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OSPF Restart Signaling
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Abstract

OSPF is a link-state intra-domain routing protocol used in IP networks. Routers find new and detect unreachable neighbors via Hello subprotocol. Hello OSPF packets are also used to ensure two-way connectivity within time. When a router restarts its OSPF software, it may not know its neighbors. If such a router sends a hello packet on an interface, its neighbors are going to reset the adjacency, which may not be desirable in certain conditions. This memo provides a mechanism that allows OSPF routers to inform their neighbors about the restart process. Note that this mechanism requires support from neighboring routers.

1 Motivation

While performing a graceful restart of OSPF software [OSPF], routers need to prevent their neigbors from reseting their adjacencies. However, after a reload, routers may not be aware of the neighbors they had adjacencies with in their previous incarnations. If such a router sends a Hello packet on an interface and this packet does not list some neighbors, those neighbors will reset the adjacency with restarting router.

This document describes a technique that allows restarting routers to inform their neighbors that they may not know about some neighbors yet and the absence of some router-IDs in the Hello packets should be ignored.

2 Proposed solution

A new bit, called RS (restart signal) is introduced into Extended Options TLV in the LLS block (see [LLS]). The value of this bit is TBD (temporarily used value is 0x00000002, see Figure 1 below).

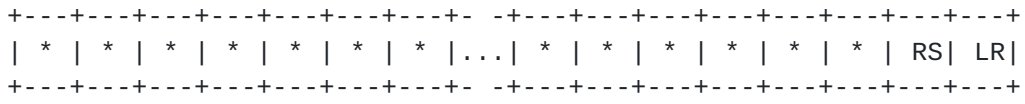

Figure 1. Bits in Extended Options TLV

OSPF routers should set the RS-bit in the EO-TLV attached to a Hello packet when this is not clear that all neighbors are listed in this packet, but the restarting router wants them to preserve their adjacencies. The RS-bit may not be set in Hello packets longer than RouterDeadInterval seconds.

For a definition of the LR bit, see [OOB].

2.1 Receiving Hello Packets with RS-bit set

When an OSPF router receives a Hello packet, containing the LLS block with the EO-TLV which has the RS-bit set, the router should skip the two-way connectivity check with the announcing neighbor (i.e., the router should not generate a 1-WayReceived event for the neighbor if it does not find its own router ID in the list of neighbors as described in 10.5 of [OSPF]), provided that the neighbor FSM for this neighbor is in the Full state.

The router should also send a unicast Hello back to the sender in reply to a Hello packet with RS bit set. This is to speed up learning of previously known neighbors. When sending such a reply packet, care must be taken to ensure that the RS bit is clear in it.

Two additional fields are introduced in the neighbor data structure: RestartState flag and ResyncTimeout timer. RestartState flag indicates that a Hello packet with RS-bit set has been received and the local router expects its neighbor to go through the LSDB resynchronization procedure using [OOB]. ResyncTimeout is a single-shot timer limiting the delay between the first seen Hello packet with RS-bit set and initialization of the LSDB resynchronization procedure. The length of ResyncTimeout timer is RouterDeadInterval seconds.

When a Hello packet with RS-bit set is received and RestartState flag is not set for the neighbor, the router sets RestartState flag and starts ResyncTimeout timer. If ResyncTimeout expires, RestartState flag is cleared and a 1-WayReceived event is generated for the neighbor. If, while ResyncTimeout timer is running, the neighbor starts LSDB resynchronization procedure using [OOB], ResyncTimeout timer is cancelled. The router also clears RestartState flag on completion of the LSDB resynchronization process.

2.2 Insuring topology stability

Under certain circumstances it might be desirable to stop announcing the restarting router as fully adjacent if this may lead to possible routing loops. In order to provide this functionality, a configurable oprion is provided on the neighboring routers that instructs the OSPF process to follow the logics described below.

When an OSPF router schedules a routing table calculation due to a change in the contents of its LSDB, it should also reset all adjacencies with restarting routers (those with RestartState set to TRUE) by clearing the RestartState neighbor flags, canceling ResyncTimeout timers (if running), and generating the 1-WayReceived events for the neighbor FSMs.

3 Compatibility Issues

The described technique requires cooperation from neighboring routers. However, if neighbors do not support this technique, they will just reset the adjacency.

4 Security Considerations

The described technique does not introduce any new security issues into OSPF protocol.

5 Acknowledgements

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6 References

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[LLS] Zinin, Friedman, Roy, Nguyen, Yeung, "OSPF Link-local Signaling", draft-ietf-ospf-lls-00.txt, Work in progress.

[OOB] Zinin, Roy, Nguyen, "OSPF Out-of-band LSDB resynchronization", draft-ietf-ospf-oob-resync-00.txt, Work in progress.

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