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P. Pillay-Esnault
Cisco Systems

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OSPF Refresh and Flooding Reduction in Stable Topologies

Status of This Memo

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Abstract

This document describes an extension to the OSPF protocol to reduce periodic flooding of Link State Advertisements (LSAs) in stable topologies.

Current OSPF behavior requires that all LSAs, except DoNotAge LSAs, to be refreshed every 30 minutes. This document proposes to generalize the use of DoNotAge LSAs in order to reduce protocol traffic in stable topologies.

1. Introduction

The explosive growth of IP-based networks has placed focus on the scalability of Interior Gateway Protocols such as OSPF. Networks using OSPF are growing every day and will continue to expand to accommodate the demand for connections to the Internet or intranets.

Internet Service Providers and users that have large networks have noticed non-negligible protocol traffic, even when their network topologies were stable.

OSPF requires every LSA to be refreshed every 1800 seconds or else they will expire when they reach 3600 seconds [1].

This document proposes to overcome the LSA expiration by generalizing the use of DoNotAge LSAs. This technique will facilitate OSPF scaling by reducing OSPF traffic overhead in stable topologies.

2. Changes in the Existing Implementation

This enhancement relies on the implementation of the DoNotAge bit and the Indication-LSA. The details of the implementation of the DoNotAge bit and the Indication-LSA are specified in "Extending OSPF to Support Demand Circuits" [2].

Flooding-reduction-capable routers will continue to send hellos to their neighbors and keep aging their self-originated LSAs in their database. However, these routers will flood their self-originated LSAs with the DoNotAge bit set. Thus, self-originated LSAs do not have to be re-flooded every 30 minutes and the re-flooding interval can be extended to the configured forced-flooding interval. As in normal OSPF operation, any change in the contents of the LSA will cause a reoriginated LSA to be flooded with the DoNotAge bit set. This will reduce protocol traffic overhead while allowing changes to be flooded immediately.

Flooding-reduction-capable routers will flood received non-self-originated LSAs with the DoNotAge bit set on all normal or flooding-reduction-only interfaces within the LSA’s flooding scope. If an interface is configured as both flooding-reduction-capable and Demand-Circuit, then the flooding is done if and only if the contents of the LSA have changed. This allows LSA flooding for unchanged LSAs to be periodically forced by the originating router.

3. Backward Compatibility

Routers supporting the demand circuit extensions [2] will be able to correctly process DoNotAge LSAs flooded by routers supporting the flooding reduction capability described herein. These routers will also suppress flooding DoNotAge LSAs on interfaces configured as demand circuits. However, they will also flood DoNotAge LSAs on interfaces that are not configured as demand circuits.

When there are routers in the OSPF routing domain, stub area, or NSSA area, that do not support the demand circuit extensions [2] then the use of these flooding reduction capabilities will be subject to the demand circuit interoperability constraints articulated in section 2.5 of "Extending OSPF to Support Demand Circuits" [2]. This implies that detection of an LSA, with the DC bit clear, will result in the re-origination of self-originated DoNotAge LSAs with the DoNotAge clear and purging of non-self-originated DoNotAge LSAs.

4. Security Considerations

This memo does not create any new security issues for the OSPF protocol. Security considerations for the base OSPF protocol are covered in [1].

5. Acknowledgments

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6. Normative References

[1] Moy, J., "OSPF Version 2", STD 54, RFC 2328, April 1998.

[2] Moy, J., "Extending OSPF to Support Demand Circuits", RFC 1793, April 1995.

A. Configurable Parameters

This memo defines new configuration parameters for the flooding reduction feature. The feature must be enabled by configuration on a router and is, by default, off.

flooding-reduction <all | list of interfaces> Indicates that the router has the flooding reduction feature enabled. By default, this parameter applies to all interfaces running under the OSPF instance to which it applies. The feature can be enabled on a subset of explicitly specified interfaces.

flooding-interval <n minutes> Indicates the interval in minutes for the periodic flooding of self-originated LSAs. By default, this value is 30 minutes as per [1]. The minimum value is also 30 minutes. A value of infinity will prevent re-flooding of self-originated LSAs that have not changed.

Author's Address

Padma Pillay-Esnault
Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134

EMail: ppe@cisco.com

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