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draft-geng-idr-bgp-ls-enhanced-detnet-01

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BGP - Link State (BGP-LS) Advertisement of IGP DetNet Extensions

Abstract

This document defines extensions to BGP-LS to distribute the enhanced DetNet information

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](https://tools.ietf.org/html/rfc2119) [[RFC2119](https://tools.ietf.org/html/rfc2119)].

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1. Introduction

DetNet[[RFC8655](#)] provides the capability to carry specified unicast or multicast data flows with extremely low data loss rates and bounded end-to-end latency within a network domain. Three primary goals of DetNet QoS are defined in section 3.1 of [[RFC8655](#)];

*Minimum and maximum end-to-end latency from source to destination, timely delivery, and bounded jitter (packet delay variation) derived from these constraints.

*Packet loss ratio under various assumptions as to the operational states of the nodes and links.

*An upper bound on out-of-order packet delivery. It is worth noting that some DetNet applications are unable to tolerate any out-of-order delivery.

This document defines extensions to BGP-LS to distribute the information for bounded latency(enhanced DetNet) .

BGP - Link State (BGP-LS)[[RFC7752](#)] defines Network Layer Reachability Information (NLRI) and attributes in order to carry link-state information. New BGP-LS Link Attribute TLVs for enhanced DetNet information are required in order to carry the Traffic Engineering Metric Extensions defined in [draft-geng-lsr-isis-extension-enhanced-detnet] .

2. Terminology

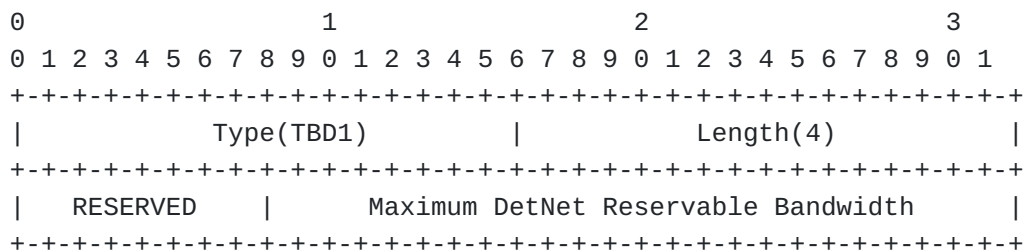
All the DetNet related terminologies used in this document conform to the [\[RFC8655\]](#).

3. Link Attribute TLVs for Enhanced DetNet

3.1. Max DetNet Reservable Bandwidth Sub-TLV

This sub-TLV specifies the maximum amount of bandwidth that is reserved for DetNet on this link. Note that this value SHOULD be smaller than the value of [Maximum Reservable Link Bandwidth \[RFC5305\]](#).

The format of this sub-TLV is shown in the following diagram:



The Type field is 2 octets in length, and the value is TBD2.

The Length field is 2 octets in length and its value is 4.

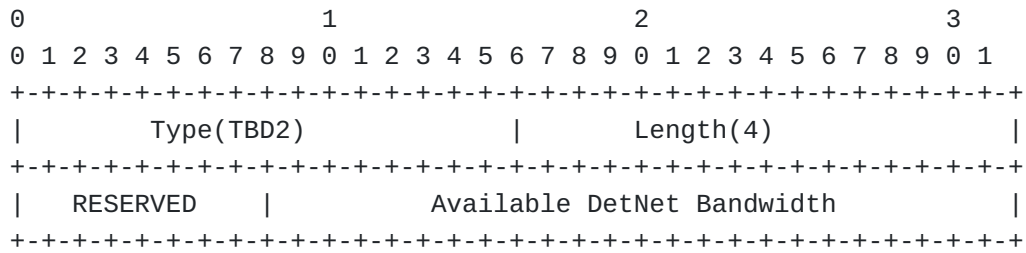
The RESERVED field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

This Maximum DetNet Reservable Bandwidth field is 3 octets in length and presents the maximum bandwidth that may be reserved for DetNet. The units are bytes per second.

3.2. DetNet Available Bandwidth Sub-TLV

This sub-TLV specifies the available bandwidth that can be reserved for DetNet flow on this link for now. It is different from the Unreserved Bandwidth sub-TLV defined [in \[RFC5305\]](#) referring to section 3.3.

The format of this sub-TLV is shown in the following diagram:



The Type field is 2 octets in length, and the value is TBD1.

The Length field is 2 octets in length and its value is 4.

