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DLEP IEEE 802.1Q Aware Credit Window Extension
draft-ietf-manet-dlep-ether-credit-extension-01

Abstract

This document defines an extension to the Dynamic Link Exchange Protocol (DLEP) that enables a Ethernet IEEE 802.1Q aware credit-window scheme for destination-specific and shared flow control.

Status of This Memo

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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 an Ethernet-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.ietf-manet-dlep-da-credit-extension] for a DiffServ-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 Ethernet VLANs and Priority Code Points. Ethernet Priority Code Point support is defined as part of the IEEE 802.1Q [IEEE.802.1Q_2014] tag format and includes a 3 bit "PCP" field. The tag format also includes a 12 bit VLAN identifier (VID) field. The defined mechanism allows for credit windows to be shared across traffic sent to multiple DLEP destinations, VLANs, and PCPs, or used exclusively for traffic sent to a particular destination and/or VLAN and/or PCP. The extension also supports the "wildcard" matching of any PCP or VID.

The extension defined in this document is referred to as "IEEE 802.1Q Aware Credit Window" or, more simply, the "Ethernet 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 IEEE 802.1Q Aware Credit Window Extension is to be used, an implementation MUST include the IEEE 802.1Q 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 IEEE 802.1Q Aware Credit Window Extension MUST support all Messages, Data Items, the Ethernet 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 IEEE 802.1Q 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 IEEE 802.1Q 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 PCP to credit window (queue) mapping.

Modems MAY support the configuration of PCP to credit window (queue) mapping on a per VLAN basis. Note that VID value of zero (0) is used by [I-D.ietf-manet-dlep-traffic-classification] to indicate that VID is ignored and any VID value is used in traffic classification.

When VLANs are supported by a modem without support from PCPs, the modem SHOULD support the configuration of VLAN 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 MAY 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.

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 use of those mechanisms, and the introduction of a new extension, do not inherently introduce any additional vulnerabilities above those documented in [RFC8175]. The approach taken to Security in that document applies 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	IEEE 802.1Q 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-09, 26 October 2021, <<https://www.ietf.org/archive/id/draft-ietf-manet-dlep-credit-flow-control-09.txt>>.
- [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-06, 29 July 2021, <<https://www.ietf.org/archive/id/draft-ietf-manet-dlep-traffic-classification-06.txt>>.
- [IEEE.802.1Q_2014]
IEEE, "IEEE Standard for Local and metropolitan area networks--Bridges and Bridged Networks", IEEE 802.1Q-2014, DOI 10.1109/ieeestd.2014.6991462, 18 December 2014, <<http://ieeexplore.ieee.org/servlet/opac?punumber=6991460>>.

- [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.ietf-manet-dlep-da-credit-extension]
Cheng, B., Wiggins, D., and L. Berger, "DLEP DiffServ Aware Credit Window Extension", Work in Progress, Internet-Draft, draft-ietf-manet-dlep-da-credit-extension-12, 29 July 2021, <<https://www.ietf.org/archive/id/draft-ietf-manet-dlep-da-credit-extension-12.txt>>.

Appendix A. Acknowledgments

The document was motivated by discussions in the MANET working group. Many useful comments were received from contributors to the MANET working group, notably Ronald in't Velt.

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7 March 2022

DLEP Radio Channel Utilization Extension
draft-rogge-manet-dlep-channel-utilization-02

Abstract

This document defines an extension to the Dynamic Link Exchange Protocol (DLEP) to provide the utilization of a radio channel.

Status of This Memo

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

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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. Radio channel utilization provides a packet/frame independent measurement how a radio channel is used and how much resources are still available. While incoming and outgoing traffic can be easily measured on the router, the amount of airtime used by management traffic of the radio is invisible to the router, as is unicast traffic between two adjacent radios (unless the radio supports promiscuous mode). This could present the a fully utilized radio channel to the router as totally empty. Getting a direct radio level information how much time on the radio channel has been used up by incoming or outgoing data or control frames allows a router to calculate a better routing metric or allows management agents to detect a channel being unusable for communication because of external jamming.

