**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **LB207/D01 comment resolution -- Miscellaneous -- CIDs 23, 24, 30, 32, 33, 34, 103, 111, 149, 400, 408, 411, 439, 440, 476, 539, 1021, 1022, 1036, 1037, 1068, 1119, 1120, 1131, 1132, 1133, 1134, 1137, 1161, 1166, 1176, 1177, 1199, 1200, 1221, 1240, 1386** |
| Date Submitted | Jan 12, 2024 |
| Sources | Alex Krebs (Apple)  krebs @ apple.com |
| Re: |  |
| Abstract |  |
| Purpose | To propose resolution for MMS related comments for “P802.15.4ab™/D (pre-ballot) C Draft Standard for Low-Rate Wireless Networks”. |
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Version history:

r3:

- CID 23 revised with proposal from Billy & Xiliang to define RIF MARKERs for all RIFs.

- CID 1166 changed to rejected after strawpoll, separating CID 149 (Accepted)

- CID 1021 proposed resolution changed following discussion on Jan 14, 2025

- CID 1120, 1131, 1132, 1133 removed the RangingConfigurationDescriptor and follow the proposal in DCN 15-25-0008 instead

- CID 1134, 1240 changed from rejected to revised, following the proposal in DCN 15-25-0008

- CID 45 added to same solution as CID 30

- CID 214 and 75 added

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# CID 1036 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1036 | 24 | 8.3.4 | 13 | The CompactMessageContent parameter is very loose in defining as set of octets what the content that clause 10.38.9 is defining in great detail. What is the role of the MAC here? Does it just send these octets blindly? | Separate CompactMessageContent into a set of parameters needed to allow the MAC to construct the appropriate message (from 10.38.9), and add a detailed description of what the MAC does with each of the parameters supplied in this primitive. |

Discussion: Let's just refer to 10.38.9 for the details, instead of spilling it out here again. Let's keep in mind this is just a "logical interface". (Note that CompactMessageControl has been renamed to CompactMessageControlVersion in DCN 687.)

Proposed resolution: Revised.

Disposition detail: Add the following sentence after p.24 l.14:

Note that the CompactMessageContent may contain different subfields that may require different handling on the MAC layer depending on the values of CompactFrameID and CompactMessageControlVersion. See 10.38.9 for details.

# CID 23 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 23 | 25 | 8.3.6 | 13 | In the rangingReportDescriptor introduced in the 802.15.4me, clarify the fields description when MMS fragment report | When RSF: - TxCounter: RMarker at the end of the fragment - RxCounter: RMarker at the end of the fragment  When RIF: - TxS0RangingCounter:  - TxS1RangingCounter: - RxS0RangingCounter: - RxS1RangingCounter: |

Discussion: For RSFs there is no need to define new TxCounter/RxCounter, since the existing

A close-up of a number

Description automatically generated

reference the RMARKER independent of the various packet types in 15.4-2024 already. For MMS packets the RMARKER positions are currently defined on p. 192, therefore no change to the draft needed in that respect. For additional markers for the RIF fragments , as group discussed to generate create new parameters for RIF MARKERs (up to 16 for Tx/Rx each).

Proposed resolution: Revised

Disposition detail: On page 140 [15.4-2024] add the following rows to Table 8-28:

|  |  |  |  |
| --- | --- | --- | --- |
| TxRif1MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the first RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif2MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the second RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif3MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 3rd RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif4MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 4th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif5MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 5th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif6MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 6th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif7MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 7th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif8MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 8th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif1MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the first RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif2MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the second RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif3MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 3rd RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif4MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 4th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif5MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 5th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif6MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 6th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif7MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 7th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| TxRif8MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 8th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif1MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the first RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif2MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the second RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif3MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 3rd RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif4MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 4th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif5MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 5th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif6MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 6th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif7MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 7th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif8MarkerStart | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the first pulse of the 8th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif1MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the first RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif2MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the second RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif3MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 3rd RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif4MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 4th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif5MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 5th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif6MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 6th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif7MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 7th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |
| RxRif8MarkerEnd | Unsigned  Integer | 0x00000000–0xffffffff | A count of the time units corresponding to the peak of the last pulse of the 8th RIF in a MMS packet at the antenna with respect to  the transmission of a ranging packet. The  units of time are specified in 10.29.1.4. This  value is invalid if the RIF was not  sent. |

