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# Use of the OSPF-MANET Interface in Single-Hop Broadcast Networks
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## Abstract

This document describes the use of the OSPF-MANET interface in single-hop broadcast networks. It includes a mechanism to deterministically reduce the number of adjacencies using Smart Peering and other considerations due to the nature of the network.

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# 1. Introduction

The OSPF-MANET interface [RFC5820] uses the point-to-multipoint adjacency model over a broadcast media to allow the following:

- all router-to-router connections are treated as if they were point-to-point links.
- Link metric can be set on a per-neighbor basis.
- Broadcast and multicast can be accomplished through the Layer 2 broadcast capabilities of the media.

It is clear that the characteristics of the MANET interface can also be beneficial in fixed network deployments; specifically in single-hop broadcast capable networks which may have a different cost associated with any pair of nodes.

This document describes the use of the MANET interface in single-hop broadcast networks.

## 1.1. Single-Hop Broadcast Networks

The OSPF extensions for MANET networks assume the ad-hoc formation of a network over bandwidth-constrained wireless links, where packets may traverse several intermediate nodes before reaching their destination (multi-hop paths on the interface). By contrast, a single-hop broadcast network (as considered in this document) is one that is structured in such a way that all the nodes in it are directly connected to each other. An Ethernet interface is a good example of the connectivity model.

Furthermore, the single-hop networks considered may have different link metrics associated to the connectivity between a specific pair of neighbors. The OSPF broadcast model [RFC2328] can’t accurately describe these differences. A point-to-multipoint description is more appropriate given that each node can reach every other node directly.

In summary, the single-hop broadcast interfaces considered in this document have the following characteristics:

- direct connectivity between all the nodes
- different link metrics may exist per-neighbor
- it has broadcast/multicast capabilities

### 1.2. MANET Interface Considerations

The operation of the MANET interface doesn't change when implemented on a single-hop broadcast interface. However, some of the proposed enhancements are not needed; explicitly, Incremental Hellos and Overlapping Relays are not required due to the connectivity model. If Overlapping Relays are used, then the A-bit SHOULD NOT be set by any of the nodes: the result is an empty set of Active Overlapping Relays.

Smart Peering can be used to reduce the burden of requiring a full mesh of adjacencies. In short, a new adjacency is not required if reachability to the node is already available through the existing STP. In general, the reachability is verified on a first-come-first-served basis; i.e. in a typical network, the neighbors with which a FULL adjacency is set up depend on the order of discovery. Section 3 explains the use of Router Priority to create a deterministic mechanism to select which nodes to form FULL adjacencies with.

Section 4 explains the operation with unsynchronized adjacencies.

The operation described in this document uses already defined mechanisms and requires no additional on-the-wire changes.

## 2. Requirements Language

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].

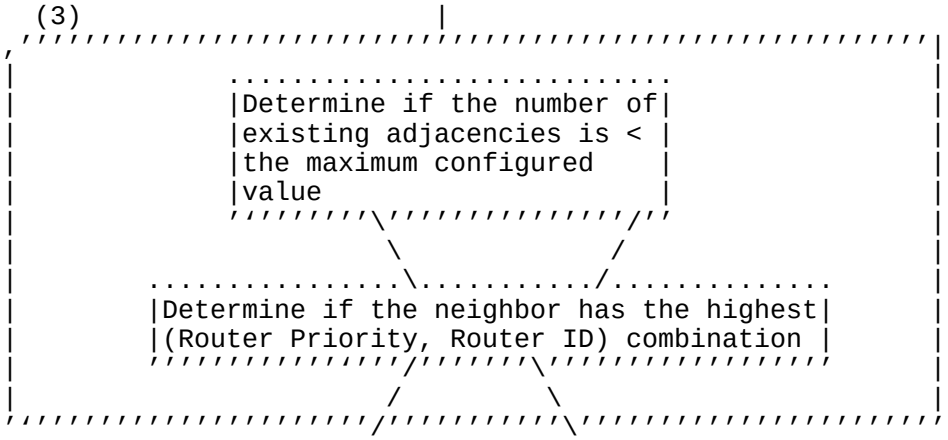
## 3. Use of Router Priority

The Smart Peering state machine [RFC5820] allows for the definition of heuristics, beyond the SPT reachability, to decide whether or not it considers a new adjacency to be of value. This section describes one such heuristic to be used in Step (3) of the state machine.

The Router Priority (as defined in OSPFv2 [RFC2328] and OSPFv3 [RFC5340]) is used in the election of the (Backup) Designated Router, and can be configured only in broadcast and NBMA interfaces. The MANET interface is a broadcast interface using the point-to-multipoint adjacency model, which means that no (Backup) Designated Router is elected. For its use with the MANET interface, the Router Priority is defined as:

Router Priority
An 8-bit unsigned integer. Used to determine the precedence of which router(s) to establish a FULL adjacency with during the Smart Peering selection process. When more than one router attached to a network is present, the one with the highest Router Priority takes precedence. If there is still a tie, the router with the highest Router ID takes precedence.

The heuristic for the smart peering state machine is described as:




Smart Peering Algorithm

In order to avoid churn in the selection and establishment of the adjacencies, every router SHOULD wait Wait Time [RFC2328] before running the Smart Peering state machine. Note that this wait should cause the selection process to consider all the nodes on the link, instead of being triggered based on receiving a Hello message from a potential neighbor. The nodes selected using this process are referred to simply as Smart Peers.

It is RECOMMENDED that the maximum number of adjacencies be configured to at least 2.

## 4. Unsynchronized Adjacencies

An unsynchronized adjacency [RFC5820] is one for which the database synchronization is postponed, but that is announced as FULL because SPT reachability can be proven. A single-hop broadcast network has a connectivity model in which all the nodes are directly connected to each other. This connectivity results in a simplified reachability check through the SPT: the adjacency to a specific peer MUST be

advertized as FULL by at least one Smart Peer.

The single-hop nature of the interface allows then the advertisement of the reachable adjacencies as FULL without additional signaling. Flooding SHOULD be enabled for all the unsynchronized adjacencies to take advantage of the broadcast nature of the media. As a result, all the nodes in the interface will be able to use all the LSAs received.

## 5. IANA Considerations

This document includes no request to IANA.

## 6. Security Considerations

No new security concerns beyond the ones expressed in RFC 5820 [RFC5820] are introduced in this document. In fact, due to the application in fixed networks, some of the concerns may actually be reduced.

## 7. Acknowledgements

The authors would like to thank Anton Smirnov for his comments.

## 8. References

### 8.1. 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", STD 54, RFC 2328, April 1998.

### 8.2. Informative References

[RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", RFC 5340, July 2008.

[RFC5820] Roy, A. and M. Chandra, "Extensions to OSPF to Support Mobile Ad Hoc Networking", RFC 5820, March 2010.

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