**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Wireless Specialty Networks (WSNs) | |
| Title | **Frame format changes** | |
| Date Submitted | 11 May 2022 | |
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| Re: |  | |
| Abstract | This document contains proposed resolutions for CIDs on D6.0 | |
| Purpose | Aid comment resolution | |
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**Legend:**

* Arial size 13 indicates subsections for individual comments
* Red underlined text needs to be adapted during the comment implementation (e.g., because it is a reference).
* Bold italic text is an instruction to the editor to implement the text

R2-36 R2-37

*Summary: This proposal updates the general frame format to include addresses for bridging in the payload / MSDU. Also, we remove subtypes and indicate the payload type / format in a new MPDU header field. Moreover, add a table listing all elements and in which frame type they shall be transported.*

Update 5.6.4

***On P30L11f., replace***

For each type, further subtypes exist that define the contents of the MPDU’s payload.

***with***

Information exchanged between two peer MAC entities is encoded in elements. MAC protocol procedures define the exchange of such elements. Elements are carried in the payload of MPDUs. Depending on which protocol procedure they serve, elements have the type data, management or control. MPDUs carry elements of their respective type.

Update 6

***Remove subsection 6.6.***

**Remove all mentions of A-MSDU.**

* **Remove 6th bullet in 6.1**
* **Update reference to 6.6 in P33L10 to new “Data Frame Transmissions” clause.**
* **Remove P33L26-27, 29-30 (second sentence in paragraph)**
* **Remove 7.6.10**
* **Remove Table D.7**
* **Remove “A-MSDU” Acronym on P19L3**
* **Remove “or A-MSDU" in P45L28, P50L9**

***Add a new Subsection 6.X Data Frame Transmissions with the following text:***

**6.X.1 Overview**

MSDUs received through the MD-SAP.request for transmission, as specified in 8.2.2, shall be encapsulated into one of the elements specified in [REF to table in 7.3] and transmitted in a data frame.

When receiving a data frame, devices shall pass the contained MSDU(s) to the higher layer through the MD-SAP.indication primitive, specified in 8.2.3.

**6.X.2 Single MSDU transmission**

When transferring a single MSDU to a peer device in the OWPAN, that MSDU shall be encapsulated in a *Single MSDU* element*. Single MSDU* elements shall the destination and source addresses of the MSDU, as received through the MD-SAP.request, in the *Destination Address* and *Source Address* fields, respectively.

**6.X.3 Multiple MSDU aggregation**

A device may aggregate multiple MSDUs in a single MPDU. The number of MSDUs that are aggregated within a single MPDU is implementation specific and may vary on a per MPDU basis.

On reception of multiple MSDUs within a single MPDU, the contained MSDUs shall be passed to the higher layer in their order in the respectively containing element.

A *Single Address Aggregated MSDU* element may be used to aggregate several MSDUs, i.e., transfer several MSDUsin one MPDU. All MSDUs in a *Single Address Aggregated MSDU* element contained in a data frame shall have the same source and destination addresses, as received through the MD-SAP.request. The *Destination Address* and *Source Address* fields of the *Single Address Aggregated MSDU* element shall be set to the respective addresses as received through the MD-SAP.request.

For each MSDU, the source and destination address in the MD-SAP.indication shall be equal to the *Destination Address* and *Source Address* fields of the *Single Address Aggregated MSDU* element.

A *Multiple Address Aggregated MSDU* element may be used to aggregate several MSDUs, i.e., transfer several MSDUsin one MPDU when transferring more than one MSDU with different source or destination addresses to the same peer device in the OWPAN. The *Destination Address* and *Source Address* fields for each MSDU shall be set to the respective source and destination addresses as received through the MD-SAP.request.

For each MSDU, the source and destination address in the MD-SAP.indication shall be equal to the *Destination Address* and *Source Address* fields that correspond the respective MSDU in the *Multiple Address Aggregated MSDU* element.

Update 6.2.2

***Insert at suitable location:***

MSDUs that have a Destination Address that has the multicast bit set in the MD-SAP.request shall be treated as if the destination address was the broadcast address.