# CID 24 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 24 | 25 | 8.3.6 | 13 | In the rangingReportDescriptor introduced in the 802.15.4me, add the fields for MMS fragment report | Field proposal: - isMmsFrag - MmsFragId - MmsFragType (RIF / RSF) |

Discussion: Following the proposed change for CID 23, the ranging markers are all individually reported and there is no technical benefit of reporting more fragment values. Note that the legacy RangingReportDescriptor does not report the SP0/1/2/3 packet type either from which the RMARKER and SRMARKERs are recorded.

Proposed resolution: Rejected.

Disposition detail: Unclear what would be gained, would deviate from base standard treatment.

# CID 103, 1037 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Rojan Chitrakar | 103 | 25 | 8.3.6 | 19 | MCPS-DATA.indication should include the Compact frame contents that are supposed to be passed up to higher layers, e.g.: passthrough data, Reply Time, Round-Trip Time etc. In fact, the entire Message Content field could be passed as done in the data.request. | Add the Compact frame contents that are supposed to be passed up to higher layers in the MCPS-DATA.indication |
| Billy Verso | 1037 | 25 | 8.3.4 | 26 | This MCPS-DATA.indication primitive seems to be missing parameters to deliver the compact frame content which is presumably required. (I note here also that having to interact with a layer above is a reason to rationalise the compact messages to have much fewer types and options, with more logical presence bits rather than an amorphous format controlled by arbitrary Message Control values.) | Add parameters to MCPS-DATA.indication to allow the MAC to deliver whatever compact frame content is needed to the upper layer. Otherwise if the MAC is autonomously doing things in response to compact frame reception, we probably need some new indication and response primitives to allow the upper layer to be informed and control/authorise those actions, and/or, PIB attributes to configure those items of autonomous behaviour where there are optional or variable behaviours needed. |

Discussion: Agreed. We already did the same thing for the MCPS-DATA.request, so we only have to follow the same procedures here for the MCPS-DATA.indication.

Proposed resolution: Revised.

Disposition detail:

Add "CompactFrameDescriptor" to the MCPS-DATA.indication on p.25 l.17.

Add the following text after p.25 l.25:

If the received packet contains a Compact frame, then the CompactFrameDescriptor as defined in Table 2 conveys the Compact frame's header and content information. For Compact frames, if the SrcAddrMode and DstAddrMode is COMPACT, then depending on the CompactFrameID conveyed in the CompactFrameDescriptor either the SrcAddr or DstAddr contain the IRK that resulted from successful resolution of the RPA Hash and RPA Prand values received in the Compact frame header.

# CID 1068 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1068 | 42 | 10.32.2 | 9 | The definition of Ranging Slot based on RFRAME needs to be updated to include a note that MMS packet (which is also an RFRAME ?) may span multiple such ranging slots. And given that ranging slots are also used for non-RFRAME frames, like ranging control frames, reporting frames etc, should include their needs in the slot sizing. | A better definition might be that the ranging slot size is generally chosen to be big enough to cater for the messages used in the ranging protocol, and allowing for processing between transmissions and receptions. Add something about the UWB MMS packet typically taking multiple slots, (rather than defining a slot big enough for the 16 ms UWB MMS RFRAME). Could suggest that a slot size of 1 ms is a good choice for UWB given that regulatory power limits are typically expressed as the mean power in a 1 ms interval. |

Discussion: Makes sense in general. Line 14,15 are already generously extending the applicability of ranging slots:



To be thorough we can extend on this for MMS. Keep in mind though that the 1ms regulatory constraint only impacts UWB, but not NB transmissions.

Proposed resolution: Revised.

