

IPv6 Options for DetNet

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DetNet Dataplane Operations

- DetNet defines its domain where DetNet information is significant
- At each hop: Forwarding sublayer operation
 - Associates a path to the flow
 - Selects one next hop along that path
 - Signals lower layer processing
 - Perfect fit for the HbH Extension Header
- At some hops: Service sublayer operation
 - PREOF
 - HbH is suitable since HbH can be ignored
 - DO + SRH also suitable if SRH signals Service-sublayer relays

Can DetNet use the IPv6 HbH Extension Header?

Using EH's has gained traction recently

- ⇒ See success of SRH with SRv6
- ⇒ RFC 8200 allows routers to ignore HbH options (removed a MUST)
- ⇒ ["IPv6 Hop-by-Hop Options Processing Procedures"](#) to make it even simpler

Less Complexity in Dataplane

- ⇒ 6-tuple is a complex key to read and use, and may be lost in tunneling / crypto
- ⇒ EH comes naturally with tunneling at PE if end-systems not service-aware
- ⇒ The HbH EH is always first after the IPv6 Header: simpler P4 / ASIC processing



DetNet dataplane requirements for IPv6

Redundancy Information for service sublayer

- ⇒ Think sequence information but that's too limitative
- ⇒ No POF: Anything unique within the upper bound on out-of-order packet delivery
- ⇒ If POF: Anything strictly ordered for the duration of the path, e.g., time stamp
- ⇒ Network Coding: multiple fragments that can be delivered in any order

Path Information for both forwarding and service sublayer

- ⇒ Path Information provides a scope for redundancy information
- ⇒ DetNet places flows on paths (water and pipe analogy), and forwards along paths
- ⇒ Same path ⇔ same DetNet treatment and fate share for all flows and OAM
- ⇒ A PREOF path is not a linear sequence of nodes (terminology issues in sight)

A native IPv6 signaling for DetNet dataplane

The draft allows placing DetNet info in IPv6 Hop-By-Hop Extension Header

DetNet information available early in the packet and easy to grab

⇒ No need to dig down to transport header to find port info

Signals the path and PHB independently of the transported flows

⇒ Enables tunneling, OAM, and flow aggregation with common treatment

Fits IPv6 architecture to coexist with other IPv6 extensions e.g., SRv6

Fits DetNet architecture whereby edge nodes assign DetNet flows "to specific paths through a network" [RFC 8655]

Current version is 07

06: New encapsulation section (Fan co-author)

⇒ Redundancy Information in HbH or in DO EH

⇒ SRv6 mode, variation with Loose Path option

07: Enriched applicability section

⇒ Positions within the DetNet architecture

⇒ Positions vs. the detnet-ip-preof draft and SRv6

Since: Toerless and Brian Carpenter's comments

⇒ DetNet architecture expects a limited domain

⇒ IPv6 HbH Options Processing Procedures“ to informative

⇒ Time stamps are often impractical

Table of Contents

1. Introduction
2. Terminology
3. Applicability
4. The DetNet Options
 - 4.1. DetNet Redundancy Information Option
 - 4.2. DetNet Path Options
 - 4.2.1. DetNet Strict Path Option
 - 4.2.2. DetNet Loose Path Option
 - 4.3. RPL Packet Information
5. Encapsulation of DetNet Options
 - 5.1. IPv6 Network
 - 5.2. Segment Routing over IPv6 Network
6. Security Considerations
7. IANA Considerations
 - 7.1. New Subregistry for the Redundancy Type
 - 7.2. New Hop-by-Hop Options
8. Acknowledgments
9. References
 - 9.1. Normative References

Working Group Feedback to be discussed

- **Tianran:** UDP vs. HbH depends on the target scenario
 - If only need tasks on the server to behave UDP should be a good choice.
 - If the on-path network devices need to behave HbH option should be better.
- **Toerless:** separate the data model for DetNet services from encaps.
 - the encoding rules should come from the registry or be pre-defined for all supportable data-model extensions
 - timestamps for PREOF would be even more of a new DetNet QoS feature as T-CQF is for bounded latency