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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title |  |
| Date Submitted | 16 July 2013 |
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| Re: | Propasal for response to ETSI TC ERM request for change regarding the management of the IE IDs. |
| Abstract | In March 2013 the SCMaint chair requested preparation and presentation of a proposed approach to address allocation of the IE ID space to allow for IEEE management of the ID assignments for external organizations. In May 2013 a proposed approach was presented to SCMaint, which proposes minimal changes to to the standard and a general scheme to manage the ID space currently defined as unmanaged in 802.15.4-2012, which provides compatibility with current standard and accommodation of currently deployed standard compliant devices. This approach was accepted for development of a plan. This revision includes elaboration of the proposed approach and an execution plan. |
| Purpose | Provide for continued growth and evolution of 802.15.4  |
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| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

# Introduction

Standard 802.15.4 has become a widely adopted as a basis for work done in other standards development organizations and industry alliances external to IEEE 802 LMSC. The introduction of Information Elements has proven very popular and external organizations have defined IEs to extend the standard defined protocol. It became clear that some coordination of ID allocation would be of great benefit, to ensure continued success of the standard and work based on the standard. A proposed approach that allocated part of the IE ID space for management by IEEE was agreed in May 2013. This document elaborates on the proposed approach.

This revision extends to concept to propose management of the MAC Command Frame ID assignments in addition to the IE ID space. The author at the request of SCMaint and the working group reached out for input from organizations outside 802.15. Input received indicated that, in addition to defining IEs, external organizations have defined new MAC commands. Thus it makes sense to extend the management concept to include command IDs would have value.

The management process proposed in this document would take responsibility for future allocation of IE IDs, Command Frame IDs, and Frame Type values.

# Allocation of IE ID space

Proposed for 802.15.4-2013:

|  |  |  |
| --- | --- | --- |
| ID Range | 802.15.4 Use | Notes |
| 0x00-0x19 | External Protocol, Managed by IEEE |  |
| 0x1a-0x26 | Defined by 802.15.4 |  |
| 0x21-0x3f | Reserved for 802.15.4 future use |  |
| 040-0x47 | External Protocol, Managed by IEEE | Request to TIA/ETSI |
| 0x48-0x7d | Reserved for 802.15.4 future use |  |
| Q0x7e | List Termination |  |
| 0x80 | Vendor Specific 2 |  |
| 0x81 | Vendor Specific 1 |  |
| 0x82 | External Protocol Specific  |  |
| 0x83-f0xff | Reserved for 802.15.4 future use |  |

Vendor Specific IE 1:

|  |  |  |
| --- | --- | --- |
| Octets: 2 | 3 | Variable |
| IE Descriptor  | Vendor ID / OUI | Vendor Specific Content |

Vendor Specific IE 2 (based on TR-51)

|  |  |  |  |
| --- | --- | --- | --- |
| Octets: 2 |  | 3 | Variable |
| IE Descriptor  | VS Control | Vendor ID / OUI | Vendor Specific Content |

Vendor Specific Control Field:

|  |  |
| --- | --- |
| Bits |  |
| 0:3 | Reserved |
| 4:7 | Precedence: Specifies how to order IEs in the IE list. If set to 15 then the IE will be placed after all other IEs in the IE list. If set to zero will be placed before defined IEs and all other VSIEs that have a precedence value greater than 0. VSIEs of the same precedence value may be placed in any order by the implementation.  |

External Protocol Specific IE:

|  |  |  |
| --- | --- | --- |
| Octets: 2 | 2 | Variable |
| IE Descriptor  | Protocol Identifier (Ethertype) | Protocol Specific Content |

|  |  |
| --- | --- |
| ID Range | Use |
| 0x0 | ESDU |
| 0x1 | MLME (Nested) |
| 0x2-0x9 | External Protocol (Managed by IEEE)2 responses that use IDS in this range. |
| 0xa - 0xd | Reserved for 802.15.4 future use |
| 0xe | Vendor Specific Payload IE  |
| 0xf | List termination |

# Allocation of Command ID space

The following table shows the proposed allocation of command IDs moving forward.

|  |
| --- |
| 802.15.4 Command ID Allocations |
| ID  | Use |
| 0x01-0x0b | Defined in 802.15.4-2012 |
| 0x0c | Reserved for 802.15.4 future use |
| 0x0d– 0x20 | Defined in 802.15.4-2012 |
| 0x21-0x25 | Proposed in current in-progress amendments |
| 0x26-0xc8 | Reserved for 802.15.4 future use |
| 0xc9-0xfe | Managed by IEEE for external protocols  |
| 0xff | Reserved for Command ID Extension (future revision of 802..15.4) |

The values 0xc9 – 0xfe would be available for external entities through a process managed by IEEE. This allocates approximately 25% of the remaining ID space to external protocol use and 75% for future growth of 802.15.4.

# Management Process and Responsibilities

The proposal is for initial management to be performed by Working Group 802.15 using a process modeled on the process used by the IEEE RAC. The process includes:

* Means for external entities to make a request for ID allocation
* A review and approval process in 802..15
* Guideline document(s) made available to the general public on how to make requests and effectively use the ID(s) assigned by the WG.

It is recommended that the Working Group charter a standing committee with the responsibility to specify and operate the management process. The scope of the standing committee will be to manage identifier values for Frame Types, IE IDs and Command Frame IDs for 802.15.4 initially, and for other 802.15 standards when necessary.

