Open Shortest Path First IGP
Internet-Draft
Intended status: Standards Track
Expires: March 28, 2019

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September 24, 2018

OSPF LLS Extensions for Local Interface ID Advertisement
draft-ietf-ospf-lls-interface-id-06

Abstract

Every OSPF interface is assigned an identifier, Interface ID, which uniquely identifies the interface on the router. In some cases it is useful to know the assigned Interface ID on the remote side of the adjacency (Remote Interface ID).

This draft describes the extensions to OSPF link-local signalling to advertise the Local Interface Identifier.

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 BCP14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

Status of This Memo

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1. Introduction

Every OSPF interface is assigned an Interface ID, which uniquely identifies the interface on the router. [RFC2328] uses this Interface ID in the Router-LSA Link Data for unnumbered links and uses the value of the MIB-II IfIndex [RFC2863]. [RFC4203] refers to these Interface IDs as the Link Local/Remote Identifiers and defines a way to advertise and use and use them for Generalized Multi-Protocol Label Switching (GMPLS) purposes. [RFC7684] defines a way to advertise Local/Remote Interface IDs in the OSPFv2 Extended Link LSA.

There is a known OSPFv2 protocol problem in verifying the bi-directional connectivity with parallel unnumbered links. If there are two parallel unnumbered links between a pair of routers and each link is only advertised from single direction, such two unidirectional parallel links could be considered as a valid single bidirectional link during the OSPF route computation on some other

router. If each link is advertised with both its Local and Remote Interface IDs, the advertisement of each link from both sides of adjacency can be verified by cross-checking the Local and Remote Interface IDs of both advertisements.

From the perspective of the advertising router, the Local Interface Identifier is a known value, however the Remote Interface Identifier needs to be learnt before it can be advertised. [RFC4203] suggests to use TE Link Local LSA [RFC3630] to communicate the Local Interface Identifier to neighbors on the link. Though such mechanism works, it has some drawbacks.

This draft proposes an extension to OSPF link-local signalling [RFC5613] to advertise the Local Interface Identifier.

1.1. Interface ID Exchange using TE Opaque LSA

Usage of the Link Local TE Opaque LSA to propagate the Local Interface Identifier to the neighbors on the link is described in [RFC4203]. This mechanism has the following problems:

LSAs can only be flooded over an existing adjacency that is in Exchange state or greater. The adjacency state machine progresses independently on each side of the adjacency and, as such, may reach the Full state on one side before the TE Link Opaque LSA arrives. The consequence is that link can be initially advertised without the Remote Interface Identifier. Later, when the TE Link Opaque LSA arrives, the link must be advertised again, this time with the valid Remote Interface Identifier. Implementations may choose to wait before advertising the link, but there is no guarantee that the neighbor will ever advertise the TE Link Opaque LSA with the Interface Identifier. In summary, the existing mechanism does not guarantee that the Remote Interface Identifier is known at the time the link is advertised.

The TE Opaque LSA is defined for MPLS Traffic Engineering, but the knowledge of the Remote Interface Identifier is useful also for cases where MPLS TE is not used. One example is the mentioned lack of a valid 2-way connectivity check for parallel point-to-point links between OSPF routers.

2. Interface ID Exchange using OSPF LLS

To address the problems described earlier and to allow the Interface Identifier exchange to be part of the neighbor discovery process, we propose to extend OSPF link-local signalling to advertise the Local Interface Identifier in OSPF Hello and Database Description (DD) packets.

2.1. Local Interface Identifier TLV

The Local Interface Identifier TLV is a LLS TLV. It has following format:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Type             |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   Local Interface Identifier                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

where:

Type: 18

Length: 4 octets

Local Interface Identifier: The value of the local Interface Identifier.

Local Interface Identifier TLV signalling using LLS is applicable to all OSPF interface types other than virtual links.

3. Backward Compatibility with RFC 4203

If the Local Interface ID signaling via Link Local TE Opaque LSA is supported in addition to the new LLS mechanism, implementations which support Local Interface ID signalling using LLS MUST prefer the Local Interface ID value received through LLS over the value received through the Link Local TE Opaque LSA if both are received from the same OSPF router.

Implementations which support Local Interface ID signalling via Link Local TE Opaque LSA MAY continue to do so to ensure backward compatibility. If they also support Local Interface ID signalling using LLS as described herein, they MUST signal the same Local Interface ID via both mechanisms.

During the rare conditions, when the Local Interface ID changes, a timing interval may exist, where the received values of the Local Interface ID advertised through LLS and Link Local TE Opaque LSA may differ. Such situation is temporary and received values via both mechanisms should become equal as soon as the next Hello and/or Link Local TE Opaque LSA is re-generated by the originator.

4. IANA Considerations

This specification allocates a single code point from the "Open Shortest Path First (OSPF) Link Local Signalling (LLS) - Type/Length/Value Identifiers (TLV)" registry.

Following value is allocated:

o 18 - Local Interface Identifier TLV

5. Security Considerations

The security considerations for "OSPF Link-Local Signaling" [RFC5613] also apply to the Local Interface Identifier TLV described herein. The current usage of a neighbor's Local Interface Identifier is to disambiguate parallel links between OSPF routers. Hence, modification of the advertised Local Interface Identifier TLV may result in the wrong neighbor interface identifier being advertised in the OSPFv2 Extended Link LSA [RFC7684] and could prevent the link from being used. If authentication is being used in the OSPF routing domain [RFC5709], then the Cryptographic Authentication TLV [RFC5613] SHOULD also be used to protect that contents of the Link-Local Signaling (LLS) block.

Receiving a malformed LLS Interface Identifier TLV MUST NOT result in a hard router or OSPF process failure. The reception of malformed LLS TLVs or Sub-TLVs SHOULD be logged but such logging MUST be rate-limited to prevent Denial-of-Service (DoS) attacks.

6. Acknowledgements

Thanks to Tony Przygienda for his extensive review and useful comments.

7. References

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