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OSPFv2 No Transit Capability
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Abstract

Open Shortest Path First for IPv6 incorporates an R-bit in the router Link State Advertisement that controls whether or not other routers will compute transit paths through that node when they perform their Shortest Path First computation. This is a very useful feature of the protocol which is currently unavailable in Open Shortest Path First Version 2.

This document extends the Open Shortest Path First Version 2 specification by adding a similar capability in a way that can safely coexist with implementations lacking this feature.

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1. Introduction

When OSPFv3 was first developed, a number of improvements were made over the existing OSPFv2 protocol. One of these was the addition of the R option bit in the router LSA to indicate whether the originator is an active router. If the "R-bit" is clear, an OSPF speaker can actively participate in the protocol without being used to forward transit traffic.

There are a number of cases where this capability is very useful. For example, a multi-homed BGP route reflector may want to participate in routing, but should not be used to forward non-locally addressed packets.

Note this is not the same capability provided by OSPF Stub Router Advertisement [[RFC3137](#)]. That technique can be used to make a node undesirable for transit traffic by increasing its cost, but other routers will still compute paths through it if no others are available.

We presuppose familiarity with the contents of [[RFC5340](#)] and [[RFC2328](#)].

2. Specification of Requirements

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. Requirements

The benefits and considerations associated with deploying an OSPFv2 no-transit router are similar to those described in [section 2.7 of \[RFC5340\]](#). In addition, a no-transit router should not be an Area Border Router or Autonomous System Boundary Router.

4. New bits in the Router LSA

Two new bits are defined in the Router-LSA to define the support and state of the capability. The S-Bit is set to indicate that a router has the capability to process the R-bit. The R-bit is clear when a router is effectively functioning as a no-transit node.

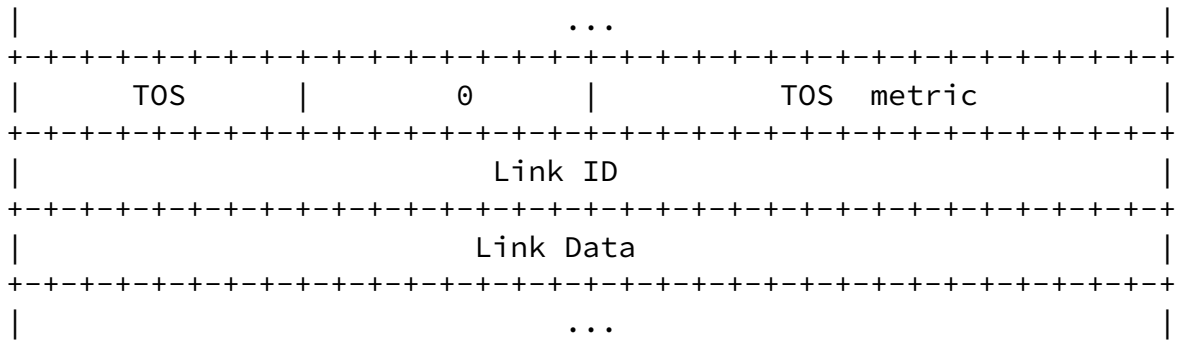
S/R possible settings

- 1/1 - Router has capability for no-transit and is transit
- 1/0 - Router has capability for no-transit and is no-transit
- 0/x - Router does not have no-transit capability and

is always a transit router (backward compatibility)

All routers implementing this capability MUST set the S-bit in their Router-LSAs. The R-bit SHOULD be set unless the router does not participate in any transit routing.

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								
+-----+																																							



The OSPFv2 Router LSA with new R and S bits

R-bit

The "Router" bit indicates whether the originator is an active router. If the router bit is clear, then routes that transit the advertising node cannot be computed. Clearing the router bit would be appropriate for a multi-homed host that wants to participate in

routing, but does not want to forward non-locally addressed packets.

S-bit

The "Support" bit indicates whether the originator can process the R-Bit.

5. Advertising of local addresses in the Router LSA

When the R-bit is clear in the router-LSA:

1. All local addresses on the router are advertised as stub links in the router-LSA with a metric set to the interface output cost.
2. The cost of other links should be set to LSInfinity as defined in [section 2 of \[RFC3137\]](#).

6. Modification in SPF calculation

The step 2 in [section 16.1 of \[RFC2328\]](#) is modified as follows:

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 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.

If all the router-LSAs in the area have the S-Bit set and vertex V is a router-LSA with R-bit clear and it is not the root, then all vertex V's links are ignored and the next vertex on the candidate list should be examined as described in Step 3.

7. Backward compatibility

For the modification in the SPF processing defined in [section 6](#) of this document to take effect, all routers in the area MUST have the S-bit set.

When an area switches from being all S-bit capable routers to a mix of S-bit capable and non-capable, previous no-transit routers may now be considered as potential transit nodes. Likewise, when a mixed area switches to being all S-bit capable, paths will no longer be computed through no-transit nodes.

If a new router not supporting the R-Bit joins the area (S-bit clear):

1. The new step defined in [section 6](#) of this document will be ignored.
2. Any no-transit router with link cost set to LSInfinity will be treated like a stub router as defined in [[RFC3137](#)].

8. IANA Considerations

This document has no actions for IANA.

9. Security Considerations

The new extensions defined in this document do not introduce any new security concerns other than those already defined in [[RFC2328](#)].

10. Acknowledgments

The authors would like to thank Liem Nguyen and Abhay Roy for their comments.

This document was produced using Marshall Rose's xml2rfc tool.

11. References

11.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2328] Moy, J., "OSPF Version 2", [RFC 2328](#), April 1998.
- [RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", [RFC 5340](#), July 2008.

11.2. Informative References

- [RFC3137] Retana, A., Nguyen, L., White, R., Zinin, A., and D. McPherson, "OSPF Stub Router Advertisement", June 2001.

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