IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)	
Title	**TG3 MAC Portland Ammendments Status**	
Date Submitted	[6 August, 2001]	
Source	[James P. K. Gilb] [Mobilian] [11031 Via Frontera, Suite C]	Voice: [858-451-2201] Fax: [858-451-3201] E-mail: [gilb@ieee.org]
Re:	[]	
Abstract	[This is a summary of the changes made to D05 to produce D06 based on the MAC ammendments in .]	
Purpose	[To record status of the MAC ammendments which were approved in Portland.]	
Notice	This document has been prepared to assist the IEEE P802.15. 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.	

1. Frame type/Command types

R. Gubbi Frame type and Command Types vs B. Shvodian Frame type table organization (221r2 items:. 42,43,63,187,188,189 ,190 ,191,193) and (114r6 item: 186)

Move these currently defined frame types into the command frame type structure:

PNC Selection Frame

- Alternate PNC Announcement Command
- Alternate PNC Pullout Command
- New PNC Announcement Command

Also

a) Association Request Frame Becomes Association Request Command
b) Association Response Frame Becomes Association Response Command
c) Disassociation Request Frame becomes Disassociation Request Command
d) Frame type bits used in Frame Control Field will now be 3 instead of 4.

Ed. action:

PNC selection now sub-clause 7.5.1, titles changed to reflect status now as commands. The last three frames are now 7.5.2-7.5.4 and the references to frames have been changed to commands.

Changed number of frame type bits to three, deleted numbering for old frames that are now commands, reserved frame types 011-110. This rippled into the frame header description where bit 7 is now reserved.

The new command types had their frame bodies modified to look like command frames.

Open actions:

Should we group bit 7 and 13 together (both reserved bits) in the frame contorl field? No, bit 7 becomes the Pad byte indication, a new indication later on.

Still need to number the command types in some sort of useful orderds. The table has been updated and numbers assigned, but they can be changed.

Also need to decide what to do with defining the AC policy, fragmentation, retry, delayed-ACK, etc. for each of the command frames.

2. More command types

Command Types 114r6 item 192:

- Split Probe Information command into Probe Request and Probe Response Commands.
- Split Device Information command into Device Information Request and Response

Ed. action:

Probe information is split. Do we delete the text regarding the information request field in the Probe response command? According to the text in the probe request command, this field is set to all zeros in the probe response mode.

Device information was already split in D05, so it remains the same. I did add the word command to end of the sub-clause titles (i.e. Device information request command).

3. Coordinator Challenge Frame (114r6 items 68,205, 206, 230)

Add the following text to d05 Clause 8.1.8,

"When a station joins a piconet, the coordinator shall compare the capabilities field of the new station to its own. If the PNC-Des-Mode bit is set in the new station and not in the current PNC, the old PNC shall perform coordinator handover if allowed by the TBD security policy. If the new station is more qualified to be the coordinator, the coordinator may perform coordinator handover if allowed by the TBD security policy. Handover shall happen within a TBD parameter duration."

Add MACPIBPNCDesMode to the MAC PIB.

Ed. action:

Text added to the end of 8.1.8, which needs some editorial work on its logical flow. MACPIBPNCDesMode was added to the MAC PIB as a system ammendement, but is undefined.

Open actions:

Define characteristics of MACPIBPNCDesMode and xref to the right place in layer managment from where it is discussed in clause 8

4. Coordinator Selection (114r6 Item 68)

Update selection table to look like the following:

Modified Table:

Order	Information	Note
1	Designated Mode Bit in Capability Field	Coordinator Designation is preferred
2	SEC bit	SEC=1 preferred
3	Battery/AC Power	AC Power preferred
4	PS bit	PS=1 preferred
5	MAX GTS Slots	Higher value preferred
6	Repeater Memory	Higher value preferred
7	Transmitter Power Level (PHY Dependant)	Higher value preferred
8	Max PHY Rate (PHY Dependant)	Higher value preferred
9	Device ID	Higher value preferred

Ed action:

Table updated as indicated above.

5. Various changes applied to D05

- Retain Frag/Defrag text in D05/Clause 8.5.
- Peer discovery added to d05/Clause 8.7. Supporting reasons listed in 271r1.
- Moved multi-rate usage table from 7.3.1 in d04 to clause 8.8 in d05. (per 271r1)
- Delayed ACK expedite request added to d05 with additional supplemental text provided in 271r1.