1.1. Requirements Language

In many IETF documents, several words, when they are in all capitals as shown below, are used to signify the requirements in the specification. These capitalized words can bring significant clarity and consistency to documents because their meanings are well defined. This document defines how those words are interpreted in IETF documents when the words are in all capitals.

- * These words can be used as defined here, but using them is not required. Specifically, normative text does not require the use of these key words. They are used for clarity and consistency when that is what's wanted, but a lot of normative text does not use them and is still normative.
- * The words have the meanings specified herein only when they are in all capitals.
- * When these words are not capitalized, they have their normal English meanings and are not affected by this document.

Authors who follow these guidelines should incorporate this phrase near the beginning of their document: 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 use of the Channel Utilization Extension SHOULD be configurable. To indicate that the Channel Utilization Extension is to be used, an implementation MUST include the Radio Channel Utilization Extension ID in the Extensions Supported Data Item. The Extensions Supported Data Item is sent and processed according to [RFC8175].

All four Data Items are time measurements in nanoseconds since an arbitrary starting point, e.g. the radio bootup. They are never reseted and will just increase monotonically.

The first Data Item (Radio Channel Active) announces the channels livetime of the radio channel while the other three provide the amount of time the channel has been used in different ways. Radio Channel Rx provides the time the radio is receiving data, Radio Channel Tx the time the radio is sending data and Radio Channel Busy the time the radio channel is blocked for any unknown reason.

A radio that doesn't track the time for receiving and transmitting data explicitly can just add all times the radio channel is not free into the Radio Channel Busy Data Item.

The time the radio channel has been free can be calculated by subtracting the values of Busy, Rx and Tx from the value provided by the Radio Active Channel Data Item. By tracking these values over time The router can calculate statistics on the channel usage for routing metrics or report the received value to a management layer.

3. Data Items

All four Data Items of this extension can be used both as Session specific and Destination specific metrics. If the radio is only tracking channel usage on interface level, the Data Items are used in SessionInitResponse and SessionUpdate messages. If the radio also is tracking channel usage for each Destination, they are also used in DestinationUp, DestinationUpdate and DestinationAnnounceResponse messages.

3.1. Radio Channel Active Data Item

Radio Channel Active Item contains information how long the radio channel has been active. This provides the router with a reference to interpret the values provided by the other three Data Items. Because of this the value in this item must be larger than the values in the other three Data Items this extensions defines together.

This Data Item is mandatory for SessionInitResponse messages.

The format of the Radio Channel Active Data Item is:

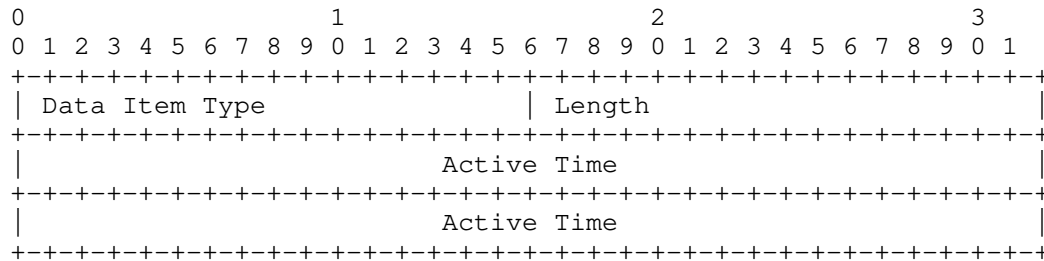


Figure 1

Data Item Type: TBD

Length: 8

Active Time: Time in nanoseconds since the channel has been active.

3.2. Radio Channel Busy Data Item

Radio Channel Busy Item contains information how much time the radio channel has been busy, not including the time provided in the Channel Rx and Chanel Tx Data Item.