Update 7.2

***On P56L23, replace***

a Type and Subtype of frame

***With***

the *Type* of the respective frame

***On P57L3, replace the paragraph with***

The payload of each data-, management-, or control frame consists of one or more elements. Depending on the frame type, different elements are contained in the payload. Data frames include one or multiple MSDUs received via the MD-SAP for transmission, encapsulated into the corresponding elements. For management frames, the payload includes elements that convey management information. The payload of control frames includes elements that carry control information.

The element(s) contained in the payload are indicated in the Payload Control field of the MPDU. For that purpose, the field contains the element id of the top-level payload element.

***Update Figure 23: Add 2-Octet field “Payload Type”, bringing size of the always-present part of the header to 16 bytes (128 Bits), and 2 reserved bytes following it.***

***In Figure 23, remove “Auxiliary Address” field.***

***In Figure 24, remove “Subtype” field.***

***On P57L24, remove paragraph for “Subtype”.***

***In Table 1, remove column “Meaning of the Auxiliary Address field”.***

***Remove P58L12-13 (Description of Auxiliary Address in Address fields).***

***Remove Table 1 and all mentions of the “direction” bits.***

* ***Bit 8-9 in Figure 24***
* ***P57L26f.***
* ***Table 1***
* ***P58L3.***

***On P59L16, in 7.2.7, replace line with***

The payload of MAC frames consists of the element whose type was specified in the payload header.

***Move 7.3, 7.4, 7.5 as new subclauses under 7.2.7.***

Update 7.3

***In Section 7.3, P60L15, replace the paragraph with the following:***

The payload of the data frame consists of any of the elements listed in Table 2. The Payload Type field of the Payload header shall discriminate the contained elements.

***Replace Table 2 with the following***

**Table 2 Data frame elements**

|  |  |  |
| --- | --- | --- |
| Element | Element Reference | Type |
| *Single MSDU* element | 7.6X | 0x0001 |
| *Single Address Aggregated MSDU* element | 7.6X | 0x0002 |
| *Multiple Address Aggregated MSDU element* | 7.6X | 0x0003 |
| reserved | - | others |

***In the P60L19-P60L22, replace “frames” with “elements”.***

***Remove P60L23-P60L24.***

***On P60L25, replace subtype with type. Replace last sentence on L26 with***

Data frames shall not specify a Type in the Payload Control field that is reserved in Table 2, and frames which specify a Type that is reserved in Table 2 shall be ignored on reception.

Update 7.4

***In section 7.4, replace P61L1-5 with the following:***

The payload of management frames consists of any of the elements listed in Table 3. The Type field of the Payload header shall indicate the contained elements.

***Replace Table 3 with the following:***

**Table 3 Management frame elements**

|  |  |  |
| --- | --- | --- |
| Element | Element Reference | Type |
| *Multiple Element Container* element | 7.6.23 | 0x0001 |
| *Announcement* element | 7.6.X | 0x0002 |
| *Association Request* element | 7.6.2 | 0x0003 |
| *Association Response* element | 7.6.3 | 0x0004 |
| *Disassociation Notification* element | 7.6.23 | 0x0005 |
| *Alien Signal* element | 7.6.17 | 0x0006 |
| *Attribute Change Request* element | 7.6.21 | 0x0007 |
| *Attribute Change Response* element | 7.6.22 | 0x0008 |
| *Supported MCS* element | 7.6.18 | 0x0009 |
| *Vendor Specific* element | 7.6.24 | 0x000a |
| *Reachable Address* element | 7.6.25 | 0x000b |
| *Relay Device Configuration Request* element | 7.6.26 | 0x000c |
| *Relay Device Configuration Response* element | 7.6.27 | 0x000d |
| *Relayed Device Configuration Request* element | 7.6.28 | 0x000e |
| *Relayed Device Configuration Response* element | 7.6.29 | 0x000f |
| reserved | - | others |

***On P61L4, replace “Variable Element Container” with “Multiple Element Container.”***

***At the end of P61L5, add***

When in the payload of a management frame, the *Multiple Element Container* element shall only contain elements specified in Table 3.

*Multiple Element Container* elements in management frames shall either only include *Multiple Element Container* elements or only include elements that are used for the purpose of the same procedure, as specified in Table X.

