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IANA Registry for 6lowpan ESC Dispatch Code points
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Abstract

RFC4944 defines ESC dispatch type for additional dispatch bytes in the 6lowpan header. The value of ESC byte has been updated by RFC6282. However, the usage of ESC extension byte has not been defined in RFC6282 and RFC4944. The purpose of this document is to define the ESC extension byte code points and to request corresponding IANA actions.

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

[RFC4944] section 5.1 defines the dispatch header and types. The ESC type is defined for using additional dispatch bytes in the 6lowpan header. RFC 6282 modifies the value of the ESC dispatch type and it is recorded in IANA registry [6LOWPAN-IANA]. However, the bytes and usage following the ESC byte are not defined in either [RFC4944] and [RFC6282]. However, in recent years with 6lowpan deployments, the implementations and Standards organizations have started using the ESC extension bytes and a co-ordination between the respective organizations and IETF/IANA are needed.

The following sections record the ITU-T specification for ESC dispatch byte code points as an existing known usage and propose the definition of ESC extension bytes for future applications. The document also requests IANA actions for the first extension byte following the ESC byte.

2. Terminology

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].

3. Usage of ESC dispatch bytes

RFC 4944 [RFC4944] first introduces this "ESC" dispatch header type for extension of dispatch bytes. RFC 6282 [RFC6282] subsequently modified its value to [01 000000].

This document specifies that the first octet following the ESC byte be used for extension type (extended dispatch values). Subsequent octets are left unstructured for the specific use of the extension type:

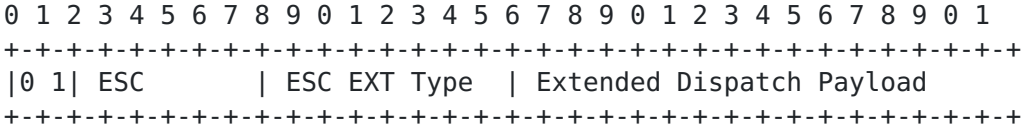


Figure 1: Frame Format with ESC Byte

ESC: The left-most byte is the ESC dispatch type containing '0100000'

ESC Extension Type (EET): It is the first byte following the ESC byte. Extension type defines the payload for the additional dispatch bytes. The values are from 0 to 255. Value 0 and 255 are reserved for future use. These values are assigned by IANA. The EET values are similar to dispatch values in the 6lowpan header except they are preceeded by the ESC byte. Thus, ESC extension types and dispatch values are using orthogonal code spaces. Though not desirable, multiple ESC bytes MAY appear in a 6lowpan header. For example, it is possible to form [Mesh-hdr][6lowpan-IPHC][Payload][ESC][EET][Payload][ESC][EET][Payload] as long as it follows the same semantics defined in this document and does not induce fragmentation. Section 3.1 describes how to handle unknown ESC dispatch type.

Extended Dispatch Payload(EDP): This part of frame format must be defined by the corresponding extension type. A specification is required to define each usage of extension type and its corresponding Extension Payload. For the sake of interoperability, specifications of extension bytes MUST NOT redefine the existing ESC Extension Type codes.

Section 5.1 in RFC4944 indicates that the Extension Type field may contain additional dispatch values larger than 63, as corrected by [4944-ERRATA]. For the sake of interoperability, the new dispatch type (EET) MUST NOT modify the behavior of existing dispatch types [RFC4944].

3.1. Interaction with other RFC4944 implementations

It is expected that RFC4944 existing implementations are not capable of processing ESC extension data bytes as defined in this document. However, implementors have to assume that existing implementation that attempt to process an EET unknown to them will simply drop the packet or ignore the ESC dispatch bytes.

If an implementation following this document, during processing of the received packet reaches the ESC byte for which it does not understand the extension bytes (EET), it MUST drop that packet. However, it is important to clarify that a router node SHOULD forward a 6lowpan packet with the EET bytes as long as it does not attempt to process any unknown ESC extension bytes.