The additional text from 271r1 for the delayed ACK is listed below:

- When delayed-ack is used, the source DEV must be able to request the dest-DEV to expedite sending the accumulated delayed-ack
- A bit-11 in stream-ID field is used for this purpose in the stream transmission by the source-DEV
- Since the frame with this request could be lost in the channel, the bit is interpreted as “Send delayed-ack at your earliest convenience”
- If this request is correctly rxd, the dest-DEV attempts sending the delayed-ack before the end of NEXT super frame

Ed. action:

Above changes are already in D05. Additional text for delayed ACK has been added to 8.6.3, text is as follows:

When delayed-ACK is used, the source DEV may request that the destination DEV expedite sending the accumulated delayed-ACK. The source DEV shall set bit 11 to 1 in the stream-ID field, (xref here), in the stream transmission when it wants the destination DEV to expedite sending the accumulated delayed-ACK.. Since the frame with this request can be lost in the channel, the destination DEV may set this bit in more than one frame in the stream transmission. If this request is correctly received, the destination DEV shall attempt to send the delayed-ACK before the end of next super frame

Open actions:

Are the reasons for 8.7 listed in 271r1 supposed to be added to D06?

There is no definition of a delayed-ACK frame in the frame formats. Does this need to be added? No, this is really the retransmission request command.

Bit 11 of the stream ID field is not yet reserved in 7.2.1.4, it should be set aside to indicate expedite delayed-ACK. Yes, change 7.2.1.4 to indicate bit 11 is the expedite-ACK bit. Text was added to describe the new bit, the text is as follows:

“The delayed-ACK expedite field is used to request that the accumulated delayed-ACK’s be sent as soon as possible. This is described in more detail in 8.7.3.”

Also, for some reason, the bits in the figure in 7.2.1.4 are numbered from 15 to 0 rather than from 0 to 15, like the rest of the descriptions. I have changed it to be numbered from 0 to 15.

6. Pad byte indication

Recommend Pad byte indication bit in Frame Control. Supporting text in 271r1

Ed. action:

Make bit 7 (was assigned to frame type) to be the Pad byte indication in 7.2.1.1. Add sub-clause 7.2.1.1.4 that describes the characteristics of the bit based on the text in 271r1. The added text for the sub-clause is:

“7.2.1.1.4 Pad byte field

The pad byte field is one bit in length and shall be set to 1 in all data frames where the number of data octets is an odd number and the data payload has been padded by an extra byte to maintain word aligned frames. It shall be set to zero otherwise."

7. Priorities 114r6 items 170, 215

Are addressed by text in 271r1 and 802.1D. Consequently, the MAC Data Service and Priority Management clauses need to be updated with text from the aforementioned sources.

Document 271r1 has this to say:

- Define 8 priorities as in 802.1D. Use priority=0 for all non-data frames and priority=1 being reserved.
- In addition, add a bit to indicate stream type (Isoch or async) as part of Stream identification
- Add the above 4-bit field in the MAC header for traffic monitoring purpose at PNC: The stream index must be reduced to 12 bits and the remaining 4 bits must be used to indicate the 4-bit priority field
- PNC shall allocate channel time for all Isoch first and highest to lowest priority streams in that order.
- PNC shall indicate the Isoch allocation in CTA
- DEVs shall transmit Isoch streams at their allocated times only. Non-Isoch streams shall be transmitted in the order of their priority

Ed. action:

Changes are not well defined, will have to wait for D07

8. PNID 114r6 item 48

Add this text to 8.1.2 :

- "The seed for generating a randomized PNID shall be the 48 bit PNC device ID."

Ed. action:

Text added to 8.1.2.

Open actions:

Now we have defined a seed, but we have specifically not defined the process for generating the random PNID. The subclause doesn't make sense. Either we define the randomization process or don't define the seed, we can't let it stand as it reads now.

9. Implied Ack 114r6 item 194

114r6 Implied Ack item 194 is addressed by d05 with additional text below.

- "Responding DEV shall send only one frame for a received frame soliciting implied-ack."
- "Responding DEV can take any length of time within the current GTS without exceeding it."
- "Responding DEV can send imm-ack as response to an implied-ack solicitation."
- "Responding DEV shall send imm-ack if it does not know the end of current GTS."
- "Responding DEV shall make sure there is enough room in the current GTS for the im-ack, if required, for the frame sent as response to implied-ack solicitation."