Disposition detail: Change text line 14, 15 to:

Ranging slots are used for RFRAMEs, ranging control frames and other packets, e.g., sensing packets, data packets, etc. Ranging slots are typically of but not restricted to a duration 1 millisecond to allow the transmitter to take full advantage of the maximum allowed output power per UWB packet under regulatory constraints. For NBA-UWB MMS operation it may be advantageous for the transmitter to also use multiple consecutive ranging slots for the transmission of e.g. a NB control or data packet longer than 1ms. On the other hand for sensing packets it may be advantageous for the transmitter to transmit in ranging slots shorter than 1ms to allow for faster switching between sensing channels.

# CID 30, 45 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 30 | 55 | 10.38.1 | 19 | "For the NBA UWB MMS case, of Figure 23, values of 1.5 ms and 2 ms shall be supported for this time interval." it could be interesting that the responder starts to send the first fragment. Then the values of A can be 1 ms and 2.5 ms | "For the NBA UWB MMS case, of Figure 23, values of 1.5 ms and 2 ms shall be supported for this time interval. Values 1 ms and 2.5 ms may also be supported for this time interval" |
| Mickael Maman | 45 | 69 | 10.38.5 | 16 | in a particular case, the responder could send the first fragment | In the ranging phase, the responder may also transmit phyUwbMmsRsfNumberFrags RSF fragments starting its first fragment at the start of the ranging phase and the initiator may start transmitting a first RSF fragment at 600 RSTU into the ranging phase. For the sake of simplicity, in this standard the initiator always start to send the first fragment but the switch is also possible. |

Discussion: Wrt #30, In general, all values MAY be supported unless explicitly forbidden somewhere. Therefore the proposed change would be editorial. What the commenter wants to suggest eventually is to mandate or recommend support. Suggestion is to have the commenter to revise his proposal. Note that the intented use for the proposed values 1ms for the responder and 2.5ms for the initiator would be incompatible with the Reply-Time and Round-Trip-Time reports sent by the initiator and responder and the commenter would need to add additional messages or clarifications, too. #45 is asking for the same thing in reference to the defined interleaved MMS sequences. Same argument holds as for #30.

Proposed resolution: Rejected

Disposition detail: Proposed change incompatible with compact frame reports.

# CID 1386 (Accepted)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Alex Krebs | 1386 | 55 | 10.38.1 | 19 | Unnecessary for intiators to support 1.5ms and responders to support 2ms. | Change  values of 1.5 ms and 2 ms shall be supported for this time interval.  to  values of 1.5 ms and 2 ms shall be supported for this time interval by responder and initiator, respectively. |

Discussion: This is removing the ambiguity that the initiator is unnecessarily mandated to support 1.5ms and the responder is unnecessarily mandated to support 2ms. See also CID 30.

Proposed resolution: Revise (DD do as discussed)

Disposition detail: n/a

# CID 32 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 32 | 55 | 10.38.1 | 25 | Clarify that NB packet and UWB Packet are compact frame packet | Change the figure with NB compact frame and UWB compact frame |

Discussion: Good idea to clarify.

Proposed resolution: Revised.

Disposition detail: Add the following sentence at the end of p.55 l.21:

Both control packets, NB Packet in Figure 23 and UWB Packet in Figure 24, carry Compact frames according to Table 1.

# CID 33 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 33 | 56 | 10.38.3 | 22 | Clarify that MMS initialization and setup is using only NB OQPSK | update title |

Discussion: The title of this chapter was originally "NBA-UWB MMS initialization and setup", but the group decided to make it more generic to include UWB driven MMS, too.

Proposed resolution: Rejected.

Disposition detail: Group prefers generic UWB MMS text.

# CID 1119 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1119 | 56 | 10.38.3.1 | 28 | "a pair of initiator and responder devices" perhaps a little unclear. | Change to: "a pair devices, i.e., an initiator and a responder," |

Discussion: Agree, but proposed change sounds wrong.

Proposed resolution: Revised.