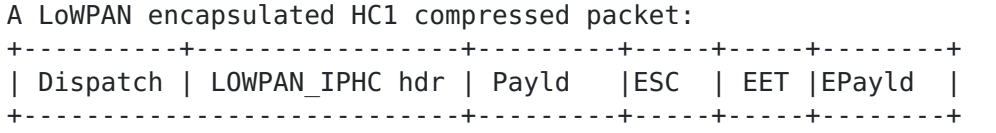
Sequence Of dispatch bytes and ESC bytes: Multiple ESC extension bytes may appear in a packet. The ESC bytes can appear as the first, last or middle dispatch bytes. However, a packet will get dropped by any node that does not understand the EET at the beginning of the packet. The closer to the end of the packet are the EET's, the higher chance there is that a legacy node will recognize and

successfully process some dispatch type [RFC4944] before the EET and then ignore the EET instead of dropping the entire packet.

3.2. ESC Extension Bytes Typical Sequence

The following diagram provides an example when ESC extension bytes might be used:

A LoWPAN encapsulated HC1 compressed packet:



A LoWPAN_IPHC Header, Mesh header and an ESC extenstion byte:

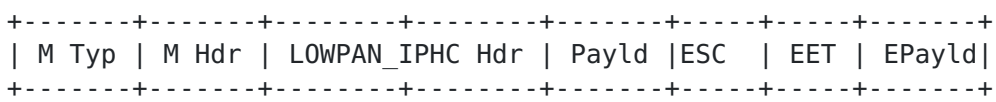


Figure 2: A 6lowpan packet with ESC Bytes

3.3. Example: ITU-T G.9903 ESC type usage

[G3-PLC] provides native mesh-under functionalities. The ESC dispatch type is used with the command frames specified in figure 9-12 and Table 9-35 in [G3-PLC] . The command ID values are 0x01 to 0x1F.

The frame format is defined as follows:

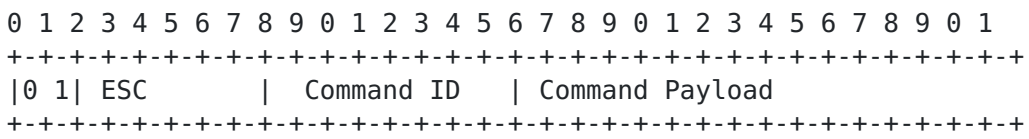


Figure 3: G.9903 Frame Format with ESC Byte

3.4. NALP and ESC bytes

According to RFC4944 [RFC4944] section 5.1, NALP dispatch bytes are used for non-6lowpan packets. Since ESC bytes are part of 6lowpan dispatch types (extended), they are orthogonal to NALP bytes.

4. IANA Considerations

This document requests IANA to register the 'ESC Extension Type' values as per the policy 'Specification Required'[RFC5226] as specified in this document which follows the same policy as in the IANA section of [RFC4944]. For each Extension Type (except the Reserved values) the specification MUST define corresponding Extended Dispatch Payload frame bytes for the receiver implementation to read the ESC bytes with interoperability.

The initial values for the 'ESC Extension Type' fields are:

Value	Description	Reference
0	Reserved for future use	This document
1-31	Used by ITU-T G.9903 and G.9905 Command IDs	ITU-T G.9903 & ITU-T G.9905
32-254	Unassigned (Reserved for future IANA Assignment-- Spec Required)	This document
255	Reserved for future use	This document

Figure 4: Initial Values for IANA Registry

5. Security Considerations

There is no additional security threats due to the assignments of ESC byte usage described in this document. However, this document forbids defining any extended dispatch values or extension types that modifies the behavior of existing Dispatch types.

6. Acknowledgements

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7. References

7.1. Normative References

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[RFC6282] Hui, J., Ed. and P. Thubert, "Compression Format for IPv6 Datagrams over IEEE 802.15.4-Based Networks", RFC 6282, DOI 10.17487/RFC6282, September 2011, <http://www.rfc-editor.org/info/rfc6282>.

7.2. Informative References

[6LOWPAN-IANA] "https://www.iana.org/assignments/_6lowpan-parameters/_6lowpan-parameters.xhtml".

[G3-PLC] "http://www.itu.int/rec/T-REC-G.9903-201402-I".

[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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