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IPv6 Option for DetNet Data Fields

Abstract

The enhanced Deterministic Networking (DetNet) is required to provide packet treatment for data plane to achieve the DetNet QoS such as deterministic latency. New functions and related metadata should be supported and DetNet data fields and option types such as Deterministic Latency Action (DLA) option should be carried in enhanced DetNet. This document defines how DetNet data fields are encapsulated in IPv6 option.

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1. Introduction

According to [[RFC8655](#)], Deterministic Networking (DetNet) operates at the IP layer and delivers service which provides extremely low data loss rates and bounded latency within a network domain. DetNet data planes has been specified in [[RFC8938](#)]. The existing deterministic technologies are facing large-scale number of nodes and long-distance transmission, traffic scheduling, dynamic flows, and other controversial issues in large-scale networks. The enhanced DetNet Data plane is required to support a data plane method of flow identification and packet treatment.

[[I-D.liu-detnet-large-scale-requirements](#)] has described the enhancement requirements for DetNet data plane, it is required to support information used by functions ensuring Deterministic Latency. [[I-D.xiong-detnet-large-scale-enhancements](#)] has proposed the overall framework of DetNet enhancements for large-scale deterministic networks. The packet treatment should schedule the resources and indicate the behaviour to ensure the deterministic latency. Moreover, new functions and related metadata should be supported in enhanced DetNet. [[I-D.xiong-detnet-data-fields-edp](#)] has proposed a common DetNet data fields and option types for enhanced DetNet data plane and defined a Deterministic Latency Action (DLA) option to carry queuing-based metadata.

This document defines how DetNet data fields are encapsulated in IPv6 option such as Deterministic Latency Action (DLA) data fields.

2. Conventions used in this document

2.1. Terminology

The terminology is defined as [\[RFC8655\]](#).

2.2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [\[RFC2119\]](#) [\[RFC8174\]](#) when, and only when, they appear in all capitals, as shown here.

3. The DetNet Options

[\[I-D.xiong-detnet-data-fields-edp\]](#) has proposed a common DetNet data fields and option types for enhanced DetNet data plane. This document defines new IPv6 options for DetNet to signal DetNet data fields. The DetNet options helps to discriminate the types of mechanisms and specify the related parameters.

The format of the DetNet options follow the generic definition in section 4.2 of [\[RFC8200\]](#). The DetNet options may be placed either in an HbH or a DoH EH. Multiple options with the same option type MAY appear in the same hop-by-hop options or destination options header with distinct data.

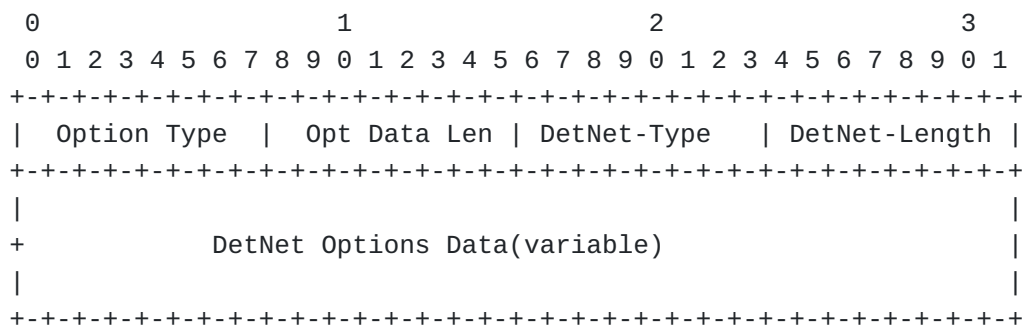


Figure 1: DetNet Options Format

[\[I-D.xiong-detnet-data-fields-edp\]](#) has defined a Deterministic Latency Action (DLA) option to carry queuing-based metadata. The DetNet DLA option data can be provided as follows:

Option Type: TBD1, 8-bit option type identifier indicates the DetNet Options.

Opt Data Len: 8-bit unsigned integer. Length of this option, in octets, not including the first 2 octets.

Reserved: 8-bit field MUST be set to zero.

DetNet-Length: 16-bit field indicates the DetNet option length.

DetNet-Type: 16-bit field indicates the DetNet option type.

DetNet Options Data: Variable-length field and Option-Type-specific data. [[I-D.xiong-detnet-data-fields-edp](#)] has defined a Deterministic Latency Action (DLA) option to carry queuing-based metadata. The DetNet option data can be provided as follows:

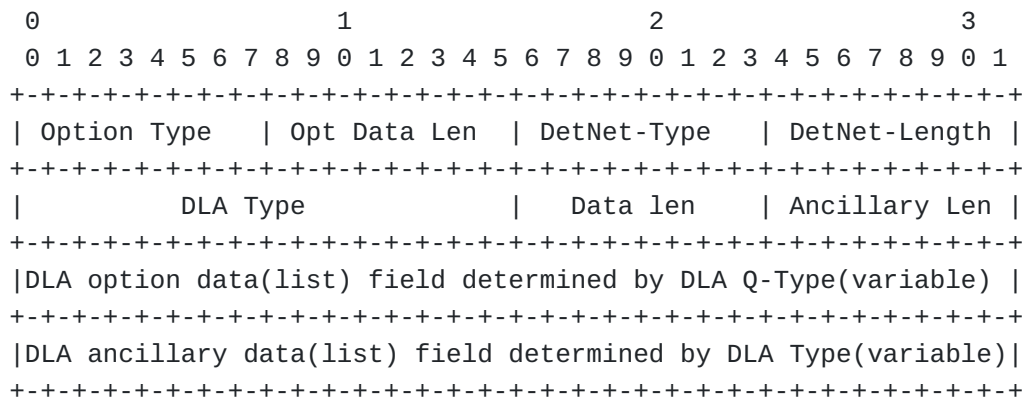


Figure 2: DetNet DLA Option Format

The definition of the value can be referred as [[I-D.xiong-detnet-data-fields-edp](#)]. The DetNet option data and Ancillary data can be provided one time or in list.

4. Encapsulation of DetNet Options

4.1. IPv6 Networks

The DetNet Options is intended to be placed in an IPv6 HbH EH since it must be processed by every DetNet forwarding node along the path. For the DetNet DLA option, all DetNet forwarding nodes can use the queuing information to achieve the packet forwarding and scheduling. The format of DetNet DLA option in IPv6 is as follows.

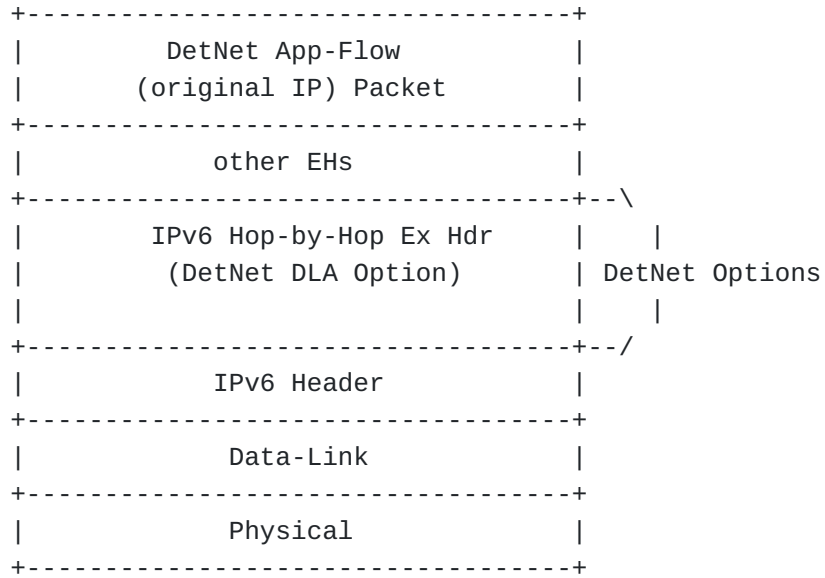


Figure 3: DetNet DLA Option Format in IPv6

4.2. SRv6 Networks

The DetNet Options is intended to be placed in an DOH EH before an SRH since it must be processed by the DetNet forwarding nodes of the SRv6 segment list. For the DetNet DLA option, the DetNet forwarding nodes among SRv6 segment list can use the queuing-based information to achieve the packet forwarding and scheduling. The format of DetNet DLA option in SRv6 is as follows.

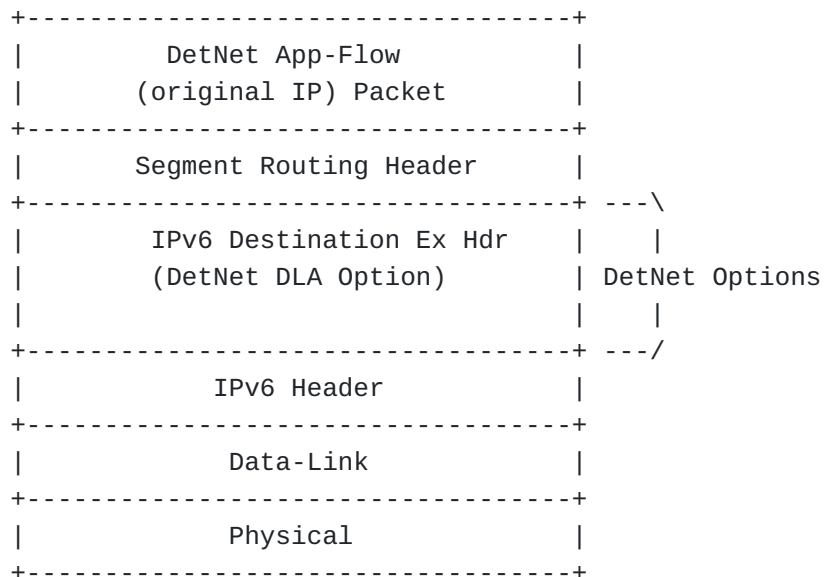


Figure 4: DetNet DLA Option Format in SRv6

5. Security Considerations

TBA

6. IANA Considerations

6.1. New Option for IPv6

This specification updates the "Destination Options and Hop-by-Hop Options" under the "Internet Protocol Version 6 (IPv6) Parameters" registry with the values below:

Type	Description	Reference
TBD1	DetNet DLA Option	[this document]

Table 1

7. Acknowledgements

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