The format of the Radio Channel Busy Data Item is:

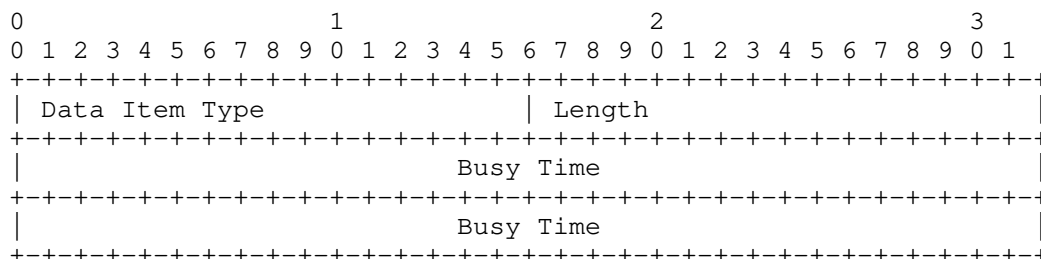


Figure 2

Data Item Type: TBD

Length: 8

Busy Time: Time in nanoseconds the channel was busy during its active time.

3.3. Radio Channel Rx Data Item

Radio Channel Rx Item contains information how much time the local radio has been receiving data from other radios.

The format of the Radio Channel Rx Data Item is:

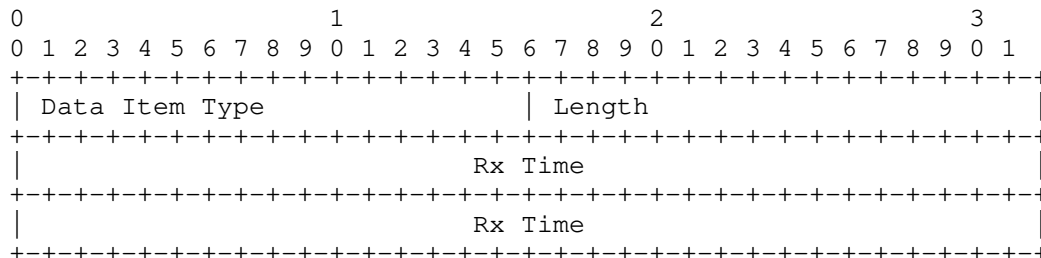


Figure 3

Data Item Type: TBD

Length: 8

Rx Time: Time in nanoseconds the local radio was receiving data from other radios during its active time.

3.4. Radio Channel Tx Data Item

Radio Channel Tx Item contains information how much time the local radio has been transmitting data to other radios.

The format of the Radio Channel Tx Data Item is:

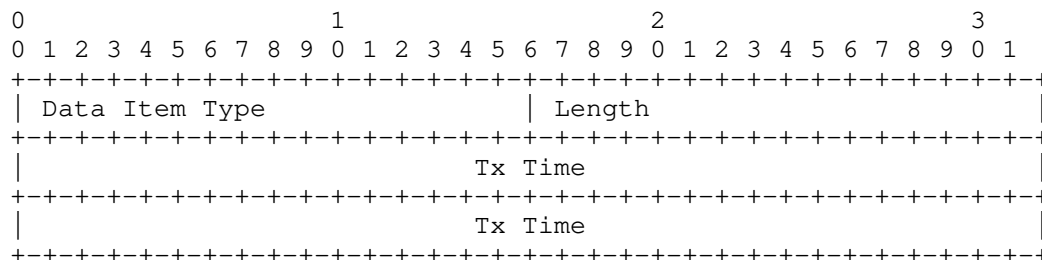


Figure 4

Data Item Type: TBD

Length: 8

Tx Time: Time in nanoseconds the local radio was transmitting data to other radios during its active time.

4. Security Considerations

The extension introduces a new Data Item for DLEP. The extension does not inherently introduce any additional vulnerabilities above those documented in [RFC8175]. The approach taken to security in that document applies equally when running the extension defined in this document.

5. IANA Considerations

As described below, IANA has assigned two values per this document. Both assignments are to registries defined by [RFC8175].

