**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) | |
| Title | **MAC frame formats** | |
| Date Submitted | January 15th, 2024 | |
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| Abstract | Call for Proposals | |
| Purpose | Announce Call for Proposals to develop the IEEE 802.15.6ma standard specification. | |
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A device compliant with the IEEE 802.15.6ma standard shall be able to properly construct for transmission and decode a subset of the frames specified in this clause upon validation using the frame check sequence following reception. The particular subset of these frames that a compliant device constructs and decodes is determined by the functions supported by that particular device.

Each frame consists of the following basic components:

* A MAC Header (MHR), which comprises frame control, duration, MAC addresses, sequence control information, and QoS control information.
* A variable length Frame Body, which contains data information specific to the frame type and subtype;
* A frame check sequence (FCS) that contains a 32-bit CRC based on ITU-T Recommendation V.42 [] (see clause X).

Each figure and table in clause 5 illustrate the components of a MAC frame and in the order in which they are passed to the physical layer (PHY), from left to right and then from top to bottom. Unless specified otherwise, a number in a field is encoded as an unsigned integer.

Note: bits and octets format

The 48-bit MAC addresses are assigned as ordered sequences of bits. The bit 0 is always transferred first, while bit 47 of the MAC address is always transferred last (see Clause 8 of IEEE Std 802-2014).

* + 1. General MAC frame format

The MAC frame format comprises a set of fields that occur in a fixed order in all frames. Figure 9 depicts the general MAC frame format.

Note: Check if IE are required.



1. —MAC frame format.
   * + 1. Frame Control field
       2. Duration field
       3. Destination Address field
       4. Source Address field
       5. Remote Destination Address field
       6. Sequence Control field
       7. QoS Control field
       8. Frame Body field
       9. FCS field
     1. MAC frame types

The standard defines three frame types: Data frames, Control frames, and Management frames:

* Data frames transport information from the coordinator to devices and vice versa.
* Control frames intend to perform clearing operations for contention access, channel acquisition, CCA maintenance functions, and positive acknowledgment of received data. Control and Data frames work together to deliver data reliably.
* Management frames perform supervisory functions such as association to join a BAN or group BAN, or dissociation to leave a BAN or group BAN.
  1. Control frames
     1. Format of Control frames
        1. ACK frame format
        2. RTS frame format

Check if needed.

* + - 1. CTS frame format

Check if needed.

* 1. Data frames
     1. Format of Data frame
  2. Management frames
     1. Format of management frames

The format of a management frame is defined in Figure 9-74



1. —Management frame format
   * + 1. Beacon frame format

The frame body of a Beacon frame contains the information shown in Table 2.

1. —Beacon Frame Body field

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| 1 | Timestamp | See X for Timestamp field format |
| 2 | Beacon interval | See X for Beacon Interval field format |
| 3 | BAN ID | BAN identifier |
| 4 | Capability information\* | Supported data rates, configuration of FEC, HARQ information, |
| 5 | Traffic indication | The coordinator indicates to sleeping devices that they have information waiting for them, or to wake up at specific intervals to find out if there is data waiting for them. |
| 6 | Channel number for association |  |

Note: **\***This field may be extended onto more fields.

The Beacon frame is broadcasted by every BAN.

Once, a BAN joins a group BAN, the C2C exchange information in the NAP including CAP and CFP information (another management frame)

* + - 1. Group Beacon Frame Body

The frame body of a Group Beacon Frame Body contains the information shown in Table 3.

1. —Group Beacon Frame Body field

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| 1 | Timestamp | See X for Timestamp field format |
| 2 | Beacon interval | See X for Beacon Interval field format |
| 3 | Group ID | BAN identifier |
| 4 | Capability information\* | Supported data rates, configuration of FEC, HARQ information, |
| 6 | Channel number for coordination channel |  |

Note: **\***This field may be extended onto more fields.

The Group Beacon frame is broadcasted by the group coordinator. The coordination channel is used for coordinators in a group to exchange messages: Number of users in CFP, CAP. Negotiate the group frame duration: CFP and CAP duration, CFP allocation and deallocation of resources.

* + - 1. Disassociation frame format
      2. Association Request frame format
      3. Association Response frame format
      4. Reassociation Request frame format
      5. Reassociation Response frame format
      6. Probe Request frame format

To discover other BANs in the surroundings

* + - 1. Probe Response frame format

To discover other BANs in the surroundings

* + - 1. GTS request frame format
      2. GTS response frame format
    1. ~~MAC Header~~

~~The MAC Header consists of the Frame Control, the Recipient ID, the Sender ID, and the BAN ID.~~

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ~~Octets:~~ | ~~Count later~~ | ~~1~~ | ~~1~~ | ~~1~~ |
|  | ~~Frame Control~~ | ~~Recipient ID~~ | ~~Sender ID~~ | ~~BAN ID~~ |

1. ~~—MAC header~~
   * 1. ~~Frame Control~~

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~Bits:~~ | ~~1~~ | ~~1~~ | ~~4~~ | ~~2~~ |  |
|  | ~~Protocol Version~~ | ~~Protocol~~  ~~Sub-Version~~ | ~~Frame Subtype~~ | ~~Frame Type~~ |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ~~Bits:~~ | ~~8~~ | ~~3~~ | ~~1~~ | ~~4~~ |
|  | ~~Sequence Number~~ | ~~Fragment Number~~ | ~~Non-final Fragment~~ | ~~Reserved~~ |

1. ~~—Frame control~~
   * + 1. ~~Protocol Version~~

~~The Protocol Version field is set to one for this revision of the standard. The original version of the standard set this field to zero. This field is invariant in size and place across all revisions of this standard.~~

* + - 1. ~~Protocol Sub-Version~~

~~The Protocol Subversion filed is set to zero for this revision of the standard. This field is invariant in size and place across all future revisions of this standard.~~

* + - 1. Frame Subtype

1. —Frame subtypes

|  |  |  |  |
| --- | --- | --- | --- |
| Frame Type  value | Frame Type  name | Frame Subtype  value | Frame Subtype  name |
| 00 | Management | 0000 | Beacon in the Common Channel |
| 00 | Management | 0001 | Beacon in a Supplementary Channel |
| 00 | Management | 0010 | Connection Request |
| 00 | Management | 0011 | Connection Assignment |
| 00 | Management | 0100 | Disconnection Request |
| 00 | Management | 0101 | Disconnection Response |
| 00 | Management | 0110 | Timeslot Reassignment |
| 00 | Management | 0111 | Channel Reassignment |
| 01 | Control | 0000 | Ack |
| 01 | Control | 0001 | NAck |
| 10 | Data |  | User Priorities |
| 11 | Reserved | 0000-1111 | Reserved |

* + - 1. ~~Frame Type~~
      2. ~~Sequence Number~~
      3. ~~Fragment Number~~
      4. ~~Non-final Fragment~~
      5. ~~Beacon frame~~

~~~~

1. ~~—Beacon frame format~~

~~Beacon~~

**~~Timestamp~~**

**~~Beacon Interval~~**

**~~BAN ID~~**

**~~Capability Information~~** ~~(configuration of FECs, HARQ, etc.)~~

**~~Supported Rates~~**

**~~Traffic indication~~** ~~(sleeping devices are indicated the coordinator has information for them or wake up at specific intervals to find out if there is data waiting for them)~~

**~~Channel number~~** ~~association~~

~~Group beacon~~

**~~Timestamp~~**

**~~Beacon Interval~~**

**~~Group ID~~**

**~~Capability information~~** ~~(TBD)~~

**~~Supported Rate~~**

**~~Channel number~~** ~~for the coordination channel~~