**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | Resolution of CID 117, 621 and 622. | |
| Date Submitted | 12 September 2025 | |
| Source | Billy Verso (Qorvo),  Vinod Kristem (Apple),  Akbar Ghasemi (Apple) | billy dot verso at qorvo dot com |
| Re: | IEEE P802.15.4ab | |
| Abstract | Comment Resolutions for selected comments on the LB213 / P802.15.4ab D02. | |
| Purpose | This document provides text changes intended to be part of the final IEEE Std 802.15.4ab (amendment to IEEE Std 802.15.4), as part of resolving selected comments from the consolidated spreadsheet (DCN 15-25-0174) that have been assigned to the author to resolve. | |
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| Comments addressed here: |

[1 Comment Index #s 117, 621 and 622 2](#_Toc208591473)

1. **Comment Index #s 117, 621 and 622**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Ind** | **Pg** | **clause** | **line** | **Comment** | **Proposed Change** |
| 117 (Vinod) | 188 | 10.42.2 | 11 | There are some gaps in Sync length negotiation using TDMS/RDMS exchange. While the transmitter has all the information to determine the outcome of negotiation, there are scenarios where receiver cannot determine the result of negotiation, which could lead to potential interop issues. These are described in detail in DCN 15-24-0620-00-04ab. Potential solutions to address these gaps are also provided, with minimal changes to the spec. | Update the TDMS/RDMS exchanges, based on the proposal presented in DCN 15-24-0620-00-04ab, to fill the gaps. We will provide the CR text to address the gaps. |
| 621 (Billy) | 188 | 10.42.2 | 11 | The points raised in 15-24-0620-00-04ab should be addressed | With reference to the original author and intent of this clause, consider what changes are needed. |
| 622 (Billy) | 188 | 10.42.2 | 20 | "SYNC and SFD it wants" is a little unclear also "SYNC and SFD" are used for the "SYNC and SFD fragment" so it would be good to not says "SYNC and SFD" anywhere else except when talking about the SYNC and SDF fragment. | change to say "and the SYNC length(s) it requires for those modulation rates and the and SFD it requires." |

**Discussion:**

DCN 15-24-0620-00 raised several issues with the Dynamic Data Mode SYNC Length Negotiation that is specified in clause 10.42.2 of P802.15.4ab (draft D02).

DCN 15-24-0311-00 reviewed the Dynamic Data Mode SYNC Length Negotiation and the issues raised in 620r0 and proposed several updates to the draft to clarify the negotiation and address the issues raised but did not include the negotiation status signalling proposed in 620r0.

This submission combines the changes proposed in 311r0 with additional changes to allow for optional inclusion of a negotiation status field/message in the negotiation.

The combined set of changes are presented in the Disposition Detail below in the form of updates to the P802.15.4ab D02 draft text.

These changes together serve to resolve comment indexes: 117, 621 and 622

**Proposed Disposition:** Revised.

**Disposition Detail:** The required changes to the draft are shown on the following pages.

*Editor, please change D02 clauses 10.42.2 and 10.42 3 as shown below:*

**10.42.2 SYNC length negotiation for HRP-EMDEV dynamic data mode**

The HRP EMDEV has a dynamic data mode, defined in 16.1, where the transmitter data rate and coding may be varied from packet to packet, depending on channel characteristics, the needs of the application and the capabilities of the transmitting and receiving devices, and, the ideal SYNC length choice in this mode also depends on the set of data rates and encodings being used and the capabilities of the receiver.

The Dynamic Data Mode Negotiation IE (DDMN IE), specified in 10.42.3.1, facilitates the negotiation of SYNC length, SFD length, supported data rates, and coding.

The general procedure, illustrated in Figure 190, is for one device to indicate the data rates and coding it wishes to use in its transmitter and for the remote device to indicate what it can handle in its receiver, ~~and the SYNC and SFD it wants~~ and the SYNC length(s) it requires for those modulation rates and the SFD it requires, and, depending on the application needs, a final negotiation result feedback indication can be sent from the transmitter confirming its support for the resulting packet formats at each data rate.

