OSPF
Internet-Draft
Intended status: Standards Track
Expires: December 16, 2017

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June 14, 2017

H-bit Support for OSPFv2
draft-ietf-ospf-ospfv2-hbit-03

Abstract

OSPFv3 defines an option field for router-LSAs known as a R-bit in RFC5340. If the R-bit is clear, an OSPFv3 router can participate in OSPF topology distribution without acting as a forwarder to forward the transit traffic. In such cases, an OSPF router would only accept traffic intended for local delivery. This draft defines R-bit functionality for OSPFv2 defined in RFC2328.

Table of Contents

1. Introduction

OSPFv3 [RFC5340] defines an option field for router-LSAs known as a R-bit. If the R-bit is clear, an OSPF router can participate in OSPFv3 topology distribution without acting as a forwarder to forward the transit traffic. In such cases, an OSPF router would only accept traffic intended for local delivery.

This functionality is particularly useful for BGP Route Reflectors known as virtual Route Reflectors (vRRs) that are not in the forwarding path but are in central location such as data centers. Such Route Reflectors typically are used for route distribution and are not capable of forwarding data traffic. However, they need to participate in the IGP routing for: 1) computing SPFs for Optimal Route Reflection functionality defined in [I-D.ietf-idr-bgp-optimal-route-reflection], and 2) resolving reachability for its Route Reflector Clients.

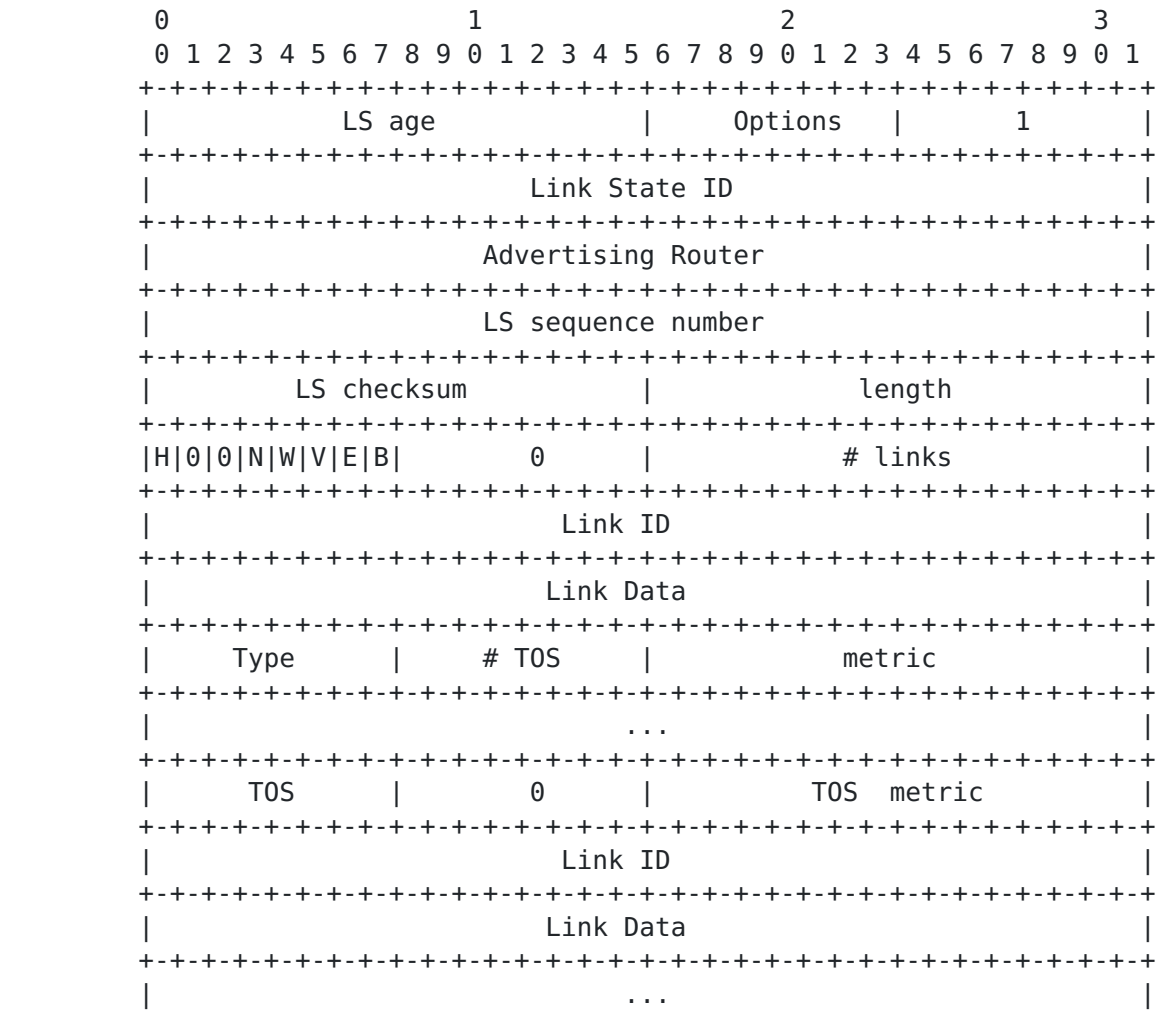
This draft defines R-bit functionality for OSPFv2 defined in [RFC2328] by introducing a new Router LSA bit known as a "H-bit".

2. 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 [RFC2119] only when they appear in all upper case. They may also appear in lower or mixed case as English words, without any normative meaning.

