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Flow Metadata Signaling with RSVP
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Abstract

This specification proposes RSVP protocol extensions for signaling flow metadata attributes.

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1. Introduction

Flow Metadata attributes are information elements (attributes) that identify flow characteristics, such as the type of media carried by application flows (e.g. video), the service class, the application that originated the flow, and others. The description of the Flow Metadata technology and some of the attribute definitions can be found in [I-D.eckert-intarea-flow-metadata-framework]. The flow attributes can be signaled over the flow path and inspected by intermediate network nodes for the purpose of applying differentiated flow treatment or collect network analytics. This specification proposes the use of RSVP as signaling protocol to carry the Flow Metadata using a new RSVP object. Two C-Type values are proposed for this object to allow for two possible encodings.

1.1. 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 [RFC2119].

2. Flow Metadata Object

This specification proposes a new RSVP object with Class-Num from the 0x11bbbbbb range. To support informational metadata attribute processing on the path to the receiver, the sender inserts the Metadata object into an IPv4 or IPv6 Path message (i.e. Path messages with SESSION Class = 1 and SENDER_TEMPLATE Class = 11). The Metadata object SHOULD appear only once in the message.

The object definition is given in Section 2.1 while the details of processing are covered in Section 2.2

2.1. FLOW_METADATA Class

FLOW_METADATA Class = 234

Two encodings are defined, both of which carry the same IPFIX registered attributes as defined in [I-D.eckert-intarea-flow-metadata-framework]. The first encoding (Basic IPFIX FLOW_METADATA) has less flexibility and lower encoding efficiency. This version of the encoding is referenced here for legacy reasons. It does not support a range of options that the second one does, including the signaling of sender and receiver attributes, security elements, distinction of originator of the attributes and ease of extensibility.

2.1.1. Basic IPFIX FLOW_METADATA Object

Basic IPFIX FLOW_METADATA Object: Class = 234, C-Type = 1

- o The metadata attributes are encoded in IPFIX format, as described in [RFC5101], with the following restrictions when creating the object:
 - * Options Template Record MUST NOT be present
 - * One and only one Template Record MUST be present
 - * One and only one Data Record MUST be included
- o An intermediate node that supports this specification SHOULD ignore any Options Template Record. It SHOULD only decode and process the first occurring Template and Data Records.

2.1.2. Enhanced Protocol Independent FLOW_METADATA Object

Enhanced Protocol Independent FLOW_METADATA Object: Class = 234, C-Type = 2

- o The contents and encoding rules for this object are specified in [I-D.eckert-intarea-flow-metadata-framework] and [I-D.choukir-tsvwg-flow-metadata-encoding].

2.2. Semantic of carrying the Metadata Object

The Metadata Object included in the Path message carries attributes from the sender of the flow towards the receiver. In some cases, e.g. if the sender does not support the generation and signaling of Metadata attribute, these attributes may be inserted by a proxy along the path of the flow. Metadata RSVP nodes on path may modify the

metadata attributes for purpose of influencing policy toward the receiver.

The node that originates Metadata information in a Path message may do so for the sole purpose of signaling Metadata information. In this case, the SENDER_TSPEC objects fields (as defined by [RFC2210]) should be set to 0:

- o Token Bucket Rate [r]
- o Token Bucket Size [b]
- o Peak Data Rate [p]
- o Minimum Policed Unit [m]

If the Metadata object is inserted in a Path message used for IntServ service [[RFC2210]] reservation requests, then all the rules of RSVP reservation request apply and in addition any actions driven purely by the metadata attributes may equally take place.

While the Metadata Object may be included in a Resv message, the specific processing rules for this option is left for followup documents or future versions of this specification.

2.3. Processing by a Non-Metadata Capable RSVP Router

As described in [RFC2205], a node that does not understand the Metadata object, should ignore but forward it, unexamined and unmodified. When received in Path or Resv messages, it should be saved with the corresponding state and forwarded in any refresh message resulting from that state.

2.4. Processing by a Metadata Capable RSVP Router

The Metadata object may be inserted by the data flow initiating endpoint or network nodes along the path. The means by which an implementation determines the content of the Metadata object is outside the scope of this document.

Intermediate nodes that support this specification, decode the Flow Metadata information as indicated by the C-Type field only when received in Path message. Depending on the attributes, local configuration and policies, the node may take some actions. The Metadata attribute semantics are described in [I-D.eckert-intarea-flow-metadata-framework]. The received Flow Metadata object is stored against the Path state. When a subsequent Path message is received with a modified Metadata object, the

intermediate node determines the attributes that have been removed, modified and/or added by comparing the old and new objects, and takes appropriate actions.

As a result of these actions, an intermediate node may add new attributes to the Metadata object received in the Path message and signal them downstream. It can also modify some of the attributes present in the Flow Metadata object. RSVP does not have any transport protocol specific restrictions and the exact set of attributes that can be inserted and modified by intermediate nodes is described in [I-D.eckert-intarea-flow-metadata-framework]. Depending on local policies, an intermediate node may also remove some of the attributes received in the Metadata object of a Path message before forwarding downstream.

An intermediate node that receives a Resv message with a Metadata Object SHOULD store the object against the state and forward it unexamined and unmodified.

3. References

3.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2205] Braden, B., Zhang, L., Berson, S., Herzog, S., and S. Jamin, "Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification", RFC 2205, September 1997.
- [RFC2210] Wroclawski, J., "The Use of RSVP with IETF Integrated Services", RFC 2210, September 1997.
- [RFC5101] Claise, B., "Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information", RFC 5101, January 2008.

3.2. Informative References

- [I-D.choukir-tsvwg-flow-metadata-encoding]
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