

Mobile Ad hoc Networks Working Group
Internet-Draft
Intended status: Standards Track
Expires: December 1, 2017

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May 30, 2017

Link Identifier Extension to DLEP
draft-dlep-lid-00

Abstract

There exists a class of modems that wish to support the Dynamic Link Exchange Protocol (DLEP) [[I-D.ietf-manet-dlep](#)] but do not present a single Layer 2 network domain as required by DLEP. Such devices may be:

- o Modems that maintain a varying link to some upstream backbone network infrastructure, where the ability to announce link state and DLEP metrics is desired, but the concept of a DLEP destination router for the backbone does not apply. Examples of such devices can include LTE modems, IEEE 802.11 stations not in ad-hoc mode, and some satellite terminals.
- o Modems that provide Layer 3 wide area network connectivity between devices, where individual DLEP destinations do exist, but are not directly reachable by MAC address.

This document introduces an optional extension to the core DLEP specification, allowing DLEP to be used between routers and modems that operate in this way.

Note:

- o This document is intended as an extension to the core DLEP specification, and readers are expected to be fully conversant with the operation of core DLEP.

Status of This Memo

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[1.](#) Introduction

The Dynamic Link Exchange Protocol (DLEP) [[I-D.ietf-manet-dlep](#)] describes a protocol for modems to advertise the status of wireless links between reachable destinations to attached routers. The core specification of the protocol assumes that every modem in the radio

network has an attached DLEP router, and the MAC address of the DLEP interface on the router is used to identify the destination in the network for purposes of reporting the state and quality of the link to that destination.

This document describes a DLEP Extension allowing modems that do not meet the strict requirement that DLEP must be implemented on a single Layer 2 domain to use DLEP to describe link state and quality to one or more destinations reachable only at Layer 3.

To enable routers to take advantage of the DLEP protocol this extension adds a single enhancement to the DLEP protocol: A new Link Identifier Data Item. This Data Item replaces the use of the MAC Address Data Item whenever the DLEP destination does not have a router reachable by MAC address.

By using the Link Identifier Data Item, the modem implementation can announce the link state and quality to a uniquely identified destination in the network, either logical or physical, explicitly indicating that the destination is not reachable via a single Layer 2 domain. A router can use this knowledge to influence any routing or flow-control decisions regarding traffic to this destination, understanding that such decisions apply at Layer 3.

1.1. Requirements

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 [BCP 14](#), [RFC 2119](#) [RFC2119].

2. Operation

To use this extension, as with all DLEP extensions, the extension MUST be announced during DLEP session initialization. A router advertises support by including the value 'Link Identitifers' (TBD1) in the Extension Data Item within the Session Initialization Message. A modem advertises support by including the value 'Link Identitifers' (TBD1) in the Extension Data Item within the Session Initialization Response Message. If both DLEP peers advertise support for this extension then the Link Identifier Data Item MAY be

used.

If a modem requires support for this extension in order to describe destinations, and the router does not advertise support, then the modem **MUST NOT** include a Link Identifier Data Item in any DLEP Message. However, the modem **SHOULD NOT** immediately terminate the DLEP session, rather it should use session-wide DLEP Data Items to announce general information about all reachable destinations via the modem. By doing this, a modem allows a router not supporting this extension to at least make a best guess at the state of any reachable network. A modem **MUST NOT** attempt to re-use the MAC Address Data Item to perform some kind of sleight-of-hand, assuming that the

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router will notice the DLEP Peer Type of the modem is special in some way.

Even when the Link Identifiers extension is in use for a DLEP session, either peer **MAY** send and receive Messages concerning DLEP destinations that are reachable via a single Layer 2 domain, using the standard DLEP MAC Address Data Item. This allows modems that support hybrid functionality of directly connected Layer 2 peers, as well as upstream links to some kind of infrastructure, as well as multicast logical destinations.

[2.1.](#) Identifier Restrictions

Within a single DLEP session, all identifiers used by this extension, both logical and physical, **MUST** be unique, and it is **RECOMMENDED** that they be 4 octets in length.

Identifiers **MUST NOT** be reused, i.e. an identifier that has been used to refer to one destination **MUST NOT** be recycled to refer to a different destination within the lifetime of a single DLEP session.

The method for generating identifiers is a modem implementation matter and out of scope of this document. Routers **MUST NOT** make any assumptions about the meaning of identifiers, or how identifiers are generated.

[2.2.](#) Link Identifier Data Item

The Link Identifier Data Item **MAY** be used whenever a MAC Address Data

Item is defined as useable in core DLEP. A single Link Identifier Data Item MUST only be used in place of a single MAC Address Data Item. A Link Identifier Data Item MUST NOT appear in the same DLEP Message as a MAC Address Data Item.

```

      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 2 3 4 5 6 7 8 9 0 1
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Data Item Type                               | Length                |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|  Flags                                     | Link Identifier...           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

Data Item Type: TBD2

Length: >0, 4 RECOMMENDED.

Flags: Flags field, defined below.

Link Identifier: The unique identifier of the link destination. This identifier has no implicit meaning and is only used to discriminate between multiple links.

The Flags field is defined as:

```

    0 1 2 3 4 5 6 7
+---+---+---+---+---+---+
|   Reserved   |
+---+---+---+---+---+---+

```

Reserved: MUST be zero. Left for future assignment.

The Flags field is here because I think it might be useful, but I can't think how currently.

[3.](#) Security Considerations

As an extension to the core DLEP protocol, the security considerations of that protocol apply to this extension. This extension adds no additional security mechanisms or features.

None of the features introduced by this extension require extra consideration by an implementation.

4. IANA Considerations

Upon approval of this document, IANA is requested to:

- o Assign a new value (TBD1) from the Specification Required section of the DLEP Extensions Registry, named "Link Identifiers".
- o Assign a new value (TBD2) from the Specification Required section of the DLEP Data Item Type Values Registry, named "Link Identifier".

4.1. DLEP Link Identifier Flag

Upon approval of this document, IANA is requested to create a new DLEP registry, named "Link Identifier Flags".

The following table provides initial registry values and the [\[RFC5226\]](#) defined policies that should apply to the registry:

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+-----+-----+	
Bit	Description/Policy
+-----+-----+	
0-7	Unassigned/Specification Required
+-----+-----+	

5. References

5.1. Normative References

[I-D.ietf-manet-dlep]
Ratliff, S., Jury, S., Satterwhite, D., Taylor, R., and B. Berry, "Dynamic Link Exchange Protocol (DLEP)", [draft-ietf-manet-dlep-29](#) (work in progress), March 2017.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

5.2. Informative References

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 5226](#), DOI 10.17487/RFC5226, May 2008, <<http://www.rfc-editor.org/info/rfc5226>>.

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