For a pair of devices, A and B, wanting to do this negotiation, device A begins by sending a DDMN IE with the Transmitter Data Mode Specifier (TDMS) field. Then in response, device B may send a DDMN IE with a Receiver Data Mode Specifier (RDMS) field and include a TDMS field covering its transmission needs. ~~Device A then ends the negotiation exchange by sending a final DDMN IE with an RDMS field.~~ The negotiation might end here with device A sending a DDMN IE with an RDMS field and optionally including a Negotiation Result Feedback (NRF) field, or there may be an additional DDMN IE with NRF field sent from device B to complete the negotiation, (shown by the dashed arrow in Figure 190). There are fields in TDMS and RDMS to control whether the fourth message with the NRF is sent.

Subsequent to the negotiation, it is assumed that the devices will use the UWB packet format with the PHR defined in 16.2.7.4 and with parameters set as per the negotiation. Any decision to do otherwise would need to be coordinated between the participating devices. The mechanisms to this are beyond the scope of this standard and are left to the higher layer. It is also left to the next higher layer to decide who goes first and when to engage in this negotiation or any subsequent re-negotiation if the application needs change, and what to do if the negotiation result feedback indicates none of the data rates are supported.



**Figure 190—Message sequence chart for SYNC PSR negotiation**

Since the RDMS may indicate different SYNC PSR values for different data rates, the specified operation with respect to this is as follows: Subsequent to a TDMS/RDMS exchange, the transmitter shall use those payload data rates and coding methods that the receiver has indicated it can support, and the transmitter shall use the SFD requested by the receiver, and a SYNC length from Table 58 that is no shorter than that requested by the receiver for the selected payload data rate and no longer than the largest SYNC indicated in the Receiver Data Mode Specifier (RDMS) for any data rate, except in the case where the transmitter cannot support sending an optional SYNC length in which case it shall use the next higher mandatory SYNC length, or otherwise the highest mandatory SYNC length.

The TDMS field shall include at least one mandatory data rate, and it is recommended that at least two mandatory data rates are included.

The NRF information, if provided, gives a final status feedback confirmation of the data rates that the transmitter can support considering the SFD and the SYNC requirements indicated by the receiver in the RDMS. Some receivers could benefit by knowing the final set of data rates to expect in dynamic data mode. If the negotiation rules result a combination of SYNC and SFD lengths mandated by Table 84 for a requested data rate, then the transmitter shall indicate support for that rate in the NRF if provided.

**10.42.3 Nested IEs for parameter negotiation**

**10.42.3.1 Dynamic Data Mode Negotiation IE (DDMN IE)**

The DDMN IE is used to negotiate data modulation and coding, as described in 10.42.2.

The Content field of the DDMN IE shall be formatted as shown in Figure 191.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bits: 0** | **1** | **2** | **~~2~~ 3–7** | **Octets: 0/2** | **0/4** |
| Transmit Specifier Present | Receiver Specifier Present | Negotiation Result Feedback Valid | ~~Reserved~~  Negotiation Result Feedback | Transmitter Data Modes Specifier | Receiver Data Mode Specifier |

**Figure 191—DDMN IE Content field format**

The Transmit Specifier Present field when one indicates that the Transmitter Data Modes Specifier field is present or when zero that it is not present.

The Receiver Specifier Present field when one indicates that the Receiver Data Modes Specifier field is present or when zero that it is not present.

The Negotiation Result Feedback Valid field when one indicates that the Negotiation Result Feedback field value is valid or when zero that it is not valid.