5.1. Extension Type Value

IANA has assigned the following value in the "Extension Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Code	Description
TBD	Radio Channel Utilization

Table 1: New Extension Type Value

5.2. Data Item Value

IANA has assigned the following value in the "Data Item Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Type Code	Description
TBD	Radio Channel Active
TBD	Radio Channel Busy
TBD	Radio Channel Rx
TBD	Radio Channel Tx

Table 2: New Data Item Value

6. Normative References

- [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>>.

7. Informative References

[RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.

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DLEP Radio Band Extension
draft-rogge-manet-dlep-radio-band-03

Abstract

This document defines an extension to the Dynamic Link Exchange Protocol (DLEP) to provide the frequency bands used by the radio.

Status of This Memo

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Author's Address	5

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.

1.1. 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 [RFC2119].

2. Extension Usage and Identification

The use of the Radio Band Extension SHOULD be configurable. To indicate that the Radio Band Extension is to be used, an implementation MUST include the Radio Band Extension Type Value in the Extensions Supported Data Item. The Extensions Supported Data Item is sent and processed according to [RFC8175].

The Radio Band Extension Type Value is TBD; see Section TBD.

3. Radio Band Data Item

Radio Band Data Item contains information which radio frequency resources are being used. These values are usually interface specific and static during the DLEP session.

The Radio Band Data Item can be used multiple times to represent multiple radio bands.

The Item can be used in a neighbor specific message if the radio use dedicated subcarriers to talk to neighbors.

The information in this Item gives the router an easy way to calculate the spectral efficiency of a radio link, how much bandwidth is used for the current data-rate reported by DLEP. This can be integrated into the routing metric to focus traffic on links that use the spectrum efficiently.

The Item can also be used as an interface to a cognitive radio controller on the router, analyzing the correlation of transmission disruptions with the frequency bands and could (together with the Request Link Characteristics message) be used to change the frequency of the radio in a standardized way.

The format of the Radio Band Data Item is:

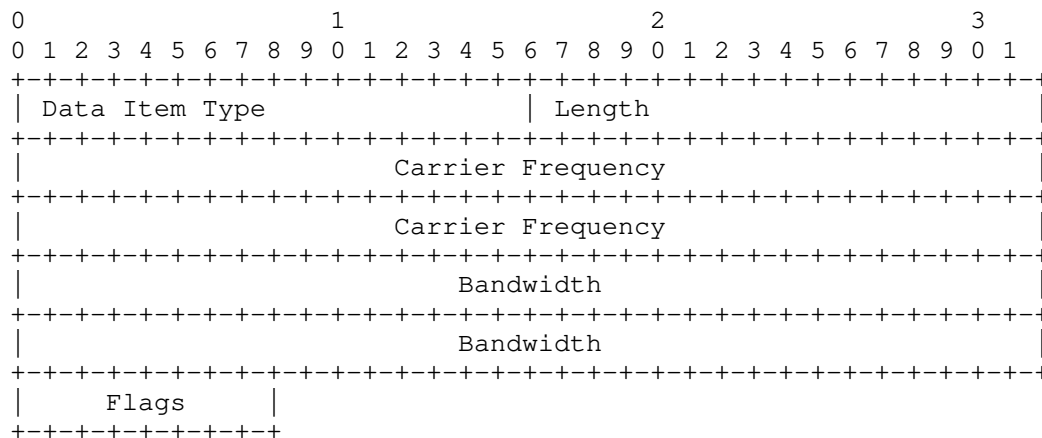


Figure 1

Data Item Type: TBD

Length: 17

Center Frequency: The center frequency of the band in Hz.

Bandwidth: The bandwidth of the band in Hz.

Flags: Flags field as defined below.

The Flags field is defined as:

```

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

```

Figure 2

U: Uplink Flag, indicating the band is used for transmitting data.

D: Downlink Flag, indicating the band is used for receiving data.

Reserved: MUST be zero. Left for future assignment.

4. Security Considerations

The extension introduces a new Data Item for DLEP. The extension does not inherently introduce any additional vulnerabilities above those documented in [RFC8175]. The approach taken to security in that document applies equally when running the extension defined in this document.

