrement SL nor update the IPv6 DA with SRH[SL]
3. reserve the value of argument field(Inherited argument)of segment[0] of SRH
4. write the inherited arguments into the argument field of segment[0] of SRH'1 and SRH'2
5. pop the SRH
6. replicate the packet into two packets: packet'1, packet'2
7. insert SRH'1 to packet'1
8. insert SRH'2 to packet'2
9. set the IPv6 DA of packet'1 to the first segment of the SRv6 Policy of SRH'1
10. set the IPv6 DA of packet'2 to the first segment of the SRv6 Policy of SRH'2
11. ELSE
12. drop the packet

SRv6 Data Plane Solution Option1-Elimination Function

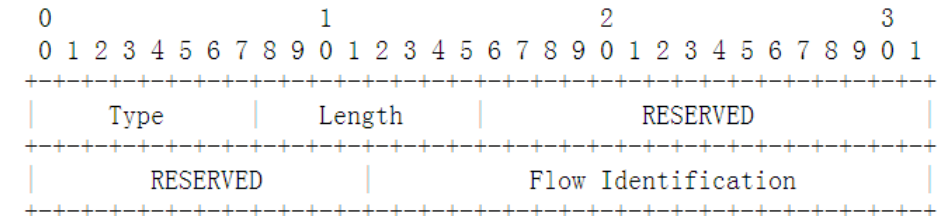
- End. B. Elimination: Packet Elimination Function
 1. IF NH=SRH & SL>0 & “the packet is not a redundant packet” THEN
 2. do not decrement SL nor update the IPv6 DA with SRH[SL]
 3. write the inherited arguments into the argument field of segment[0] of SRH’
 4. pop the SRH
 5. insert SRH’
 6. set the IPv6 DA to the first segment of the SRv6 Policy
 7. ELSE
 8. drop the packet

SRv6 Data Plane Solution Option2-Encapsulation

- Flow Identification(32bits) and Sequence Number(32bits) are carried as TLVs



- Type: 8bits, to be assigned by IANA.
- Length: 8.
- RESERVED: 28 bits, MUST be 0 on transmission and ignored on receipt.
- Flow Identification: 20 bits, which is used for identifying DetNet flow.



- Type: 8 bits, to be assigned by IANA.
- Length: 8.
- RESERVED: 20 bits. MUST be 0 on transmission and ignored on receipt.
- Sequence Number: 28 bits, which is used for indicating sequence number of a DetNet flow.

