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Routing Multipoint Relay Optimization for the Optimized Link State Routing Protocol Version 2 (OLSRv2)

Abstract

This specification updates the Optimized Link State Routing Protocol version 2 (OLSRv2) with an optimization to improve the selection of routing multipoint relays. The optimization retains full interoperability between implementations of OLSRv2 with and without this optimization.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc7187.

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1. Introduction

The Optimized Link State Routing Protocol version 2 [RFC7181] is a proactive link state routing protocol designed for use in mobile ad hoc networks (MANETs) [RFC2501]. This document improves one area of the OLSRv2 specification.

One improvement included in OLSRv2, compared to its predecessor described in [RFC3626], is the use of link metrics, rather than minimum-hop routing. A rationale for how link metrics were included in OLSRv2 is documented in [RFC7185]. However, one aspect of the use of link metrics described in [RFC7185], the removal of some unnecessarily selected routing multipoint relays (MPRs), was not included in [RFC7181]. This specification updates OLSRv2 to include this optimization.

Note that this optimization does not impact interoperability: implementations that do and do not implement this optimization will interoperate seamlessly.

2. Terminology

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 [RFC2119].

Additionally, this document uses the terminology of [RFC7181].

3. Applicability Statement

This specification updates [RFC7181]. As such, it is applicable to all implementations of this protocol. The optimization presented in this specification is simply permissive; it allows an additional optimization, and there is no requirement for any implementation to

include it. However, inclusion of this optimization is advised; it can, in some cases, create smaller and fewer messages, without ever having the opposite effect.

[RFC7181] defines the properties for the selection of routing MPRs from among a router's symmetric 1-hop neighbors. The properties are

- the selected MPRs must consist of a set of symmetric 1-hop neighbors that cover all the symmetric 2-hop neighbors, and
- the selected MPRs must do so retaining a minimum distance route (1-hop, if present, or 2-hop) to each symmetric 2-hop neighbor.

The discussion in the latter part of Section 6.2 of [RFC7185] indicates that this requirement is overly prescriptive for routing MPR selection. The update to [RFC7181] described in this specification permits a router to use the described optimization, while still being considered compliant with OLSRv2.

Note that whether or not a router is considered compliant, a router that implements the optimization described in this specification will interoperate successfully with routers that are not implementing this optimization.

4. Routing MPR Selection

A set of routing MPRs created as specified in [RFC7181] MAY be optimized in the following manner. Note that this uses the notation of Section 18.2 of [RFC7181]:

1. If there is a sequence x_0, ..., x_n of elements of N1 such that:
   - x_0 is a routing MPR,
   - x_1, ... , x_n have corresponding elements y_1, ..., y_n of N2, and
   - d1(x_0) + d2(x_0,y_1) + ... + d2(x_m-1,y_m) < d1(x_m) for m = 1, ... , n,

   then x_1 to x_n may be removed from the set of routing MPRs, if selected.

Note that "corresponding elements" in N1 and N2 means that these elements represent the same router. All of this information is available from information gathered by NHDP [RFC6130].

5. Security Considerations

The update to OLSRv2 [RFC7181] does not introduce any new protocol signals, nor does it change the processing of any received protocol signals.

This update to OLSRv2 [RFC7181] permits an implementation that is compliant with OLSRv2 to (potentially) eliminate some unneeded routers from the routing MPR sets generated as described in [RFC7181], which also eliminates the need to include the corresponding information in generated Topology Control (TC) messages. Because this information is not used when included, this update to OLSRv2 [RFC7181] does not present any additional security considerations, beyond those described in [RFC7181].

6. Acknowledgments

The authors would like to gratefully acknowledge Philippe Jacquet (Alcatel-Lucent) for intense technical discussions and comments.

7. References

7.1. Normative References

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[RFC6130] Clausen, T., Dean, J., and C. Dearlove, "Mobile Ad Hoc Network (MANET) Neighborhood Discovery Protocol (NHDP)", RFC 6130, April 2011.

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7.2. Informative References

[RFC2501] Macker, J. and S. Corson, "Mobile Ad hoc Networking (MANET): Routing Protocol Performance Issues and Evaluation Considerations", RFC 2501, January 1999.

[RFC3626] Clausen, T. and P. Jacquet, "The Optimized Link State Routing Protocol", RFC 3626, October 2003.

[RFC7185] Clausen, T., Dearlove, C., and P. Jacquet, "Rationale for the Use of Link Metrics in the Optimized Link State Routing Protocol Version 2 (OLSRv2)", RFC 7185, April 2014.

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