5. IANA Considerations

As described below, IANA has assigned two values per this document. Both assignments are to registries defined by [RFC8175].

5.1. Extension Type Value

IANA has assigned the following value in the "Extension Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Code	Description
TBD	Radio Band

Table 1: New Extension
Type Value

5.2. Data Item Value

IANA has assigned the following value in the "Data Item Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Type Code	Description
TBD	Radio Band

Table 2: New Data Item
Value

6. Normative References

- [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>>.
- [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>>.

7. Informative References

- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.

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DLEP Radio Quality Extension
draft-rogge-manet-dlep-radio-quality-02

Abstract

This document defines an extension to the Dynamic Link Exchange Protocol (DLEP) to provide the quality of incoming radio signals.

Status of This Memo

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

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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.

1.1. 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 [RFC2119].

2. Extension Usage and Identification

The use of the Radio Quality Extension SHOULD be configurable. To indicate that the Radio Quality Extension is to be used, an implementation MUST include the Radio Quality Extension Type Value in the Extensions Supported Data Item. The Extensions Supported Data Item is sent and processed according to [RFC8175].

The Radio Quality Extension Type Value is TBD; see Section TBD.

3. Radio Quality Data Items

This section describes the quality related Data Items of this extension.

All Data Items available in this extension provide access to the radios physical layer measurements related to signal quality. Because of different designs of Radio PHY layers, this quality can be expressed in different ways, by referring to signal-to-noise ratio or by measuring the biterror rate (e.g. by using a forward error correction). Both of these possible informations are very valuable for calculating MANET metrics for radio networks with moving nodes and low datarates, e.g. VHF radio networks. Estimating channel quality based on packet loss can be impractical, because the estimated value changes too fast (because of movement) compared to the number of received frames. Signal Strength (or Biterror rate) can provide the additional information necessary to build a reasonable stable and agile metric.

3.1. Radio SNR Data Item

Radio SNR Data Item contains information which signal to noise ratio the radio measured. This Data Item can be both interface and neighbor specific.

The format of the Radio SNR Data Item is:

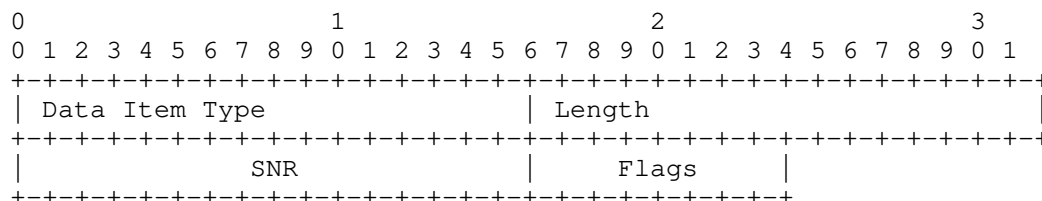


Figure 1

Data Item Type: TBD

Length: 3

SNR: SNR measured in dB multiplied by 10 as a signed integer.

Flags: Flags field as defined below.

The Flags field is defined as:

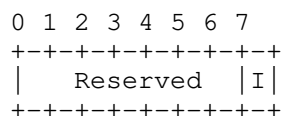


Figure 2

I: Interference Flag, indicating the the data includes interference into the noise value (SINR).

Reserved: MUST be zero. Left for future assignment.

3.2. Radio Signal Strength Data Item (also called RSSI)

Radio Signal Strength Data Item contains information which absolute signal strength the radio measured. This Data Item can be both interface and neighbor specific.

This Data Item could also be used together with the Request Link Characteristics message to reconfigure the outgoing signal strength, either to reduce the size of the collision domain or to increase the range of the radio.