Disposition detail: Change text line 28 to:

To start a UWB MMS ranging session, initiator and responder may engage in an initialization and setup phase to negotiate a ranging configuration different from the default set of parameters.

# CID 34 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Mickael Maman | 34 | 57 | 10.38.3.2 | 11 | define the role of advertiser and advertising devices. Currently only the initiation can be the advertiser and send an Advertising Poll compact frame. | The advertiser (initiator or responder) may send Advertising Poll Compact frames opportunistically at times and intervals at its discretion as deemed suitable for the higher layer functionality to be supported. Similarly, the advertising (responder or initiator) may opportunistically listen for incoming Advertising Poll Compact frames. For the sake of simplicity, we will consider the initiator as the advertiser and the responder as the advertising. The reverse is also possible. |

Discussion: In general the higher layer can generate arbitrary content and call the MCPS-DATA.request primitive with the CompactFrameDescriptor and Msdu to have it sent out. The initialization procedure defined on p.57 and following is very specific though about the ADV-POLL, ADV-RESP, SOR packet sequence, where the SOR packet content is the result of the decision authority of the initiator, eventually overriding proposed values in ADV-RESP from the responder. Simply suggesting the responder could sent the ADV-POLL packet would be insufficient and the one who intends to say so should then define the procedure(s) on how the session is finally initialized. E.g. is the intent to have the SOR still be sent by the initiator? If yes, how does the initiator know the desired/supported configuration from the responder. If no, how does the responder initialize a ranging session via SOR. Would the latter imply that the responder tasks the initiator to send a POLL at a specific time offset? All this should be defined in the comment resolution proposal.

Proposed resolution: Rejected.

Disposition detail: Proposed change is incomplete and would create inconsistencies if applied.

# CID 408 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Tero Kivinen | 408 | 58 | 10.38.3.2 | 11 | The SOR is not defined as acronym. Either spell it out or add it to acronyms. | The figures use short versions of the actual frame names, so perhaps just add legend to the figure that expands the names of frames from the shorthand version ("ADV POLL") to full name ("Advetrising Poll Compact Frame"). I do not know what the POLL and REPORT frames are supposed to be as there are multiple possible frames they could match. |

Discussion: A generic solution to fix all diagrams by introducing an abbreviation column in Table 1 had been previously suggested in 15-24-569r1 for a similar comment #432, but not agreed upon by the group. Instead the suggestion was made to add descriptive text to the figure's caption.

Proposed resolution: Revised.

Disposition detail: Change text line 12 to:

**Figure 26—Example NBA UWB MMS session initialization with Adverting Poll (ADV POLL) packets, Advertising Response (ADV RESP) packets, a Start of Ranging (SOR) packet, a One-to-one Poll (POLL) packet, a One-to-one Response (RESP) packet, and a One-to-one Initiator Report (REPORT) packet and a One-to-one Responder Report (REPORT) packet.**

# CID 1120, 1131, 1132, 1133 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1131 | 58 | 10.38.3.2 | 31 | it does not matter what is communicated via OOB, it is the values configured into appropriate PIB configurations that "shall" be used, e.g. phyCurrentChannelInfo, etc | Need to figure out the architecture of layering and what does what, and ensure that PHY, MAC, and upper layer roles are understood and specified properly. |
| Billy Verso | 1132 | 58 | 10.38.3.2 | 31 | fields don't have default values, it should be the values configured into appropriate PIB configurations that "shall" be used, e.g. phyCurrentChannelInfo, etc | See my other comments on same line number. |
| Billy Verso | 1133 | 58 | 10.38.3.2 | 31 | Logically, (to me at least), the compact frames exchanged are asking for particular configurations to be used, but it is the receiving control layer (above the MAC) that is deciding the validity of this and configuring the parameters in the PIB and commanding subsequent UWB MMS ranging packet transmission and reception, using MCPS-DATA.request. | Rework the text accordingly. Essentially to say that these SOR frames may specify PHY and MAC parameter, as may the ADV frames, and that the higher layer is responsible for configuring the phyCurrentChannelInfo and other attributes appropriately for the ranging phase. (Suggest to look at the parameters in these messages to see which primitive parameter or PIB attribute is set as a result, and figure out are we missing any controls.) |
| Billy Verso | 1120 | 56 | 10.38.3.1 | 31 | Given that the messages being sent for the initialisation and ranging phases are sent using MCPS-DATA.request and not autonomously by the MAC. The MAC is not really aware of the MMS ranging phase. Perhaps therefore we could just have generic attributes which are set by next higher layer according to the phase it is in, e.g. for channel selection just use the phyCurrentChannelInfo attribute. | Consider removing the attributes, or, perhaps (a bit contrived) there could be a Set-MMS-Ranging-Phase primitive that copies the phase specific configurations to the generic configurations. Developing message sequence charts showing next higher layer interactions through the MMS ranging phases may help in clarifying what is actually needed by way of MAC & PHY configurations, and what is really in the domain of the next higher layer. |