The Negotiation Result Feedback (NRF) field is formatted as per Figure X, with one bit per data rate. This may be used after the exchange of TDMS and RDMS values to give a final status feedback confirmation of whether the transmitter can support the specified data rate with the SFD and the SYNC requirements indicated by the receiver in the RDMS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bits: 0** | **1** | **2** | **3** | **4** |
| NRF\_1p95 | NRF\_7p8 | NRF\_31p2 | NRF\_62p4 | NRF\_124p8 |

**Figure X—Negotiation Result Feedback (NRF) field of the DDMN IE**

*[Editor to insert new figure number and update the* ‘*Figure X’ reference in the paragraph above.]*

The NRF\_1p95, NRF\_7p8, NRF\_31p2, NRF\_62p4 and NRF\_124p8 single bit fields indicate the negotiation result for each data rate 1.95 Mb/s, 7.8 Mb/s, 31.2 Mb/s, 62.4 Mb/s and 124.8 Mb/s respectively. When an NRF bit is one this indicates the transmitter can support the corresponding data rate with the requested SFD length and the SYNC length determined as described in 10.42.2, or when an NRF bit is zero that this data rate cannot be supported or was not part of the negotiation, i.e. was not proposed by the transmitter in its TDMS.

The Transmitter Data Mode Specifier (TDMS) field is formatted as per Figure 192. This is used to indicate the desired set of data rates for transmissions and whether LPDC is desired with these or not, and whether the device wishes to send an NRF report confirming its transmitter support of the resulting packet formats at each rate

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bits: 0–1** | **2–3** | **4-5** | **6–7** | **8–9** | **10– ~~15~~ 13** | **14** | **15** |
| TRCS\_1p95 | TRCS\_7p8 | TRCS\_31p2 | TRCS\_62p4 | TRCS\_124p8 | reserved | WSNRF | SFD32 Support |

**Figure 192—Transmitter Data Modes Specifier field of the DDMN IE**

The TRCS\_1p95, TRCS\_7p8, TRCS\_31p2, TRCS\_62p4 and TRCS\_124p8 fields are each a 2-bit Transmitter Rate/Code Specifier (TRCS), as formatted in Figure 193, one for each of the HRP EMDEV dynamic data mode data rates 1.95 Mb/s, 7.8 Mb/s, 31.2 Mb/s, 62.4 Mb/s and 124.8 Mb/s respectively.

|  |  |
| --- | --- |
| **Bits: 0** | **1** |
| Rate Request | LDPC Request |

**Figure 193—Encoding of TRCS subfields of the DDMN IE**

The Rate Request field when one indicates that the device transmitter supports and wishes to use the corresponding dynamic data rate, or when zero that it is not going to use the rate.

The LDPC Request field when one indicates that the device transmitter wishes to use LDPC coding with the corresponding dynamic data rate, or when zero that it is not going to use LDPC with for this rate.

The WSNRF field when one indicates that the device transmitter is willing / wishes to send an NRF report indicating the final status of the negotiation.

The WSNRF field shall be set to one if the sender’s transmitter is unable to support every combination of mandatory preamble length and mandatory SFD length. The responding device can then choose to request the NRF depending on whether what it proposes in the RDMS will result in SYNC and SFD lengths that are in the subset mandated in Table 84.

NOTE––WSNRF not being set means the sender’s transmitter can support mandatory preamble lengths and mandatory SFD lengths in any combination, for the requested data rates. In this case the NRF might be considered unnecessary, but it can still be requested by setting the NRF Request field in the RDMS to one.

The SFD32 Support field when one indicates that the device transmitter supports the optional length 32 SFD defined in Table 16-11, or when zero that this SFD is not supported so the receiver device knows not to ask for it.

