Manet
Internet-Draft
Intended status: Standards Track
Expires: 18 September 2026

H.R. Rogge
Fraunhofer FKIE

17 March 2026

DLEP Radio Quality Extension
draft-ietf-manet-dlep-radio-quality-04

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.

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 18 September 2026.

Table of Contents

1. Introduction 2
1.1. Requirements Language 2
2. Extension Usage and Identification 3
3. Radio Quality Data Items 3
3.1. Radio Biterror Rate Data Item 4
3.2. Radio SNR Data Item 4
3.3. Radio Signal Strength Data Item (also called RSSI) . . . 5
3.4. Radio Noise Data Item 6
4. Security Considerations 6
5. IANA Considerations 6
5.1. Extension Type Value 6
5.2. Data Item Value 7
6. Normative References 7
7. Informative References 7
Author's Address 8

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

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 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 5.1.

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. Biterror rate (and Signal Strength) can provice the additional information necessary to build a reasonable stable and agile metric. Biterror rate (before error correction) is a more generic way to represent this value, because it is a radio independent measurement.

The Biterror Rate data item is mandatory when using the Radio Quality extension. All other TLVs presented in this document are optional.

3.1. Radio Biterror Rate Data Item

Radio Biterror Rate Data Item is a mandatory TLV that contains information about the radio receivers estimate how often a transmitted bit will be received wrong. This value can often be either directly measured by the radio by comparing the result of a forward-error-correction to the original received data or calculated from the received signal-to-noise ratio and knowledge about the current modulation coding scheme. This Data Item can be both interface and neighbor specific.

The format of the Radio Biterror Rate Data Item is:

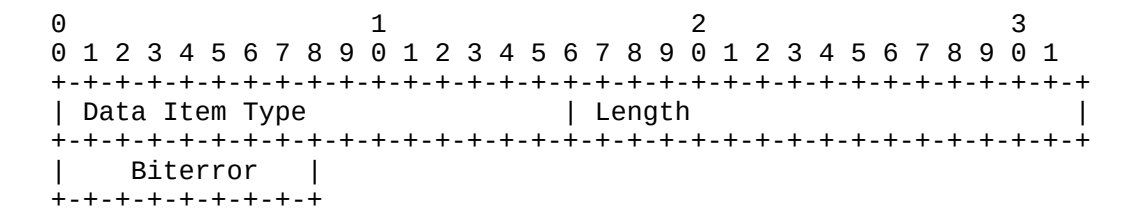

Figure 1

Data Item Type: TBD

Length: 1

Biterror: Biterror rate measured as a negative exponent multiplied by 10 (to base 10), e.g. "40" for an error rate of 1 to 10^-4. An error rate of 0 is encoded with a 255.

3.2. 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:

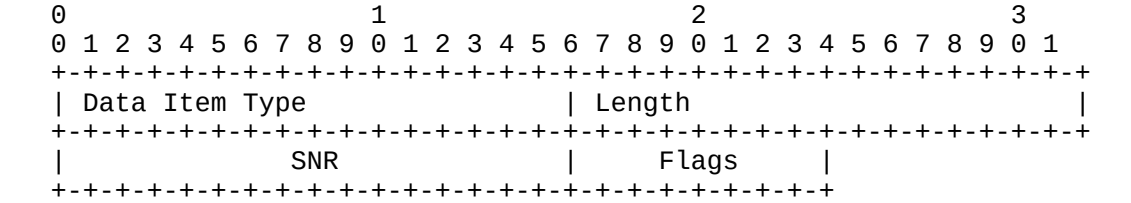

Figure 2

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:

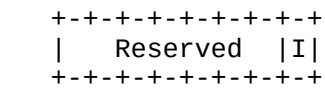

Figure 3

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

Reserved: MUST be written as zero. Ignored on receipt and left for future assignment.

3.3. 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:

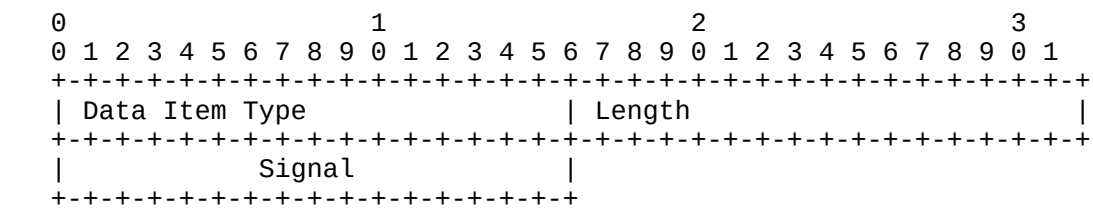

Figure 4

Data Item Type: TBD

Length: 2

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

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:

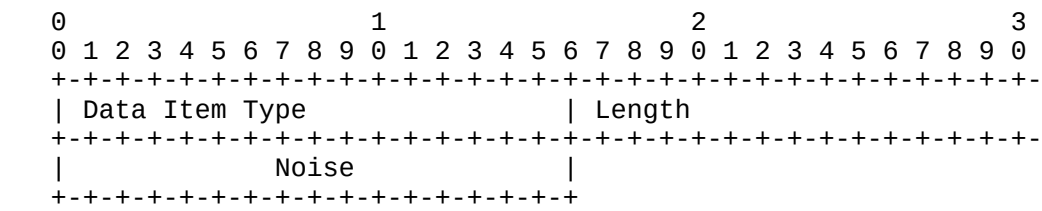

Figure 5

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	Reference
TBD	Radio Quality	This document

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	Reference
TBD	Radio Biterror Rate	This document
TBD	Radio SNR	This document
TBD	Radio Signal	This document
TBD	Radio Noise	This document

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>.

Author’s Address

Henning Rogge
Fraunhofer FKIE
Fraunhofer Strasse 20
53343 Wachtberg
Germany
Email: henning.rogge@fkie.fraunhofer.de