Discussion: Agree with the comments. We can simplify the text significantly by simply saying that the next higher layer sets PIB config. In addition to the MCPS-DATA.request for the initiator, as mentioned in #1133, we will need to add the same PIB attributes to the MCPS-DATA.indication for the responder. Note also that the text wrt CID 1131 appears twice, also on p.57.

Proposed resolution: Revised.

Disposition detail: Change p.57 l.20 to 28 to:

If the initiator intends to proceed to the control phase, the Message Control field of the Start of Ranging

Compact frame shall be set to 0x00 or 0x10 (with value of the status field set as SUCCESS). If a responder

receives a Start of Ranging Compact frame with the Message Control field equal to 0x10 and the value of

the status field is set as SUCCESS the values of the NB Channel Map field, Management PHY Configuration

field, Management MAC Configuration field, Ranging PHY Configuration field and Ranging MAC

Configuration field shall be passed to the higher layer. If any of the fields is present in both the Advertising Response and the Start of Ranging packet the latter value shall be passed to the higher layer. Unless further altered by OOB methods the higher layer is expected to employ the provided ranging configuration values to start the ranging session.

Apply the same change on p.58 l.23 to 31:

If the initiator intends to proceed to the control phase, the Message Control field of the Start of Ranging

Compact frame shall be set to 0x00 or 0x10 (with value of the status field set as SUCCESS). If a responder

receives a Start of Ranging Compact frame with the Message Control field equal to 0x10 and the value of

the status field is set as SUCCESS the values of the NB Channel Map field, Management PHY Configuration

field, Management MAC Configuration field, Ranging PHY Configuration field and Ranging MAC

Configuration field shall be passed to the higher layer. If any of the fields is present in both the Advertising Response and the Start of Ranging packet the latter value shall be passed to the higher layer. Unless further altered by OOB methods the higher layer is expected to employ the provided ranging configuration values to start the ranging session.



# CID 400 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Tero Kivinen | 400 | 57 | 10.38.3.2 | 18 | How does the responder indicate it wants to receive Advertising Poll Compact Frame? The Advertising Poll Compact frame does not contain destination address, that would allow responder to recognize that it wants to receive that specific frame. It contains RPA prand and hash which means the for every single frame received the responder need to loop through every single IRK it has and check the hash to see whether it recognizes the sender of the frame, and even if it recognizes the frame, that does not mean it comes from the original sender, as it can also be replay frame. | There is no interface to specify that responder wants to listen Advertising Poll Compact Frames. There is no way of using hardware filtering to filter incoming frames. There is no replay protection to protect against replayed frames. Remove the compact frames and use the normal frames which do offer security, privacy, replay protection etc all features required by modern systems. |

Discussion: The advertising poll frame has Frame ID value 0. If the responder wants to receive ADV-POLL frames it only needs to look at the first byte of the PSDU, check for Compact frame type in FrameControl and value 0 in Compact Frame ID.

Proposed resolution: Rejected.

Disposition detail: Question answered, unsubstantiated claims.

