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Internet-Draft   INSIDE Secure
Intended status: Standards Track   P. Kinney
Expires: October 9, 2016   Kinney Consulting LLC
                                                       April 7, 2016

IEEE 802.15.4 Information Element for IETF
draft-kivinen-802-15-ie-01.txt

Abstract

   IEEE Std 802.15.4 has Information Elements (IE) that can be used to
   extend the 802.15.4 in interoperable manner. IEEE 802.15 Assigned
   Numbers Authority (ANA) manages the registry of the Information
   Elements, and this document requests ANA to allocate a number for
   IETF and provides the information how the IE is formatted to provide
   sub types.

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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   This Internet-Draft will expire on October 9, 2016.

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1. **Introduction**

The IEEE Std. 802.15.4 [IEEE-802-15-4] has Information Elements (IE)
that can be used to extended the 802.15.4 in interoperable manner.
There are two different IE types, Header IE and Payload IE. The
Header IEs are part of the Medium Access Control (MAC) header, and
they are never encrypted, but they may be authenticated. Most of the
Header IE processing is done by the MAC, and IETF protocols should
not need to extend up with them. The Payload IEs are part of the MAC
payload and they may be encrypted and authenticated.

IETF protocols will need to include information in the 802.15.4
frames, and standard 802.15.4 way of doing that is to include payload
IE in the frame that will contain the information. Because of this
the IETF needs to obtain a dedicated Payload IE from IEEE 802.15
Assigned Numbers Authority (ANA) [IEEE-802-15-ANA]. The up to date
802.15 ANA database can be found in [IEEE-802-15-ANA-DB].

The 802.15.4 operations manual [IEEE-802-15-OPS] provides information
on how a standardization organization may request an allocation of
the one IE to them. To make this request the standardization
organization needs to: provide the reason for the request; a
description of the protocol format that shows there is sufficient
subtype capability; a statement that the external organization
understands that only one ID number will be issued.

This document provides the information needed for the request.

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. Users of the IETF IE

There are several IETF working groups such as 6TiSCH, 6lo, CoRE etc,
which could benefit from the IETF IE. The 6TiSCH working group has
already expressed the need for the IE, and this allocation should
provide them a way forward.

4. IETF IE Subtype Format

The maximum length of the Payload IE content is 2047 octets, and
802.15.4 frame contains a list of payload IEs, i.e. a single frame
can have multiple payload IEs, terminated with the payload IE
terminator, and may be followed by the payload.

Because the frame contains a list of the payloads, there is no need
to provide internal structure inside the IETF IE. The Payload IE
format of the 802.15.4 contains the Length field, so the length of
the Sub-Type Content can be calculated from the Length field of the
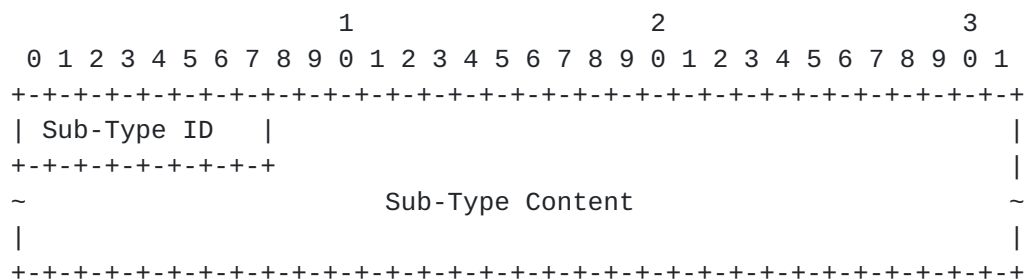IETF IE.

The format of the IETF IE is as follows:

```
                      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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Sub-Type ID   |                                               |
+-+-+-+-+-+-+-+-+                                               |
~                       Sub-Type Content                        ~
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

                   Figure 1: IETF IE Subtype Format

o Sub-Type ID is the IANA allocated number specifying the sub-type
   of the IETF IE. Value 0 is reserved for future extensibility,
   i.e., in case a longer Sub-Type ID field is needed.

o Sub-Type Content is the actual content of the information element,
   and its length can be calculated from the Length field of the IETF
   IE.

One IEEE 802.15.4 frame can contain multiple IETF IEs for same or different sub types.

5. Request to allocate IETF IE

IETF would request the 802.15.4 Working Group to allocate a Payload IE for IETF use. Furthermore IETF understands that only one ID will be issued to it.

6. Security Considerations

This document creates an IANA registry for IETF IE Sub-type IDs, and the security of the protocols using the IEs needs to be described in the actual documents allocating values from this registry.

The IEEE Std 802.15.4-2015 [IEEE-802-15-4] contains methods where security of the IE can be enforced when a frame is received, but this is only per IE type, thus all IETF IEs will have same security level requirements regardless of the Sub-Type ID used. This can cause issues if different security processing would be needed and any of those IEs would need to be processed in the MAC level. Fortunately everything IETF does should be in a higher level than the MAC level, thus the higher layer processing for these IEs needs to perform separate security policy checking based on the IETF IE Sub-Type ID in addition to the checks done by the MAC.

7. IANA Considerations

This document creates a new registry for IETF IE Sub-type IDs registry:

```
Value     Sub-type ID
0         Reserved
1-200     Unassigned
201-255   Experimental Use
```

Changes and additions to this registry is by expert review.

8. References

8.1. 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, <http://www.rfc-editor.org/info/rfc2119>.

8.2. Informative References

[IEEE-802-15-4]
          "IEEE Standard for Low-Rate Wireless Personal Area
          Networks (WPANs)", IEEE Standard 802.15.4, 2015.

[IEEE-802-15-ANA]
          "IEEE 802.15 Assigned Numbers Authority",
          <http://www.ieee802.org/15/ANA.html>.

[IEEE-802-15-ANA-DB]
          "IEEE 802.15 ANA database",
          <https://mentor.ieee.org/802.15/
          documents?is_dcn=257&is_group=0000>.

[IEEE-802-15-OPS]
          "IEEE 802.15 Operations Manual",
          <https://mentor.ieee.org/802.15/
          documents?is_dcn=235&is_group=0000>.

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