The RESERVED field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

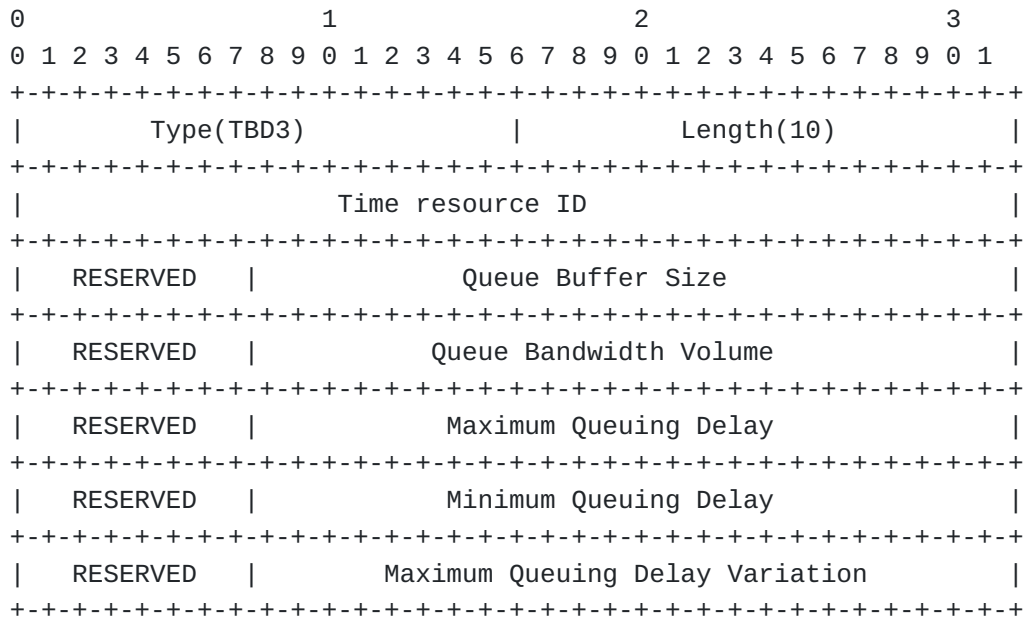
This Available DetNet Bandwidth field is 3 octets in length and presents the available bandwidth for DetNet in this link. The units are bytes per second.

3.3. DetNet Time Resource Sub-TLV

Time resource ID represent different types of identifiers used to indicate the capability of underlying bounded latency mechanisms. When the underlying technique is a logical queue based scheduling mechanisms, it represents a queue ID (There may different technologies for implementing logical queues, for example QoS, Flex-E, etc.). When the underlying technique is a time scheduling based mechanisms, it represents a time slot ID.(Cyclic queuing mechanisms could be considered as a special form of time scheduling, whose time slot is with equal length)

There are 2 types of Time Resource Sub-TLV: Time Resource for Logical queues sub-TLV and Time Resource for Time Scheduling sub-TLV:

The format of Time Resource for Logical queues sub-TLV is shown in the following diagram:



The Type field is 2 octets in length, and the value is TBD3.

The Length field is 2 octets in length and its value is 24.

Time resource ID for Logical Queues is 3 octets in length, and specifies the identifier of a logical queue.

The queue The Queue Buffer Size field is 3 octets in length, and specifies the size of a queue with unit of bytes.

Queue Bandwidth Volume: is 3 octets in length, and carries maximum bandwidth could be put into the queue to provide the latency boundary. It is encoded in G bps encoded as an integer value.

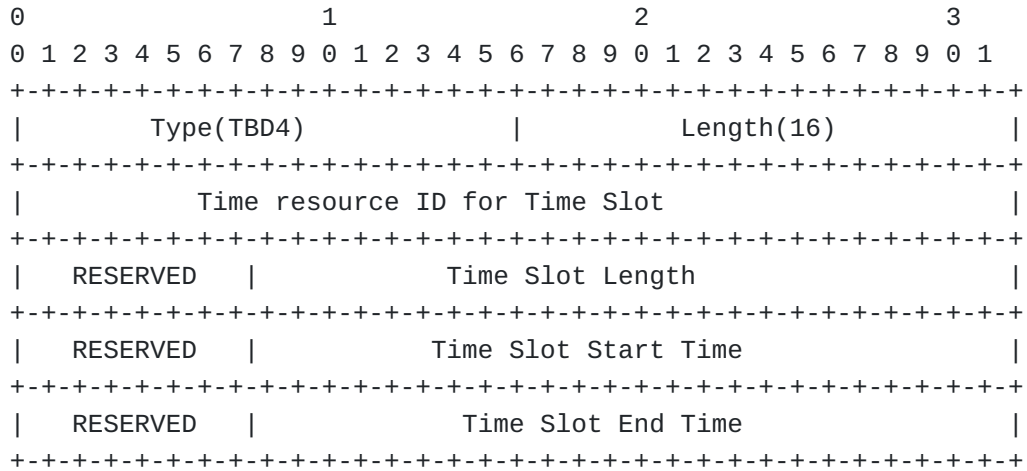
Minimum Queuing Delay is 3 octets in length, and carries minimum queuing delay value (in microseconds) encoded as an integer value. Implementations may also add this to the value of Min Delay Unidirectional Link Delay Sub-TLV [\[RFC7471\]](#) in order to advertise the minimum delay of this link. Min Queuing Delay can be the same with the Max Queuing Delay.