3. H-bit Support

This draft defines a new Router-LSA bit known as a Host Bit or a H-bit. The H-bit indicates the OSPFv2's capability of acting as a transit router. When set, the OSPFv2 router indicates that the transit capability is disabled. The bit value usage of the H-bit is reversed as opposed to the R-bit value defined in OSPFv3 [RFC5340] to support backward compatibility. The OSPFv2 Router LSA format is defined as:



bit H
: When set, an OSPFv2 router is a non-transit router and is incapable of acting as a forwarder.

When H-bit is set, an OSPFv2 router is a non-transit router and is incapable of acting as a forwarder. In this mode, the other OSPFv2 routers SHOULD NOT use the originating OSPFv2 router for the transit traffic, but they will use the OSPFv2 router for data traffic destined to that OSPFv2 router. An OSPFv2 router originating a Router LSA with the H-bit set SHOULD advertise its LINKS with MAX Link cost as defined in Section 3 of [RFC6987]. This is to increase the applicability of the H-bit in partial deployments where it is the responsibility of the operator to ensure that the H-bit does not result in routing loops.

When H-bit is set, IPv4 prefixes associated with local interfaces MAY be advertised in summary LSAs. Non-local IPv4 prefixes, e.g., those advertised by other routers and installed during the SPF computation, MAY be advertised in summary-LSAs if configured by policy. Likewise, when H-bit is set, only IPv4 prefixes associated with local interfaces MAY be advertised in AS-external LSAs. Non-local IPv4 prefixes, e.g., those exported from other routing protocols, MUST NOT be advertised in AS-external-LSAs. Finally, when H-bit is set, an ABR MUST advertise a consistent H-bit setting in its self-originated router-LSAs for all attached areas.

4. SPF Modifications

The SPF calculation described in section 16.1 [RFC2328] will be modified to assure that the routers originating router-LSAs with the H-bit set will not be used for transit traffic. Step 2 is modified as follows:

> 2) Call the vertex just added to the tree vertex V. Examine the LSA associated with vertex V. This is a lookup in the Area A's link state database based on the Vertex ID. If this is a router-LSA, and the H-bit of the router-LSA is set, and vertex V is not the root, then the router should not be used for transit and step (3) should be executed immediately. If this is a router-LSA, and bit V of the router-LSA (see Section A.4.2) is set, set Area A's TransitCapability to TRUE. In any case, each link described by the LSA gives the cost to an adjacent vertex. For each described link, (say it joins vertex V to vertex W):

5. Auto Discovery and Backwards Compatibility

To avoid the possibility of any routing loops due to partial deployments, this draft defines a new OSPF Router Functional Capability known as a Host Support Capability. The value of this capability is a bit value to be assigned by IANA from OSPF Router Functional Capability Bits registry [RFC7770] .

The Auto Discovery via announcement of the Host Support Functional Capability ensures that the H-bit functionality and its associated SPF changes SHOULD only take effect if all the routers in a given OSPF area support this functionality.

Implementations are encouraged to provide a knob to manually override enforcement of the H-bit functionality in partial deployment scenarios for cases where the topology guarantees that the router supporting the H-bit will not cause routing loops.

6. OSPF AS-External-LSAs/NSSA LSAs with Type 2 Metrics

When calculating the path to an OSPF AS-External-LSA or NSSA-LSA with a Type-2 metric, the advertised Type-2 metric is taken as more significant than the OSPF intra-area or inter-area path. Hence, advertising the links with MaxLinkMetric as specified in [RFC6987] does not discourage transit traffic when calculating AS external or NSSA routes. Consequently, OSPF routers implementing [RFC6987] or this specification should advertise a Type-2 metric of LSInfinity for any self-originated AS-External-LSAs or NSSA-LSAs in situations when the OSPF router is acting as a stub router [RFC6987] or implementing this specification.

7. IANA Considerations

This draft defines a new Router LSA bit known as a H-bit. This draft requests IANA to 1) Create a new OSPF Router LSA bits registry and 2) assign a H-bit code type from the newly allocated OSPF Router LSA bit registry.

This draft defines a new Router Functional Capability known as a Host Support Functional Capability. This draft requests IANA to allocate the value of this capability from the Router Functional Capability Bits TLV.

8. Security Considerations

This document introduces no new security considerations above and beyond those already specified in [RFC2328] and [RFC5340].

9. Acknowledgements

The authors would like to acknowledge Hasmit Grover for discovery of the limitation in [RFC6987], Acee Lindem, Abhay Roy, David Ward, Burjiz Pithawala and Michael Barnes for their comments.

10. Change Log

Initial Version: April 23 2015

11. References

11.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[RFC2328] Moy, J., "OSPF Version 2", STD 54, RFC 2328, DOI 10.17487/RFC2328, April 1998, <http://www.rfc-editor.org/info/rfc2328>.

[RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", RFC 5340, DOI 10.17487/RFC5340, July 2008, <http://www.rfc-editor.org/info/rfc5340>.

[RFC7770] Lindem, A., Ed., Shen, N., Vasseur, JP., Aggarwal, R., and S. Shaffer, "Extensions to OSPF for Advertising Optional Router Capabilities", RFC 7770, DOI 10.17487/RFC7770, February 2016, <http://www.rfc-editor.org/info/rfc7770>.

11.2. Informative References

[I-D.ietf-idr-bgp-optimal-route-reflection] Raszuk, R., Cassar, C., Aman, E., Decraene, B., Litkowski, S., and K. Wang, "BGP Optimal Route Reflection (BGP-ORR)", draft-ietf-idr-bgp-optimal-route-reflection-13 (work in progress), January 2017.

[RFC6987] Retana, A., Nguyen, L., Zinin, A., White, R., and D. McPherson, "OSPF Stub Router Advertisement", RFC 6987, DOI 10.17487/RFC6987, September 2013, <http://www.rfc-editor.org/info/rfc6987>.

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