The format of the Radio Signal Strength Data Item is:

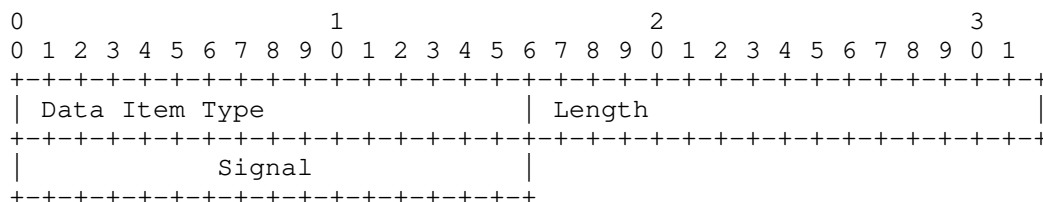


Figure 3

Data Item Type: TBD

Length: 2

Signal: Signal Strength measured in dBm multiplied by 10 as a signed integer.

3.3. Radio Biterror Rate Data Item

Radio Biterror Rate Data Item contains information which absolute noise value the radio measured. This Data Item can be both interface and neighbor specific.

The format of the Radio Biterror Rate Data Item is:

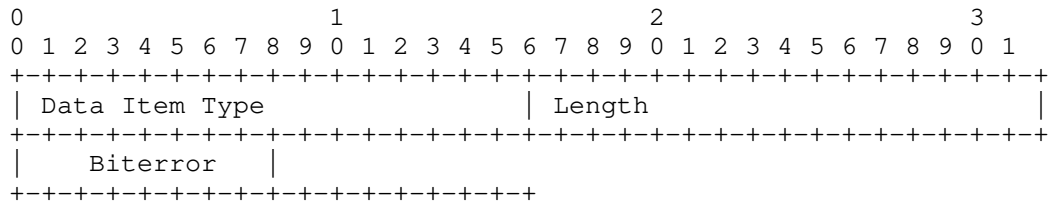


Figure 4

Data Item Type: TBD

Length: 1

Biterror: Biterror rate measured as a negative exponent to base 10, e.g. "4" for an error rate of 1 to 10^{-4} . An error rate of 0 is encoded with a 255.

3.4. Radio Noise Data Item

Radio Noise Data Item contains information which absolute noise value the radio measured. This Data Item SHOULD be interface specific.

The format of the Radio Noise Data Item is:

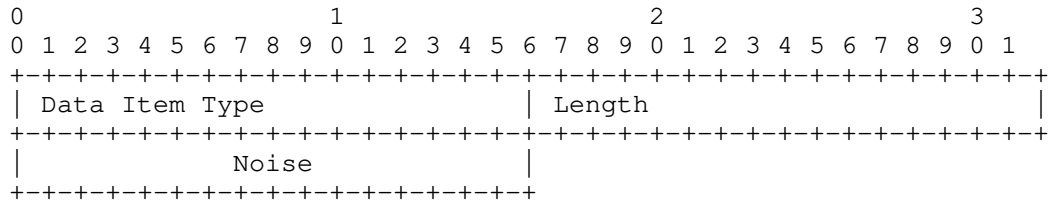


Figure 5

Data Item Type: TBD

Length: 2

Noise: Noise measured in dBm multiplied by 10 as a signed integer.

4. Security Considerations

The extension introduces a new Data Item for DLEP. The extension does not inherently introduce any additional vulnerabilities above those documented in [RFC8175]. The approach taken to security in that document applies equally when running the extension defined in this document.

5. IANA Considerations

As described below, IANA has assigned two values per this document. Both assignments are to registries defined by [RFC8175].

5.1. Extension Type Value

IANA has assigned the following value in the "Extension Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Code	Description
TBD	Radio Quality

Table 1: New Extension Type Value

5.2. Data Item Value

IANA has assigned the following value in the "Data Item Type Values" registry within the "Dynamic Link Exchange Protocol (DLEP) Parameters" registry. The new value is in the range with the "Specification Required" [RFC8126] policy:

Type Code	Description
TBD	Radio SNR
TBD	Radio Signal
TBD	Radio Biterror Rate
TBD	Radio Noise

Table 2: New Data Item Value

6. Normative References

- [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>>.

[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>>.

7. Informative References

[RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.

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