

AODV Extensions for Multipath Routing
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Abstract

This document describes how AODV [1] can be extended for the support of MANET multipath routing. In AODV, the route information is not available either at the source or at the destination. So, AODV is less appropriate in establishing multiple routes with more desirable properties, compared with DSR [2]. But, for the sake of reliability and load balancing, in this draft, we describe how we can extend AODV to establish multiple routes from the source to the destination.

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1. Requirements notation

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 [[RFC2119](#)].

2. Introduction

The mobile ad hoc network (MANET) is composed of a number of mobile nodes which can communicate with each other through multiple wireless links without the help of a wired infrastructure. Therefore, in the MANET, the route connectivity tends to be very unstable. This route instability can be mitigated by providing more than one route to a source and destination node pair. In recent years, there have been intensive studies done on multipath routing protocols for the MANET [3]. Also, multipath routing protocols may have the advantage of providing load balancing by distributing data traffic to a number of routes. On the other hand, it may incur more control message overhead to set up multiple routes.

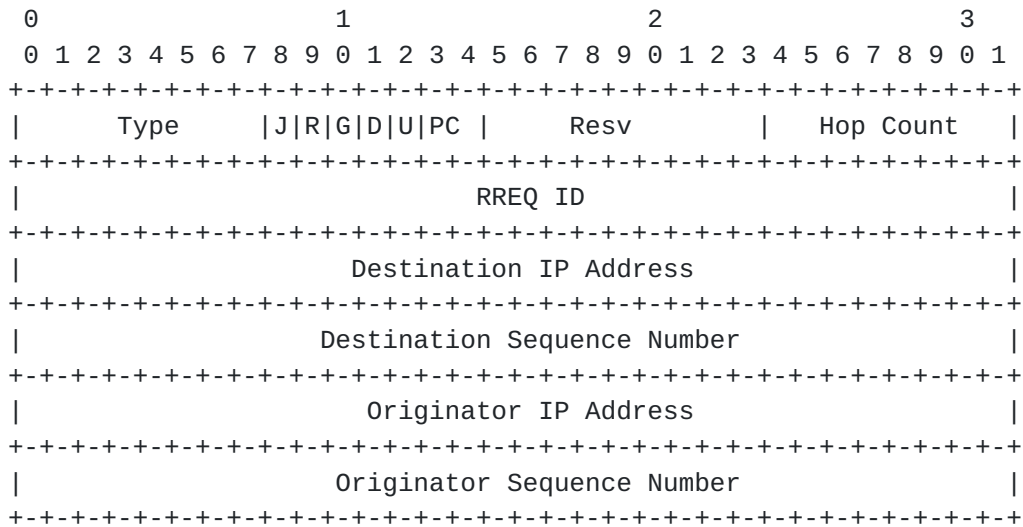
In AODV [[1](#)], the destination returns only one route reply (RREP) message which fixes the previous-hop node and the next-hop node of each intermediate node of the chosen route. Either the source or the destination node does not have the knowledge of the nodes on the route, so it is not possible for the source or the destination node to choose multiple routes with desirable properties, such as link-disjoint, node-disjoint, etc.. Even in this case, for the sake of reliability and load balancing, it is preferable to have multiple routes for a source-destination node pair.

In this draft, we describe how the AODV Options header has to be extended to support the multiple paths between the source and the destination nodes.

3. Extensions on AODV Options Header

3.1 Extensions on AODV Route Request Option

The Route Request option in the AODV Options header is extended as follows:



IP fields

The same as described in [1].

Route Request fields

The same as described in [1] except for the PC field.

PC (Path Count)

This field indicates the maximum number of routes between the source and the destination. The default value of PC is 0 which implies a single route between the source and the destination. The source sets the PC value to the value which is one less than the required maximum number of routes. When the destination receives RREQ messages from the source, it has to send back at most (PC+1) different RREP messages (routes) to the source. The mechanism to select those routes is out of the scope of this draft.

4. Other Considerations

TBD.

References

- [1] C. Perkins, E. Belding-Royer and S. Das, "Ad hoc On-demand Distance Vector (AODV) Routing," [RFC 3561](#), July 2003.
- [2] D. Johnson, Y. Hu and D. Maltz, "The Dynamic Source Routing Protocol," [RFC 4728](#), February 2007.
- [3] M. Tarique, K. E. Tepe, S. Abidi and S. Erfani, "Survey of Multipath Routing Protocols for Mobile Ad Hoc Networks," Journal of Network and Computer Applications, November 2009.

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