# CID 411 (Reassigned)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Tero Kivinen | 411 | 59 | 10.38.3.2 | 12 | Message sequence chart is missing. | Add message sequence chart for initialization when coordination is active. |

Discussion: As discussed, this comment could be merged with the resolution of #417 in DCN 15-25-0008. Proposal is to reassign this to Mickael Maman.

Proposed resolution: n/a

Disposition detail: n/a

# CID 439, 440 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Tero Kivinen | 439 | 66 | 10.38.3.7 | 6 | How is this ranging block structure set up? | Add message sequence chart showing what MLME calls are needed to set up the ranging block structure. |
| Tero Kivinen | 440 | 66 | 10.38.3.8 | 27 | How is this done inside the MAC, i.e., how does the upper layer configure this information. | Provide message sequence chart that shows how this indication procedure is done. |

Discussion: No changes in 4ab, ranging block structure is already in base standard.

Proposed resolution: Rejected.

Disposition detail: Base standard specficies this behaviour.

# CID 111 (Accepted)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Rojan Chitrakar | 111 | 59 | 10.38.3.4 | 18 | "The initiator may set the value of the field Time\_Offset …" The sentence assumes that the SOR carries the optional Starting Block Index field; this should be made explicit. Also "may" should be "shall" here. | Change to: "If the Starting Block Index field is present in the Start of Ranging Compact frame, initiator shall set the value of the field Time\_Offset..." |

Discussion: Agreed. (it's on page 60 though.)

Proposed resolution: Accepted.

Disposition detail: n/a

# CID 1134, 1240 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1134 | 59 | 10.38.3.3 | 19 | I am wondering about these slot configurations, 4z did not add any such parameters. It has the notion of slots but it left the mechanics to the next higher layer to command transmissions or receiver enable at the appropriate time for the slot use case. This meant that the MAC behaviour was simple and the protocol behaviours did not have to be specified in detail as would otherwise have been the case. | Change the initialisation slots into a concept for the control layer rather than a hard MAC configuration…. The MAC is not really in control of sending the ADV POLL or RESP since it is relying to the next higher layer to provide the message content and command its transmission at the appropriate time via the MCPS-DATA.request, which is actually defining the slot boundary. |
| Billy Verso | 1240 | 124 | 10.38.10.1 | 16 | Not sure everything in this table is actually configuring MAC behaviour. Next higher layer and MAC roles are a bit blurred I think, some of these parameters while a necessary part of the protocol definition are perhaps not actually affecting MAC behaviour and should more properly be in NHL domain. | Consider which are MAC and which not and revised table accordingly, and used of these elsewhere, |

Discussion:

Following the proposal discussed on Jan 14, and the adaption of the resolution for initialization and setup proposed in DCN 15-25-0008, the higher layer controls the initialization and setup procedure. While the comment is technically correct that in this case no MAC variables would be needed, the proposal here is to still keep Table 20 as it helps the reader understand what behavior is expected of the higher layer. The change below only corrects the incorrect statement that the fixed default value (as stated in Table 20) may be changed.

Proposed resolution: Revised.

Disposition detail: Change p.59 l.16 as follows:

**10.38.3.3 Initialization configuration**

The channel used for transmissions during the initialization phase is specified by the

*macMmsNbInitChannel* attribute, which may be changed prior to initialization.

The *macMmsNbInitSlotDuration* attribute specifies the initialization slot duration. The value may

be changed by the next higher prior to use or via the first accesses of the initialization channel, i.e.,

Advertising Poll Compact frame or Public Advertising Poll Compact frame.

# CID 1137 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1137 | 60 | 10.38.3.4 | 11 | The text is talking about "field values" when it means choosing / negotiating configuration parameters values other than those being specified by the by the messages. This makes it harder to understand. | The paragraph (and more) needs a rewrite with clear language referring to what is a field value and what is a configuration parameter, although I appreciate this is a somewhat abstract description when in detail the messages being discussed have different forms with many fields and sub-fields, which would need to be considered/handled for any real implementation of this negotiation. |

Discussion: We can simply change the wording from "field values" to "configuration parameters" as the comment suggests. Not sure what else is insinuated with a "rewrite with clear language" but the commenter is encouraged to provide proposal if still deemed required follow this clarification.