SRv6 Data Plane Solution Option2-Replication Function

- End. B.Replication: Packet Replication Function

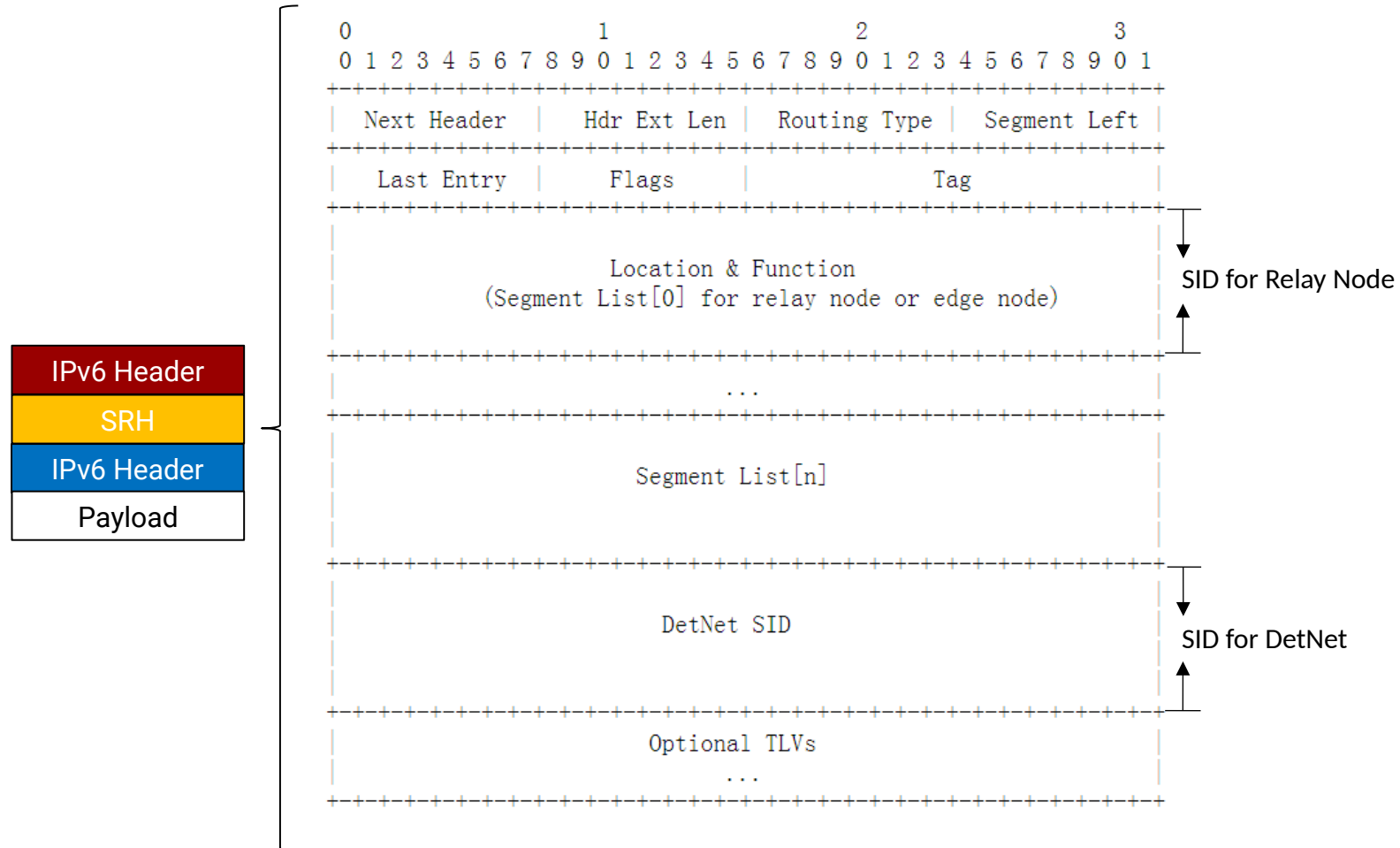
1. IF NH=SRH & SL>0 THEN
2. do not decrement SL nor update the IPv6 DA with SRH[SL]
3. reserve the value of DetNet TLVs of SRH
4. add the DetNet TLVs into SRH'1 and SRH'2
5. pop the SRH
6. replicate the packet into two packets: packet'1, packet'2
7. insert SRH'1 to packet'1
8. insert SRH'2 to packet'2
9. set the IPv6 DA of packet'1 to the first segment of the SRv6 Policy of SRH'1
10. set the IPv6 DA of packet'2 to the first segment of the SRv6 Policy of SRH'2
11. ELSE
12. drop the packet

SRv6 Data Plane Solution Option2-Elimination Function

- End. B. Elimination: Packet Elimination Function
 1. IF NH=SRH & SL>0 & “the packet is not a redundant packet” THEN
 2. do not decrement SL nor update the IPv6 DA with SRH[SL]
 3. reserve the value of DetNet TLVs of SRH
 4. add the DetNet TLVs into SRH’
 5. pop the SRH
 6. insert SRH’
 7. set the IPv6 DA to the first segment of the SRv6 Policy
 8. ELSE
 9. drop the packet