Ed. action:

The following text was added to sub-clause 8.6.4

The responding DEV shall send only one frame in response to a received frame soliciting an implied-ACK. The responding DEV may take any length of time to respond to the request for an implied-ACK within the current GTS, without exceeding it. The responding DEV may send an Imm-ACK as a response to an implied-ACK solicitation. If the responding DEV does not know the end of current GTS, it shall send an Imm-ACK in response to an implied-ACK solicitation. The responding DEV shall make sure there is enough time remaining in the current GTS for the Imm-ACK, if required, for the frame sent as response to an implied-ACK solicitation.

Open actions:

This addition doesn't read very well when combined with the information in the preceeding paragraph. We need to redistribute the ideas into a few paragraphs in that sub-clause

10. Assoc/Disassoc 114r6 items (211,212).

Add Broadcasting DevInfo concepts to d05 as captured in 271r1 and 259r2.

From 271r1:

- PNC must be specified to broadcast the device-information (table) periodically (aBroadcastDevInfoDuration).
- This helps in reducing the delay in PNC-handover by letting all the PNC-capable DEVs to keep their local tables current.

From 259r2

Broadcast complete device information table after a station associates or disassociates.

Draft04, 7.5.7.2

> The coordinator shall broadcast the Device information table after a station associates or disassociates in order to inform all stations in the piconet.

Draft04, 8.1.4

> Add the following text to the top of page 89:
>
> The coordinator shall broadcast the Device information table after a station associates in order to inform all stations in the piconet.

Draft04, 8.1.5

> Add the following text to line 15 on page 89:
>
> The coordinator shall broadcast the Device information table after a station disassociates in order to inform all stations in the piconet.

Also, in Figure 33, Clause 7.5.10.1/d05 remove Requester Dev. ID field

Ed. actions:

Since we shall not require actions in two different locations in the standard, the requirement for broadcasting the Dev Info is consolidated into one sub-clause in the MAC functional description, with the following text:

8.1.9 Broadcasting DEV information

The PNC shall broadcast the device information table using the device information command after a DEV associates or disassociates in order to inform the other DEVS in the piconet. In addition, the PNC shall send the device information table for each of the associated DEVs at least once every aBroadcastDevInfoDuration via a device inormation command. This broadcasting of the device information table is intended to help in reducing the delay in a PNC-handover by enabling other PNC-capable DEVs to keep their local tables current

Requester Dev. ID field removed from appropriate figure.

11. StreamMgt 114r6 item 216

Add this text:

- "Reduce the stream index to 8 bits with the remaining 3 bits reserved. This results in simpler implementation based on global stream index that is allocated by PNC. An implementation based stream index that is unique for SA/DA pair results in more complex implementation.
- Add a Stream-index to ChnlTimeReq by replacing the reserved field in Fig.22, Clause 7.5.1.1; Add Stream-index to ChnlTimeAllocationBlock along with one reserved byte in figure 20 clause 7.4.9;
- Remove time slot duration from CTA block in Fig. 20, clause 7.4.9;
- Add ChnlTimeReq Block to Stream QoS parms in Stream Mgt . Cmnd in figure 42 Clause 7.5.12;
- Retain StreamID in Stream QoS parms.; Add descriptions for each of the "new" fields.

Ed. actions:

Stream index reduced from 11 bits to 8 bits in 7.2.1.4, last three bits are reserved, as indicated in the updated figure.

Stream index added to channel time request command and to the channel time allocation block. The numbering for the bytes in the CTA figure was changed from 12 to 6 to reflect the correct number.

Time slot duration was removed from the CTA block figure.

Channel time request block was already added in D05. The stream ID is retained. Descriptions for the new fields were added in D05.

12. CoordHandOvr (114r6 item 128)

Add these variables:

- minHandOvrTO(.25sec) and maxHandOvrTO(1.sec).
- Also change the CoordHandOvr timer resolution to 1Kus

Ed. actions:

Added the parametrs to the table at the end of the MAC functional description and the following sentence to the coordinator handover clause.

"The minimum handover timeout is aMinHandOvrTO and the maximum handover timeout is aMaxHandOvrTO."

13. MaxGTS Info Element (114r6 item 213)

Doc: 259r2 item #6 suggests replacing the reserved byte of the Max GTS info element with MaxProcessedCTAs. Also add indicated PIB values.

