

Workgroup: Network Working Group
Internet-Draft:
draft-ietf-manet-dlep-da-credit-extension-16
Published: 18 March 2024
Intended Status: Standards Track
Expires: 19 September 2024
Authors: B. Cheng
MIT Lincoln Laboratory
L. Berger
LabN Consulting, L.L.C.
D. Wiggins
DLEP DiffServ Aware Credit Window Extension

Abstract

This document defines an extension to the Dynamic Link Exchange Protocol (DLEP) that enables a DiffServ aware credit-window scheme for destination-specific and shared flow control.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

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."

This Internet-Draft will expire on 19 September 2024.

Copyright Notice

Copyright (c) 2024 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 (<https://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. Code Components extracted from this document must include Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.

Table of Contents

- [1. Introduction](#)
 - [1.1. Key Words](#)
- [2. Extension Usage and Identification](#)
- [3. Management Considerations](#)
- [4. Security Considerations](#)
- [5. IANA Considerations](#)
 - [5.1. Extension Type Value](#)
- [6. References](#)
 - [6.1. Normative References](#)
 - [6.2. Informative References](#)
- [Appendix A. Acknowledgments](#)
- [Authors' Addresses](#)

1. Introduction

The Dynamic Link Exchange Protocol (DLEP) is defined in [[RFC8175](#)]. It provides the exchange of link related control information between DLEP peers. DLEP peers are comprised of a modem and a router. DLEP defines a base set of mechanisms as well as support for possible extensions. This document defines one such extension.

The base DLEP specification does not include any flow control capability. There are various flow control techniques theoretically possible with DLEP. This document defines a DLEP extension which provides a DiffServ-based flow control mechanism for traffic sent from a router to a modem. Flow control is provided using one or more logical "Credit Windows", each of which will typically be supported by an associated virtual or physical queue. A router will use traffic flow classification information provided by the modem to identify which traffic is associated with each credit window. Credit windows may be shared or dedicated on a per flow basis. See [[I-D.berger-manet-dlep-ether-credit-extension](#)] for an Ethernet-based version of credit window flow control.

This document uses the traffic classification and credit window control mechanisms defined in [[I-D.ietf-manet-dlep-traffic-classification](#)] and [[I-D.ietf-manet-dlep-credit-flow-control](#)] to provide credit window based flow control based on DLEP destinations and DiffServ [[RFC2475](#)] DSCPs (differentiated services codepoints). The defined mechanism allows for credit windows to be shared across traffic sent to multiple DLEP destinations and DSCPs, or used exclusively for traffic sent to a particular destination and/or DSCP. The extension also supports the "wildcard" matching of any DSCP.

The extension defined in this document is referred to as "DiffServ Aware Credit Window" or, more simply, the "DA Credit" extension. The

reader should be familiar with both the traffic classification and credit window control mechanisms defined in [\[I-D.ietf-manet-dlep-traffic-classification\]](#) and [\[I-D.ietf-manet-dlep-credit-flow-control\]](#).

This document defines a new DLEP Extension Type Value in [Section 2](#) which is used to indicate support for the extension.

1.1. Key Words

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 BCP 14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

2. Extension Usage and Identification

The extension defined in this document is composed of the mechanisms and processing defined in [\[I-D.ietf-manet-dlep-traffic-classification\]](#) and [\[I-D.ietf-manet-dlep-credit-flow-control\]](#). To indicate that the DiffServ Aware Credit Window Extension is to be used, an implementation MUST include the DiffServ Aware Credit Window Type Value in the Extensions Supported Data Item. The Extensions Supported Data Item is sent and processed according to [[RFC8175](#)]. Any implementation that indicates use of the DiffServ Aware Credit Window Extension MUST support all Messages, Data Items, the DiffServ Traffic Classification Sub-Data Item, and all related processing defined in [\[I-D.ietf-manet-dlep-traffic-classification\]](#) and [\[I-D.ietf-manet-dlep-credit-flow-control\]](#).

The DiffServ Aware Credit Window Extension Type Value is TBA1, see [Section 5](#).

3. Management Considerations

This section provides several network management guidelines to implementations supporting the DiffServ Aware Credit Window Extension.

The use of the extension defined in this document SHOULD be configurable on both modems and routers.

Modems SHOULD support the configuration of DSCP to credit window (queue) mapping.

