

OSPF Refresh and Flooding Reduction in Stable Topologies

Status of This Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Copyright Notice

Copyright (C) The Internet Society (2005).

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

The author would like to thank Jean-Michel Esnault, Barry Friedman, Thomas Kramer, Acee Lindem, Peter Psenak, Henk Smit, and Alex Zinin for their helpful comments on this work.

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

EEmail: ppe@cisco.com

Full Copyright Statement

Copyright (C) The Internet Society (2005).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.