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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.

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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

- o the selected MPRs must consist of a set of symmetric 1-hop neighbors that cover all the symmetric 2-hop neighbors, and
- o 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  $x_0, \dots, x_n$  of elements of  $N1$  such that:

- \*  $x_0$  is a routing MPR,
- \*  $x_1, \dots, x_n$  have corresponding elements  $y_1, \dots, y_n$  of  $N2$ , and
- \*  $d1(x_0) + d2(x_0, y_1) + \dots + d2(x_{m-1}, y_m) < d1(x_m)$  for  $m = 1, \dots, n$ ,

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

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC6130] Clausen, T., Dean, J., and C. Dearlove, "Mobile Ad Hoc Network (MANET) Neighborhood Discovery Protocol (NHDP)", [RFC 6130](#), April 2011.
- [RFC7181] Clausen, T., Dearlove, C., Jacquet, P., and U. Herberg, "The Optimized Link State Routing Protocol Version 2", [RFC 7181](#), April 2014.

### 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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