The Receiver Data Mode Specifier (RDMS) field is formatted as per Figure 194. This is used to indicate the receiver supported data rates and coding along with its SYNC length and SFD requirements, and to request negotiation result feedback from the remote transmitter.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bits: 0–4** | **5–9** | **10-14** | **15–19** | **20–24** | **25–26** | **27** | **~~27~~ 28–31** |
| RRCS\_1p95 | RRCS\_7p8 | RRCS\_31p2 | RRCS\_62p4 | RRCS\_124p8 | RSFDS | NRF Request | reserved |

**Figure 194—Receiver Data Modes Specifier field of the DDMN IE**

The RRCS\_1p95, RRCS\_7p8, RRCS\_31p2, RRCS\_62p4 and RRCS\_124p8 fields are each a 5-bit Receiver Rate/Code/Sync specifier (RRCS), as formatted in Figure 195, one for each of the HRP-EMDEV dynamic data mode data rates 1.95 Mb/s, 7.8 Mb/s, 31.2 Mb/s, 62.4 Mb/s and 124.8 Mb/s respectively.

|  |  |
| --- | --- |
| **Bits: 0–3** | **4** |
| SYNC Support | LDPC Support |

**Figure 195—Encoding of RRCS subfields of the DDMN IE**

The SYNC Support field encodes whether the corresponding dynamic data rate, if proposed by the remote transmitter, is supported by the device receiver, and if supported what SYNC length is required for it. The permitted values and their meanings are specified in Table 58. The transmit device should ignore RDMS SYNC length values for any rates it did not propose in its TDMS.

**Table 58—Sync Support Field values**

|  |  |
| --- | --- |
| **SYNC Support field value** | **Meaning** |
| 0 | ~~Data rate not supported or not to be used~~  This data rate is not supported or the TDMS did not propose its use. |
| 1 | PSR = 16 |
| 2 | PSR = 24 |
| 3 | PSR = 32 |
| 4 | PSR = 48 |
| 5 | PSR = 64 |
| 6 | PSR = 96 |
| 7 | PSR = 128 |
| 8 | PSR = 192 |
| 9 | PSR = 256 |
| 10 to 15 | Reserved |

The LDPC Support field when set to one indicates that the device receiver, can support LDPC for the associated data rate, or when zero that LDPC is not supported/allowed for this data rate. Note that if the receiver supports LDPC on a data rate, the transmitting device when sending at that rate can choose per frame whether to use LDPC or not.

The RSFDS field is the receiver SFD specifier indicating the SFD that the device receiver is expecting to be used for all supported data rates. This is encoded as per Table 59. The length 32 SFD should not be chosen here unless the remote device has indicated support for this in its TDMS.

**Table 59—RSFDS field values**

| **RSFDS field value** | **SFD # selected (ref. Table 16-11)** | **SFD Length** |
| --- | --- | --- |
| 0 | 1 | 4 |
| 1 | 2 | 8 |
| 2 | 3 | 16 |
| 3 | 4 | 32 |

The NRF Request field when set to one is requesting that the remote device provides feedback of the negotiation results to confirm whether the transmitter can support the specified data rate with the SFD and the SYNC requirements (determined as described in 10.42.2). The NRF Request field shall be set to one if any of SYNC and SFD lengths proposed in the RDMS would result in combinations that are not mandatory in Table 84. When the RDMS with NRF Request field value of one is in the third message (i.e., shown Figure 190) this implies that a fourth message (shown dashed in Figure 190) is required to complete the negotiation. When the NRF Request field is set to zero it means that this feedback is not required, i.e., that the fourth message, shown dashed in Figure 190, need not be sent.

*Editor, in clause 16.1 please add sentence shown below (on p213 paragraph lines 24 to 28):  
(This is something already implied but worth stating explicitly for clarity.)*

The HRP UWB PHY includes an optional dynamic data mode with a special PHR arrangement, described in 16.2.7.4, allowing dynamic selection between modulation rates and coding schemes. A device supporting this is termed an HRP low-latency data device, (HRP-LLDDEV). The HRP-LLDDEV shall support the HRP-EMDEV mandatory features, and the mandatory features of the HRP-LLDDEV specified in this clause, and elsewhere in this standard. The HRP-LLDDEV transmitter shall support the SYNC, SFD and data rate combinations of Table 84 with the PHR described in 16.2.7.4. (Note that those rows with non-zero number of STS Segments can be ignored for this purpose).

*<END>*