Managed Object	Data Type
MACPIBMaxAssignedCTAs	Integer
MACPIBMaxProcessedCTAs	Integer

Ed. actions:

Added the text from 259r2 with editorial changes (Bill, you shall not use must, use shall instead. You may use can in very limited situations, but generally you should use may.) The text added is:

"The max CTAs element, illustrated in Figure 18, contains two fields. The MaxAssignedCTAs field describes the maximum number of GTS slots that may be assigned to a DEV, where the DEV is either the source or destination, including group or multicast destinations. The MaxProcessedCTAs field specifies the maximum number of CTAs that the DEV is able to process. The coordinator shall not assign more than MaxAssignedCTAs slots to a DEV and they shall fall within the first MaxProcessedCTA slots. The coordinator may have more than MaxProcessedCTAs in a beacon, but the CTAs assigned to a DEV shall not exceed the first MaxProcessedCTAs for that particular DEV. If the coordinator is unable to meet the limitations of the DEV, the coordinator may reject additional channel time requests from the DEV."

Also added the PS element section that is referenced in the opening table, but not in the text. Added the Max CTAs element to the table. Added the MAC PIB elements to the MAC PIB characteristic group.

Open actions:

Review the new text for the Max CTAs.

Provide definitions for the new MAC PIB items

14. Channel Time Request good until changed.(221r2 Item 117 and 114r6 Item 217)

Add the text below to clause 8.2.4/d04

> "Channel time requests that are ACKed are valid until the next channel time request is made."

Add text to d05/8.2.3.2 to address What happens if the PNC allocates less channel time than was requested? Does it allocate more if it becomes available? Yes.

Ed. Action:

Added sentence to the end of the first paragraph of 8.2.3.2 (where 8.2.4 ended up)

Added the following sentence to the end of the last paragraph of 8.2.3.2:

"If the PNC allocates less time than requested, it shall allocate more time if it becomes available in the CFP."

15. TSF Elimination and Duration increment change (114r6 items: 166, 208, 209, 210)

Add or delete text to the d04 clauses referenced in doc 259r2 (text not repeated here).

Ed. actions:

Made changes according to 259r2 with one exception. The last sentence to be added to sub-clause 8.3.3, "Time zero is at the end of the transmission of hte beacon header" was not added since it is a second definition of the same requirement. Since the previous definition is only 4 or 5 sentences above this, even a cross reference looks silly..

Open actions.

Other places reference the reference time for the superframe, e.g. 8.2.3.2 Channel time allocation (CTA) and channel time usage. We need to check the rest of the MACFD to make sure all time zero references are removed.

16. CAP Back-Off Resolution (114r6 Items 146, 219)

Add the following sentence to section d04/8.2.3.1:

"The resolution of the backoff value shall be aBackoffSlot µs, where aBackOffSlot is a PHY dependant parameter."

Ed. actions:

Sentence added

Open actions:

Need to tell the PHY committee what the constraints of this number are so they can put a number in the PHY section. Then it needs to be made an xref to the location where it is defined.

17. FrameBody 114r6 item 228:

Add aMaxFrameSize parameter to d04/clauses 7.1.12 and 11.2.7. Indicate this parm is a Phy dependant parameter.

Ed. actions:

Added the parameter to the PHY clause. This number includes the frame body and FCS only, per the definition in the PHY. Added the following text to 7.2

The maximum size of a MAC frame, aMaxFrameSize, is is a PHY dependent parameter that includes the frame body and FCS, but not the PHY preamble, header, MAC header or HCS. For the 2.4 GHz PHY, this parameter is defined in 11.2.7.

Also changed the number 2032 in Fig. 3 to be aMaxFrameSize-4

Open actions:

This fields that are included in the maximum size of a MAC frame really needs to be defined in the frame formats section, instead of in the PHY clause.

18. Repeater 114r6 item 224

Add clarifying text to the Repeater Service MAC Functional Description Subclause describing the ACK policy required to support the repeater service.

Ed. actions:

None, the text to be added has not yet been defined.

Open actions:

Create text that can be approved to be added to the next draft.

19. Device Registration 114r6 item 225

Add this text to the Device Registration MAC Functional Description subclause

> PNID should always have the PNID value that appears in the Beacon.
>
> Open registration should be accomplished through a new open registration command (if needed) and not via a null PNID.

Ed. actions:

Changed the text regarding the PNID value to say “The PNC shall always use the PNID that appears in the beacon.”

However, adding the text for open registration creates confusion because the existing document indicates that registration is done via a null PNID. This text was not specified to be deleted.

Open actions:

Fix the paragraph in 8.1.7 to convey a single requirement.