Update 7.5

***In section 7.5, P61L17, replace the line with the following:***

The payload of the control frame consists of any of the elements listed in Table 4. The Type field of the Payload header shall discriminate the contained elements.

***At the end of P61L17, add***

When in the payload of a control frame, the *Multiple Element Container* element shall only contain elements specified in Table 4.

***Replace Table 4 with the following:***

**Table 4 Control frame elements**

|  |  |  |
| --- | --- | --- |
| Element | Element Reference | Type |
| *Sync* element | 7.6.X | 0x0001 |
| *Explicit MIMO Feedback* element | 7.6.9 | 0x0002 |
| *ACK* element | 7.6.11 | 0x0003 |
| *Block ACK request* element | 7.6.12 | 0x0004 |
| *Block ACK* element | 7.6.13 | 0x0005 |
| *MCS Request* element | 7.6.14 | 0x0006 |
| *BAT Request* element | 7.6.15 | 0x0007 |
| *GTS Request* element | 7.6.16 | 0x0008 |
| *GTS Descriptor List* element | 7.6.7 | 0x0009 |
| *GTS Descriptor* element | 7.6.8 | 0x000a |
| *RTS Descriptor* element | 7.6.X | 0x000b |
| *Vendor Specific* element | 7.6.24 | 0x000c |
| reserved | - | others |

Update 7.6

***In 7.6.1, after P61L24 replace the last line in the paragraph with the following:***

[REF to Table X] lists the elements defined within this standard and the frame type(s) and procedure(s) they are used in. Depending on the frame type an element is transmitted in, the element ID for the respective element is defined in tables 2, 3 or 4 for data, management or control frames, respectively.

***Add new Table X:***

|  |  |  |  |
| --- | --- | --- | --- |
| Element | Element  Reference | Contained in Frame Type | Procedure(s) using the element |
| *Association Request* element | 7.6.2 | management | - Association (6.4.6) |
| *Association Response* element | 7.6.3 | management | - Association (6.4.6) |
| *Disassociation Notification* element | 7.6.4 | management | - Disassociation (6.4.7) |
| *Sync* element | 7.6.X | control | - Beacon-Enabled Channel Access (6.3) |
| *Announcement* element | 7.6.X | management | - OWPAN management (6.4) |
| *Capability List* element | 7.6.6 | management | - Association (6.4.6) |
| *GTS Descriptor List* element | 7.6.7 | control | - GTS allocation and signaling (6.3.6) |
| *GTS Descriptor* element | 7.6.8 | control | - GTS allocation and signaling (6.3.6) |
| *Explicit MIMO Feedback* element | 7.6.9 | control  management | - Association (6.4.6)  - Adaptive MIMO transmission |
| *Single MSDU* element | 7.6X | data | - Data transmission (6.X) |
| *Multiple Address Aggregated MSDU* element | 7.6X | data | - Data transmission (6.X) |
| *Single Address Aggregated MSDU* element | 7.6X | data | - Data transmission (6.X) |
| *ACK* element | 7.6.11 | control | - Acknowledgement (6.7) |
| *Block ACK Request* element | 7.6.12 | control | - Acknowledgement (6.7) |
| *Block ACK* element | 7.6.13 | control | - Acknowledgement (6.7) |
| *MCS Request* element | 7.6.14 | control | - Adaptive transmission (6.8) |
| *BAT Request* element | 7.6.15 | control | - Adaptive transmission (6.3) |
| *GTS Request* element | 7.6.16 | control | - GTS allocation and signaling (6.3.6) |
| *RTS Descriptor* element | 7.6X | control | - RTS allocation and signaling (6.3X) |
| *Alien Signal* element | 7.6.17 | management | - Interference detection (6.4.8) |
| *Supported MCS* element | 7.6.18 | management | - Association (6.4.6)  - Adaptive transmission (6.8) |
| *PM-PHY MCS* element | 7.6.19 | management | - Association (6.4.6)  - Adaptive transmission (6.8) |
| *HB-PHY MCS* element | 7.6.20 | management | - Association (6.4.6)  - Adaptive transmission (6.8) |
| *Attribute Change Request* element | 7.6.21 | management | - OWPAN maintenance (6.4.4) |
| *Attribute Change Response* element | 7.6.22 | management | - OWPAN maintenance (6.4.4) |
| *Vendor Specific* element | 7.6.24 | control  management | - OWPAN maintenance (6.4.4) |
| *Reachable Address* element | 7.6.25 | management | - Relaying (6.10) |
| *Relay Device Configuration Request* element | 7.6.26 | management | - Relaying (6.10) |
| *Relay Device Configuration Response* element | 7.6.27 | management | - Relaying (6.10) |
| *Relayed Device Configuration Request* element | 7.6.28 | management | - Relaying (6.10) |
| *Relayed Device Configuration Response* element | 7.6.29 | management | - Relaying (6.10) |

