**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |
| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | Draft text of MAC individual frame format for TG8 |
| Date Submitted | March 12, 2015 |
| Source | Qing Li (InterDigital Inc.) | Email: Qing.Li@InterDigital.com |
| Re: | Draft text of MAC individual frame format for 802.15.8 |
| Abstract | This is the work in progress text of the MAC component for IEEE 802.15.8 group for PAC. |
| Purpose | This document provides the details of draft text to IEEE 802.15.8 |
| Notice | This document does not represent the agreed views of the IEEE 802.15 Working Group or IEEE 802.15.8 Task Group. It represents only the views of the participants listed in the “Source(s)” field above. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |
| Patent Policy | The contributor is familiar with the IEEE-SA Patent Policy and Procedures:<http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and<http://standards.ieee.org/guides/opman/sect6.html#6.3>.Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and<http://standards.ieee.org/board/pat>. |

1. MAC protocol
	1. MPDU formats

----------------------------- Beginning of Text ------------------------------------

(Copied from IEEE 802.15.4 2011 release, clause 5.2.2, and then modified for PAC)

5.2.2 Format of individual frame types

**5.2.2.1 Beacon frame format (To be removed for PAC)**

The beacon frame shall be formatted as illustrated in Figure 38



**Figure 38—Beacon frame format**

The GTS fields shall be formatted as illustrated in Figure 39, and the pending address fields shall be formatted as illustrated in Figure 40.

****

**Figure 39—Format of the GTS information fields**



**Figure 40—Format of the pending address information fields**

**5.2.2.1.1 Beacon frame MHR fields**

The Frame Type field shall contain the value that indicates a beacon frame, as shown in Table 2, and the Source Addressing Mode field shall be set to indicate the beacon source addressing mode, as defined in

5.1.2.4. The Security Enabled field shall be set to one if security is enabled and the Frame Version field is not zero. If a broadcast data or command frame is pending, the Frame Pending field shall be set to one. All other fields in the Frame Control field shall be set to zero and ignored on reception.

The Sequence Number field shall contain the current value of macBSN.

The addressing fields shall comprise only the source address fields. The Source PAN Identifier and Source Address fields shall contain the PAN identifier and address, respectively, of the device transmitting the beacon.

The Auxiliary Security Header field, if present, shall contain the information required for security processing of the beacon frame, as specified in 5.2.1.7.

**5.2.2.1.2 Superframe Specification field**

The Superframe Specification field shall be formatted as illustrated in Figure 41.



**Figure 41—Format of the Superframe Specification field**

The Beacon Order field shall specify the transmission interval of the beacon. The relationship between the beacon order and the beacon interval is explained in 5.1.1.1.

The Superframe Order field shall specify the length of time during which the superframe is active (i.e., receiver enabled), including the beacon frame transmission time. The relationship between the superframe order and the superframe duration is explained in 5.1.1.1.

The Final CAP Slot field specifies the final superframe slot utilized by the CAP. The duration of the CAP, as implied by this field, shall be greater than or equal to the value specified by aMinCAPLength. However, an exception is allowed for the accommodation of the temporary increase in the beacon frame length needed to perform GTS maintenance, as described in 5.2.2.1.3.

The Battery Life Extension (BLE) field shall be set to one if frames transmitted to the beaconing device during its CAP are required to start in or before macBattLifeExtPeriods full backoff periods after the IFS period following the beacon. Otherwise, the BLE field shall be set to zero.

The PAN Coordinator field shall be set to one if the beacon frame is being transmitted by the PAN coordinator. Otherwise, the PAN Coordinator field shall be set to zero.

The Association Permit field shall be set to one if macAssociationPermit is set to TRUE (i.e., the coordinator is accepting association to the PAN). The association permit bit shall be set to zero if the coordinator is currently not accepting association requests on its network.

**5.2.2.1.3 GTS Specification field**

The GTS Specification field shall be formatted as illustrated in Figure 42.



**Figure 42—Format of the GTS Specification field**

The GTS Descriptor Count field specifies the number of 3-octet GTS descriptors contained in the GTS List field of the beacon frame. If the value of this field is greater than zero, the size of the CAP shall be allowed to dip below aMinCAPLength to accommodate the temporary increase in the beacon frame length caused by the inclusion of the field. If the value of this field is zero, the GTS Directions field and GTS List field of the beacon frame are not present.

The GTS Permit field shall be set to one if macGTSPermit is equal to TRUE (i.e., the PAN coordinator is accepting GTS requests). Otherwise, the GTS Permit field shall be set to zero.

**5.2.2.1.4 GTS Directions field**

The GTS Directions field shall be formatted as illustrated in Figure 43.



**Figure 43—Format of the GTS Directions field**

The GTS Directions Mask field is a mask identifying the directions of the GTSs in the superframe. The lowest bit in the mask corresponds to the direction of the first GTS contained in the GTS List field of the beacon frame, with the remainder appearing in the order that they appear in the list. Each bit shall be set to one if the GTS is a receive-only GTS or to zero if the GTS is a transmit-only GTS. GTS direction is defined relative to the direction of the data frame transmission by the device.