Modems MAY support the configuration of the number of credit windows (queues) to advertise to a router.

Routers may have limits on the number of queues that they can support and, perhaps, even limits in supported credit window combinations, e.g., if per destination queues can even be supported at all. When modem-provided credit window information exceeds the capabilities of a router, the router SHOULD use a subset of the provided credit windows. Alternatively, a router MAY reset the session and indicate that the extension is not supported. In either case, the mismatch of capabilities SHOULD be reported to the user via normal network management mechanisms, e.g., user interface or error logging.

In all cases, if credit windows are in use, traffic for which credits are not available MUST NOT be sent to the modem by the router.

4. Security Considerations

This document defines a DLEP extension that uses base DLEP mechanisms and the credit window control and flow mechanisms defined in [[I-D.ietf-manet-dlep-traffic-classification](#)] and [[I-D.ietf-manet-dlep-credit-flow-control](#)]. The defined extension exposes vulnerabilities similar to existing DLEP messages, e.g., an injected message resizes a credit window to a value that results in a denial of service. The security mechanisms documented in [[RFC8175](#)] can be applied equally to the mechanism defined in this document.

5. IANA Considerations

This document requests one assignment by IANA. All assignments are to registries defined by [[RFC8175](#)].

5.1. Extension Type Value

This document requests 1 new assignment to the DLEP Extensions Registry named "Extension Type Values" in the range with the "Specification Required" policy. The requested value is as follows:

| Code | Description |
|------|------------------------------|
| TBA1 | DiffServ Aware Credit Window |

Table 1: Requested Extension Type Value

6. References

6.1. Normative References

[[I-D.ietf-manet-dlep-credit-flow-control](#)] Cheng, B., Wiggins, D., Berger, L., and S. Ratliff, "DLEP Credit-Based Flow Control Messages and Data Items", Work in Progress,

Internet-Draft, draft-ietf-manet-dlep-credit-flow-control-12, 11 July 2023, <<https://datatracker.ietf.org/doc/html/draft-ietf-manet-dlep-credit-flow-control-12>>.

[I-D.ietf-manet-dlep-traffic-classification] Cheng, B., Wiggins, D., and L. Berger, "DLEP Traffic Classification Data Item", Work in Progress, Internet-Draft, draft-ietf-manet-dlep-traffic-classification-09, 10 July 2023, <<https://datatracker.ietf.org/doc/html/draft-ietf-manet-dlep-traffic-classification-09>>.

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

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

[RFC8175] Ratliff, S., Jury, S., Satterwhite, D., Taylor, R., and B. Berry, "Dynamic Link Exchange Protocol (DLEP)", RFC 8175, DOI 10.17487/RFC8175, June 2017, <<https://www.rfc-editor.org/info/rfc8175>>.

6.2. Informative References

[I-D.berger-manet-dlep-ether-credit-extension] Wiggins, D. and L. Berger, "DLEP IEEE 802.1Q Aware Credit Window Extension", Work in Progress, Internet-Draft, draft-berger-manet-dlep-ether-credit-extension-07, 29 July 2021, <<https://datatracker.ietf.org/doc/html/draft-berger-manet-dlep-ether-credit-extension-07>>.

[RFC2475] Blake, S., Black, D., Carlson, M., Davies, E., Wang, Z., and W. Weiss, "An Architecture for Differentiated Services", RFC 2475, DOI 10.17487/RFC2475, December 1998, <<https://www.rfc-editor.org/info/rfc2475>>.

Appendix A. Acknowledgments

The Sub-Data item format was inspired by Rick Taylor's "Data Item Containers". He also proposed the separation of credit windows from traffic classification at IETF98. Many useful comments were received from contributors to the MANET working group, notably Ronald in't Velt.

We had the honor of working too briefly with David Wiggins on this and related DLEP work. His contribution to the IETF and publication of the first and definitive open source DLEP implementation have

been critical to the acceptance of DLEP. We mourn his passing on November 23, 2023. We wish to recognize his guidance, leadership and professional excellence. We were fortunate to benefit from his leadership and friendship. He shall be missed.

Authors' Addresses

Bow-Nan Cheng
MIT Lincoln Laboratory
Massachusetts Institute of Technology
244 Wood Street
Lexington

Email: bcheng@ll.mit.edu

David Wiggins

Lou Berger
LabN Consulting, L.L.C.

Email: lberger@labn.net