***Insert the following new subclause under 7.6:***

**7.X Single MSDU Element**

The *Single MSDU* element, depicted in Figure Y1, is used to transfer a single MSDU received through the MD-SAP to another device in the OWPAN.

|  |  |  |
| --- | --- | --- |
| 6 Octets | 6 Octets | Variable |
| Destination MAC Address | Source MAC Address | MSDU |

Figure Y1: Single MSDU element

**Destination MAC Address**: The *DestinationAddress* as indicated in the MD-DATA.request primitive invocation.

**Source MAC Address:** The *SourceAddress* as indicated in the MD-DATA.request primitive invocation.

**MSDU:** The MSDU as provided through the MD-DATA.request primitive.

***Insert the following new subclause under 7.6:***

**7.X Multiple Address Aggregated MSDU element**

The *Multiple Address Aggregated* *MSDU* element, depicted in Figure Y2, is used to transfer multiple MSDUs that have different Source and Destination MAC Addresses to devices in the OWPAN.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N \* (4 + variable) Octets | | | | | | | | |
| Destination MAC Address 1 | Source MAC Address 1 | Length 1 | MSDU 1 | … | Destination MAC Address N | Source  MAC Address N | Length N | MSDU N |

Figure Y2: Combined MSDU element

**Destination MAC Address 1...N**: The *DestinationAddress* of the subsequent MSDUas indicated in the MD-DATA.request primitive invocation.

**Source MAC Address 1...N:** The *SourceAddress* of the subsequent MSDUas indicated in the MD-DATA.request primitive invocation.

**Length 1...N**: Number of octets of the subsequent MSDU. This field is two octets wide.

**MSDU 1...N:** MSDUs as provided through the MD-DATA.request primitive.

**7.X Single Address Aggregated MSDU element**

The *Single Address* *Aggregated MSDU* element, depicted in Figure Y3, is used to transfer multiple MSDUs that share Source and Destination MAC Addresses received through the MD-SAP between devices in the OWPAN.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6 Octets | 6 Octets | N \* (2 + variable) Octets | | | | |
| Destination MAC Address | Source MAC Address | Length 1 | MSDU 1 | … | Length N | MSDU N |

Figure Y3: Combined MSDU element

**Destination MAC Address**: The *DestinationAddress* of all MSDUsas indicated in the MD-DATA.request primitive invocation.

**Source MAC Address:** The *SourceAddress* of all MSDUsas indicated in the MD-DATA.request primitive invocation.

**Length 1...N**: Number of octets of the subsequent MSDU. This field is two octets wide.

**MSDU 1...N:** MSDUs as provided through the MD-DATA.request primitive.

***Remove subclause 7.6.10 “MSDU Aggregation element”.***

***Rename “Variable Element Container” to “Multiple Element Container” in the whole document.***

***On P75L8, change “The value shall be a valid ID as listed in Table 14” to***

The value shall be a valid ID as listed in table 3 if the *Multiple Element Container* element is transmitted in a management frame or a valid ID as listed in table 4 if the *Multiple Element Container* element is transmitted in a control frame, respectively.

Update 8.2

***In table 18 and 19, update the “Description” column of the row that starts with “Msdu” to the following text:***

The MSDU in EtherType format, i.e., starting with the Length/Type field and ending with the MAC Client Data field as defined in [REF to IEEE802.3].