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Node-ID Based Resource Reservation Protocol (RSVP) Hello: A Clarification Statement

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Abstract

Use of Node-ID based Resource Reservation Protocol (RSVP) Hello messages is implied in a number of cases, e.g., when data and control planes are separated, when TE links are unnumbered. Furthermore, when link level failure detection is performed by some means other than exchanging RSVP Hello messages, use of a Node-ID based Hello session is optimal for detecting signaling adjacency failure for Resource reSerVation Protocol-Traffic Engineering (RSVP-TE). Nonetheless, this implied behavior is unclear, and this document formalizes use of the Node-ID based RSVP Hello session in some scenarios. The procedure described in this document applies to both Multi-Protocol Label Switching (MPLS) and Generalized MPLS (GMPLS) capable nodes.

1. Introduction

The RSVP Hello message exchange was introduced in [RFC3209]. The usage of RSVP Hello has been extended in [RFC3473] to support RSVP Graceful Restart (GR) procedures.

More specifically, [RFC3473] specifies the use of the RSVP Hello messages for GR procedures for Generalized MPLS (GMPLS). GMPLS introduces the notion of control plane and data plane separation. In other words, in GMPLS networks, the control plane information is carried over a control network whose end-points are IP capable and that may be physically or logically disjoint from the data bearer links it controls. One of the consequences of separation of data bearer links from control channels is that RSVP Hello messages are not terminated on data bearer links' interfaces even if (some of) those are numbered. Instead, RSVP Hello messages are terminated at the control channel (IP-capable) end-points. The latter MAY be identified by the value assigned to the node hosting these control channels, i.e., Node-ID. Consequently, the use of RSVP Hello messages for GR applications introduces a need for clarifying the behavior and usage of Node-ID based Hello sessions.

Even in the case of packet switching capable interfaces, when link failure detection is performed by some means other than RSVP Hello messages (e.g., [BFD]), the use of Node-ID based Hello sessions is also optimal for detection of signaling adjacency failures for GMPLS-RSVP-TE and RSVP-TE when there is more than one link between a pair of nodes. Similarly, when all TE links between neighbor nodes are unnumbered, it is implied that the nodes will exchange Node-ID based Hello messages for detection of signaling adjacency failures. This document also clarifies the use of Node-ID based Hello message exchanges when all or a sub-set of TE links are unnumbered.

2. Terminology

Node-ID: TE Router ID as advertised in the Router Address TLV for OSPF [OSPF-TE] and Traffic Engineering Router ID TLV for ISIS [ISIS-TE]. For IPv6, the Node-ID refers to the Router_IPv6_Address for OSPFv3 [OSPFv3-TE] and the IPv6 TE Router_ID for IS-IS [IS-ISv6-TE].

Node-ID based Hello Session: A Hello session in which local and remote Node-IDs are used in the source and destination fields of the Hello packet, respectively.

Interface bounded Hello Session: A Hello session in which local and remote addresses of the interface in question are used in the source and destination fields of the Hello packet, respectively.

2.1. Conventions Used in This Document

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].

3. Node-ID Based RSVP Hello Messages

A Node-ID based Hello session is established through the exchange of RSVP Hello messages such that local and remote Node-IDs are respectively used in the source and destination fields of Hello packets. Here, for IPv4, Node-ID refers to the TE router-id as defined in the Router Address TLV for OSPF [OSPF-TE] and the Traffic Engineering router ID TLV for ISIS [ISIS-TE]. For IPv6, the Node-ID refers to the Router_IPv6_Address for OSPFv3 [OSPFv3-TE] and the IPv6 TE Router_ID for IS-IS [IS-ISv6-TE]. This section formalizes a procedure for establishing Node-ID based Hello sessions.

If a node wishes to establish a Node-ID based RSVP Hello session with its neighbor, it sends a Hello message with its Node-ID in the source IP address field of the Hello packet. Furthermore, the node also puts the neighbor’s Node-ID in the destination address field of the IP packet.

When a node receives a Hello packet where the destination IP address is its local Node-ID as advertised in the IGP-TE topology, the node MUST use its Node-ID in replying to the Hello message. In other words, nodes MUST ensure that the Node-IDs used in RSVP Hello messages are those derived/contained in the IGP-TE topology. Furthermore, a node can only run one Node-ID based RSVP Hello session per IGP instance (i.e., per Node-ID pair) with its neighbor.

Even in the case of packet switching capable interfaces, when link failure detection is performed by some means other than exchanging RSVP Hello messages, use of Node-ID based Hello sessions is also optimal in detecting signaling adjacency failures for GMPLS-RSVP-TE and RSVP-TE when there is more than one link between a pair of nodes. Similarly, if all interfaces between a pair of nodes are unnumbered, the optimal way to use RSVP to detect signaling adjacency failure is to run Node-ID based Hello sessions. Furthermore, in the case of an optical network with single or multiple numbered or unnumbered control channels, use of Node-ID based Hello messages for detecting signaling adjacency failure is also optimal. Therefore, when link failure detection is performed by some means other than exchanging RSVP Hello messages, or if all interfaces between a pair of nodes are unnumbered, or in a GMPLS network with data and control plane separation, a node MUST run Node-ID based Hello sessions for detection of signaling adjacency failure for RSVP-TE. Nonetheless,

if it is desirable to distinguish between signaling adjacency and link failures, Node-ID based Hello sessions can co-exist with the exchange of interface bound Hellos messages. Similarly, if a pair of nodes share numbered and unnumbered TE links, Node-ID and interface based Hello sessions can co-exist.

4. Backward Compatibility Note

The procedure presented in this document is backward compatible with both [RFC3209] and [RFC3473].

Per [RFC3209], the Hello mechanism is intended for use between immediate neighbors, and Hello messages are by default sent between direct RSVP neighbors. This document does not modify this behavior, as it uses as "local node_id" the IPv4/IPv6 source address of the sending node and as "remote node_id" the IPv4/IPv6 destination address of the neighbor node. TTL/Hop Limit setting and processing are also left unchanged.

Moreover, this document does not modify the use of Hello Processing for State Recovery as defined in Section 9.3 of [RFC3473] (including definition and processing of the RESTART_CAP object).

5. Security Considerations

As this document does not modify or extend the RSVP Hello messages exchange between immediate RSVP neighbors, it does not introduce new security considerations.

The security considerations pertaining to the original [RFC3209] remain relevant. RSVP message security is described in [RFC2747] and provides Hello message integrity and authentication of the Node-ID ownership.

6. Acknowledgements

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7. Reference

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