# Background

The 802.15.4 IE Story, complete as of 802.15.4k-2013 (as submitted to RevCom 4/13). NOTE: Current amendments underway define additional IEs which would be allocated from the “reserved” space. In addition to hat is shown in the table, TG4m has requested xx IE IDs from the MLME Short ID space and TG4p has requested 3 IE ID values from the Header IE space.

|  |
| --- |
| Payload IE group ID allocations |
| Group ID value | Description |
| 0x0 | Encapsulated Service Data Unit (ESDU) as described in 5.2.4.4 |
| 0x1 | MLME (Nested) |
| 0x2 | Unmanaged |  |
| TBD | Expect request for 1 group ID currently used |
| TBD | Expect request for 1 group ID from external SDO/Alliance  |
| …0x9 |  |
| 0xa–0xe | Reserved |
| 0xf | List termination |

|  |
| --- |
| 802.15.4 IE ID Allocations |
| Key: |

|  |  |  |
| --- | --- | --- |
| Deyfined in 802.15.4e |  Defined in 802.15.4j |  |
| Defined in 802.15.4g | Defined in 802.15.4k |  |
| Unmanaged |

 |
| Header IEs |  | MLME IEs |
| ID  | Use |  | Sub-ID  | Use |
| 0x00-0x19 | Unmanaged |  | 0x00-0x19 | Reserved |
| 0x1a | LE CSL |  | 0x1a | TSCH Synchronization |
| 0x1b | LE RIT |  | 0x1b | TSCH Slotframe |
| 0x1c | DSME PAN Descriptor |  | 0x1c | TSCH Timeslot |
| Q | RZ Time |  | 0x1d | Hopping Timing  |
| 0x1e | ACK/NACK Time Correction  |  | 0x1e | EB Filter |
| 0x1f | GACK |  | 0x1f | MAC Metrics 1 |
| 0x20 | Low Latency Network info |  | 0x20 | MAC Metrics 2 |
| 0x21 | Extended DSME PAN Descriptor |  | 0x21 | Coexistence Specification |
| 0x22 | MPDU Frag Sequence Context |  | 0x22 | SUN PHY Capabilities  |
| 0x23 | Simplified SF Spec |  | 0x23 | MR-FSK Gen PHY  |
| 0x24 | implified GTS Spec |  | 0x24 | IE that shall not be named |
| 0x25 | LECIM Capabilities |  | 0x25 | PHY Parameter Change |
| 0x26 | TRLE Descriptor |  | 0x26 | O-QPSK PHY Specific |
| 0x27 | Reserved |  | 0x27 | PCA Info |
| … |  |  | 0x28 | LECIM DSSS Op Mode Desc. |
|  |  |  | 0x29 | LECIM FSK Op Mode Desc. |
|  |  |  | 0x2a |  |
|  |  |  | … | Reserved |
| … |  |  | 0x3f |  |
|  |  |  | 0x40 | Unmanaged |
| 0x7d | Reserved |  | … |  |
| 0x7e | List Term 1 |  | … |  |
| 0x7f | List Term 2 |  | 0x7f |  |
| 0x80-0xff | Reserved |  |  |  |

Command IDs: This table incudes all the MAC Command IDs allocated in the published standard (amendments through 4k) and currently active projects (proposed in 4m and 4p). TG4m and TG4p are in draft and likely to change.

|  |
| --- |
| 802.15.4 Command ID Allocations |
| Key: |

|  |  |  |
| --- | --- | --- |
| Defined in 802.15.4e |  Defined in 802.15.4j | Proposed 802.15.4m |
| Defined in 802.15.4g |  Defined in 802.15.4k | Proposed 802.15.4p |
| Defined in 802.15.4-2011 | Reserved |

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| ID  | Use |  | ID  | Use |
| 0x01 | Association request  |  | 0x14 | DSME-Association response  |
| 0x02 | Association response |  | 0x15 | DSME-GTS request  |
| 0x03 | Disassociation notification  |  | 0x16 | DSME-GTS reply  |
| 0x04 | Data request |  | 0x17 | DSME-GTS notify  |
| 0x05 | PAN ID conflict notification |  | 0x18 | DSME-Information request  |
| 0x06 | Orphan notification |  | 0x19 | DSME-Information reply  |
| 0x07 | Beacon request  |  | 0x1a | DSME-Beacon allocation notification  |
| 0x08 | Coordinator realignment  |  | 0x1b | DSME-Beacon collision notification  |
| 0x09 | GTS request |  | 0x1c | DSME-Link status report  |
| 0x0a | TRLE-Management request |  | 0x1d | AMCA-Beacon request  |
| 0x0b | TRLE-Management response |  | 0x1e | AMCA-Hello  |
| 0x0c | Reserved |  | 0x1f | AMCA-Channel probe  |
| 0x0d | LL-Discover response  |  | 0x20 | LE-RIT data request |
| 0x0e | LL-Configuration status  |  | 0x21 | DBS request  |
| 0x0f | LL-Configuration request  |  | 0x22 | DBS response  |
| 0x10 | LL-CTS shared group  |  | 0x23 | Neighbor discovery request  |
| 0x11 | LL-Request To Send (RTS)  |  | 0x24 | Probe |
| 0x12 | LL-Clear to send (CTS) |  | 0x25 | Ranging |
| 0x13 | DSME-Association request |  | 0x26-0xff | Reserved |