**5.2.2.1.5 GTS List field**

The size of the GTS List field is defined by the values specified in the GTS Specification field of the beacon frame and contains the list of GTS descriptors that represents the GTSs that are being maintained. The maximum number of GTS descriptors shall be limited to seven.

Each GTS descriptor shall be formatted as illustrated in Figure 44.



**Figure 44—Format of the GTS descriptor**

The Device Short Address field shall contain the short address of the device for which the GTS descriptor is intended.

The GTS Starting Slot field contains the superframe slot at which the GTS is to begin.

The GTS Length field contains the number of contiguous superframe slots over which the GTS is active.

**5.2.2.1.6 Pending Address Specification field**

The Pending Address Specification field shall be formatted as illustrated in Figure 45.



**Figure 45—Format of the Pending Address Specification field**

The Number of Short Addresses Pending field indicates the number of short addresses contained in the Address List field of the beacon frame.

The Number of Extended Addresses Pending field indicates the number of extended addresses contained in the Address List field of the beacon frame.

**5.2.2.1.7 Address List field**

The size of the Address List field is determined by the values specified in the Pending Address Specification field of the beacon frame and contains the list of addresses of the devices that currently have messages pending with the coordinator. The address list shall not contain the broadcast short address.

The maximum number of addresses pending shall be limited to seven and may comprise both short and extended addresses. All pending short addresses shall appear first in the list followed by any extended addresses. If the coordinator is able to store more than seven transactions, it shall indicate them in its beacon on a first-come-first-served basis, ensuring that the beacon frame contains at most seven addresses.

**5.2.2.1.8 Beacon Payload field**

The Beacon Payload field is an optional sequence of up to aMaxBeaconPayloadLength specified to be transmitted in the beacon frame by the next higher layer. The set of octets contained in macBeaconPayload shall be copied into this field.

**5.2.2.2 Data frame format**

The data frame shall be formatted as illustrated in Figure 46.



**Figure 46—Data frame format**

**5.2.2.2.1 Data frame MHR fields**

The Frame Type field shall contain the value that indicates a data frame, as shown in Table 2. The Security Enabled field shall be set to one if security is enabled and the Frame Version field is not zero. All other fields in the Frame Control field shall be set appropriately according to the intended use of the data frame.

The Sequence Number field shall contain the current value of *macDSN*.

The addressing fields shall comprise the destination address fields and the source address fields, dependent on the settings in the Frame Control field.

The Auxiliary Security Header field, if present, shall contain the information required for security processing of the data frame, as specified in TBD.

**5.2.2.2.2 Data Payload field**

The payload of a data frame shall contain the sequence of octets that the next higher layer has requested the MAC sublayer to transmit.

**5.2.2.3 Acknowledgment frame format**

The acknowledgment frame shall be formatted as illustrated in Figure 47.



**Figure 47—Acknowledgment frame format**

The Frame Type field shall contain the value that indicates an acknowledgment frame, as shown in Table 2. If the acknowledgment frame is being sent in response to a received data request command, the PD sending the acknowledgment frame shall determine whether it has data pending for the recipient. If the device can determine this before sending the acknowledgment frame, as described in TBD, it shall set the Frame Pending field according to whether there is pending data. Otherwise, the Frame Pending field shall be set to one. If the acknowledgment frame is being sent in response to either a data frame or another type of MAC command frame, the device shall set the Frame Pending field to zero. All other fields in the Frame Control field shall be set to zero and ignored on reception.

The Sequence Number field shall contain the value of the sequence number received in the frame for which the acknowledgment is to be sent.

**5.2.2.4 MAC command frame format**

The MAC command frame shall be formatted as illustrated in Figure 48.



**Figure 48—MAC command frame format**

**5.2.2.4.1 MAC command frame MHR fields**

The Frame Type field shall contain the value that indicates a MAC command frame, as shown in Table 2. If the frame is to be secured, the Security Enabled field shall be set to one and the frame secured according to the process described in TBD. Otherwise the Security Enabled field shall be set to zero. All other fields in the Frame Control field shall be set appropriately according to the intended use of the MAC command frame.

The Sequence Number field shall contain the current value of *macDSN*.

The addressing fields shall comprise the destination address fields and the source address fields, dependent on the settings in the Frame Control field.

The Auxiliary Security Header field, if present, shall contain the information required for security processing of the MAC command frame, as specified in TBD.

**5.2.2.4.2 Command Frame Identifier field**

The Command Frame Identifier field identifies the MAC command being used. Valid values of the Command Frame Identifier field are defined in Table 5.

**5.2.2.4.3 Command Payload field**

The Command Payload field contains the MAC command itself. The formats of the individual commands are described in TBD.

------------------------------------ End of Text --------------------------------------