DSR Extensions for Multipath Routing
draft-ahn-manet-multipath-dsr-01.txt

Status of this Memo

This Internet-Draft is submitted to IETF in full conformance with the provisions of BCP 78 and BCP 79. This document may not be modified, and derivative works of it may not be created, except to format it for publication as an RFC or to translate it into languages other than English.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at http://www.ietf.org/ietf/1id-abstracts.txt.

The list of Internet-Draft Shadow Directories can be accessed at http://www.ietf.org/shadow.html.

This Internet-Draft will expire on May 23, 2018.

Copyright Notice

Copyright (c) 2017 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust’s Legal Provisions Relating to IETF Documents (http://trustee.ietf.org/license-info) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document.
Abstract

This document describes how DSR [1] can be extended for the support of MANET multipath routing. In DSR, the route record information is available at the destination, so the destination can select multiple routes with good characteristics and notify the source of them. Therefore, in this draft, we describe how we can extend the Route Request option to specify the number of routes selected at the destination.

Table of Contents

1. Requirements notation ......................................... 3
2. Introduction ..................................................... 3
3. Extensions on DSR Options Header ............................... 4
3.1 Extensions on DSR Route Request Option ..................... 4
4. Other Considerations ............................................ 5
References .......................................................... 5
Author’s Address .................................................. 5
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 unstability 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 [2]. 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.

The DSR protocol [1] works based on the source routing mechanism and supports multiple routes between a source and destination node pair by maintaining several routes in the route cache of the source node. That is, DSR basically support multipath routing and the source routing capability makes the support of multipath routing easier. However, in DSR, a route reply (RREP) message with the information of a route is sent back to the source by an intermediate node which has a fresh route to the destination or by the destination itself. Hence, the source can collect a random number of the routes to the destination.

In [3], the C flag is newly defined in the DSR Route Request option in order to resolve the cached route reply implosion problem of DSR. If the cached route reply capability is turned off (i.e., $C = 0$), the destination can collect all the route information from the source. So, it is possible for the destination to select those routes with good characteristics, such as link-disjoint, node-disjoint, etc. Therefore, in this draft, we extend the DSR Route Request option to allow the source to specify the maximum number of routes between the source and the destination, and to make the destination to select the specified number of routes from the obtained routes.
3. Extensions on DSR Options Header

3.1 Extensions on DSR Route Request Option

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

```
 0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Option Type  |  Opt Data Len |     Identification    |C|PC |R|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         Target Address                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Address[1]                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Address[2]                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                             ...                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Address[n]                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

IP fields
The same as described in [1].

Route Request fields
The same as described in [3] except for the PC field and R bit.

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. For the cases of nonzero PC values, the C bit has to be set to 0 (i.e., the cached route reply capability is disabled). When the destination receives an RREQ message with a nonzero PC value, 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.

R bit
Reserved bit.
4. Other Considerations

TBD.

References


Author’s Address

Sanghyun Ahn
University of Seoul
90, Cheonnong-dong, Tongdaemun-gu
Seoul 130-743
Korea
Email: ahn@uos.ac.kr