Maximum Queuing Delay is 3 octets in length, and carries the maximum queuing delay value (in microseconds) encoded as an integer value. Implementations may also add this to the value of Max Delay Unidirectional Link Delay Sub-TLV [\[RFC7471\]](#) in order to advertise the maximum delay of this link.

Maximum Queuing Delay variation is 3 octets in length, and carries the maximum queuing delay variation value (in microseconds) encoded as an integer value.

The RESERVED field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

The format of Time Resource for Time Scheduling sub-TLV is shown in the following diagram:



The Type field is 2 octets in length, and the value is TBD4.

The Length field is 2 octets in length and its value is 16.

Time Resource ID for Time Slot is 4 octets in length, and specifies the identifier of a time slot.

The Time Slot Length field is 3 octets in length, and specifies the length of time slot value (in microseconds) encoded as an integer value. When it is based on IEEE 802.1 Qch, time slot granularity presents cycle length.

The Time Slot Start Time field is 3 octets in length, and specifies the start time of the time slot in the time scheduling (in microseconds) encoded as an integer value.

The Time Slot End Time field is 3 octets in length, and specifies the end time of the time slot in the time scheduling (in microseconds) encoded as an integer value.

The RESERVED field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

4. Node Attribute TLVs for Enhanced Detnet

4.1. DetNet Processing Delay Sub-TLV

In the scope of DetNet, packet processing delay, which begins after the packet goes into the input port and ends before the packet

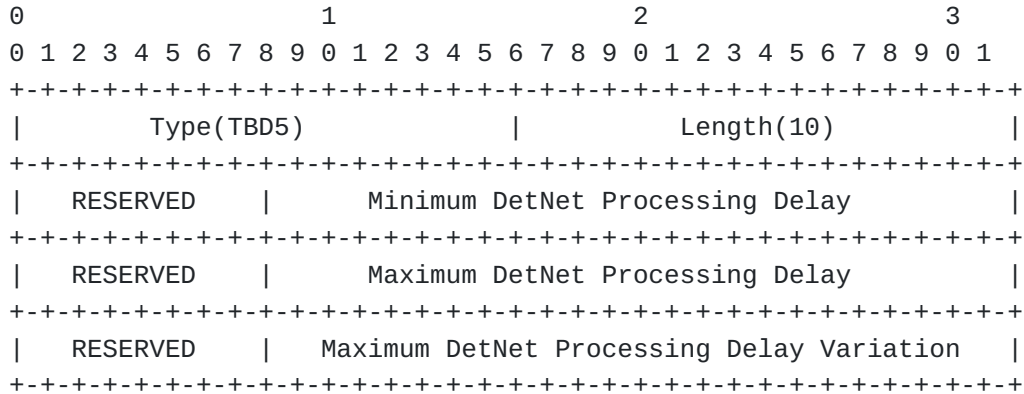
arrives the output buffer, can expected in a known range, and the value of the delay bound is specified in this sub-TLV, including:

*Maximum DetNet packet processing delay

*Minimum DetNet packet processing delay

*Maximum DetNet packet processing delay variation

The format of this sub-TLV is shown in the following diagram:



The Type field is 2 octets in length, and the value is TBD5.

The Length field is 2 octets in length and its value is 8.

The RESERVED field is reserved for future use. It MUST be set to 0 when sent and MUST be ignored when received.

The Minimum DetNet Processing Delay is 3 octets in length and presents the minimum delay for a DetNet flow in the device, excluding the queuing delay in output port. The units are microsecond.

The Maximum DetNet Processing Delay is 3 octets in length and presents the maximum delay for a DetNet flow in the device, excluding the queuing delay in output port. The units are microsecond.

The Maximum DetNet Processing Delay Variation is 3 octets in length and presents the maximum delay variation for a DetNet flow in the device, excluding the queuing delay in output port. The units are microsecond.

5. IANA Considerations

IANA has made assignments in the "BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs" registry for the new Link Attribute TLVs as listed below:

Type	Description
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TBD1	Maximum DetNet Reservable Bandwidth
TBD2	DetNet Available Bandwidth
TBD3	Time Resource ID for Logical Queue
TBD4	Time Resource ID for Time Slot
TBD5	Packet Processing Delay

6. Security Considerations

This document does not introduce security issues beyond those discussed [in \[RFC7471\]](#) and [\[RFC7810\]](#).

7. Acknowledgements

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