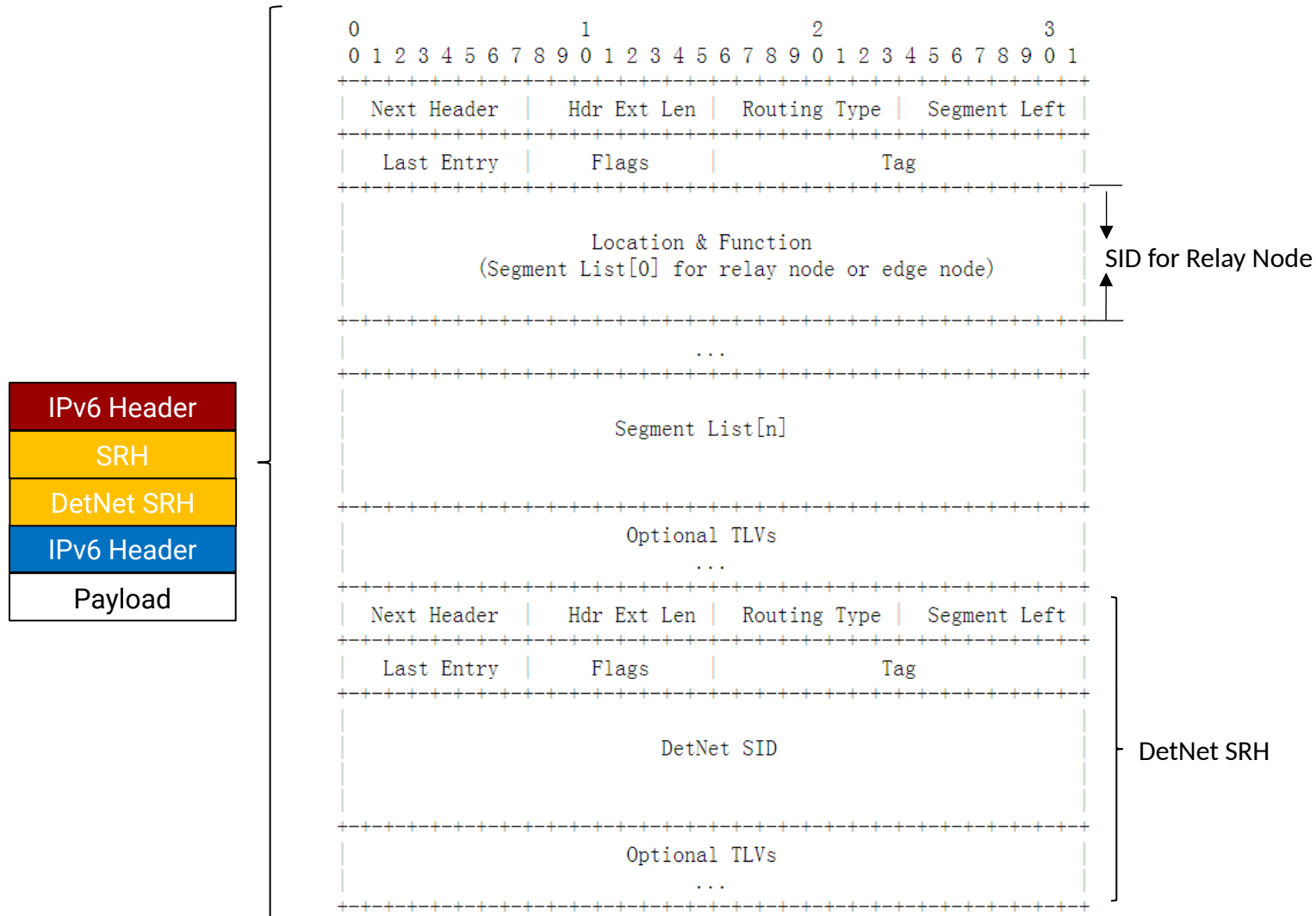
SRv6 Data Plane Solution Option3-Encapsulation

- Flow Identification and Sequence Number are carried as in DetNet SID



SRv6 Data Plane Solution Option4-Encapsulation

- Flow Identification and Sequence Number are carried in DetNet SRH



DetNet SRv6 Data Plane Solution Example