Proposed resolution: Revised.

Disposition detail: Change the text to:

For all other configuration parameters, the initiator may set the value of the configuration parameter independent of

the configuration requested by the responder via the Advertising Response Compact frame if the selected

# configuration is mandatorily supported. CID 1161 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1161 | 66 | 10.38.3.7 | 13 | The MAC (by definition, without stating it) uses the parameters set by the NHL. These can be negotiated in any way, like OOB methods or using the compact frames defined in the text, which I believe the MAC does not (and should not) act on without NHL oversight. I think short term parameter changes are the same, i.e. the NHL gets the parameter change request and decides whether/how to re-configure the MAC. (Line 23 clearly indicates there is a decision involved beyond the scope of the MAC specification). | Rewrite this and the next paragraph to reflect this architecture (assuming I am right) or possibly considerer to delete them if they not really saying anything that needs to be said. |

Discussion: We can adapt the proposed change with the earlier introduced addons for MCPS-DATA.request and MCPS-DATA.indication.

Proposed resolution: Revised.

Disposition detail: Change the text starting p.66 l.13 to:

An initiator and a responder may engage in an

initialization setup handshake to obtain a ranging configuration for a ranging session. The initial ranging configuration of a ranging session servers as the long-term operating parameters until the end of the ranging session. Alternatively the higher layer may start a ranging session using a ranging configuration obtained via OOB methods.

# CID 149 (Accepted)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Bin Qian | 149 | 67 | 10.38.4.1 | 35 | The poll Compact frame refers not only to one-to-one ranging case, but also to one-to-many ranging case | Change the first sentence to "The Poll Compact frame (10.38.9.7 and 10.38.9.12) serves to enable carrier coherent transmissions from the initiator to the responder device." |

Discussion: Jan 14, group discussed to accept proposed change.

Proposed Resolution: Accepted

Disposition Detail: n/a

# CID 1166 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1166 | 67 | 10.38.4 | 21 | Clause 10.38.8 is covering Procedures for one-to-many MMS ranging, and I am wondering the content from 10.38.4 to 10.38.7 shou be combined under a single umbrella of "Procedures for one-to-one MMS ranging" | Consider whether this makes sense to help the read/user better understand the standard, and if so provide instructions to the editor to guide which parts would be appropriate to a common general section, and which parts should be made one-to-one case specific. |

Discussion: CID 1166 and CID 149 seem contradicting each other at least to some extent. CID 1166 is asking for a more clear distinction between one-to-one (O2O) and one-to-many (O2M) modes. CID 149 is proposing to add information that certain aspects of O2O also apply to O2M. I think we can still follow both ideas, ie. do a better representation by editorial reordering but still allow some mixed information for O2O and O2M.

Current document structure is as follows:

10.38.1 Introduction => generic

10.38.2 => O2O specific, separating a Ranging Round into consecutive Control-, Ranging-, and Report Phase (too restrictive for some O2M modes)

10.38.3 Initialization => contains separate subsections for O2O and O2M initialization

10.38.4 Control phase (referring to 10.38.2) => O2O specific, e.g. some O2M modes have more than 1 response slots

10.38.5 Ranging phase (referring to 10.38.2) => O2O specific, e.g. for some O2M modes 400 RSTU gaps are used insted

10.38.6 Report phase (referring to 10.38.2) => O2O specific

10.38.7 Narrowband specific, but applies to both O2O/O2M

10.38.7.4 Channel switching has been written for O2O but maybe applies to O2M as well?

Proposed resolution: Rejected.

Disposition detail: Strawpoll indicated group's preference to not change document structure.

# CID 1176 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1176 | 71 | 10.38.7.4.1 | 22 | The changing of channel is complex and perhaps dependant on the use case, one-to-one, one-many, number of reports being sent/received in the various rounds before the switch, does the MAC (at all nodes) always know when it the start of a new ranging block and time to do the channel switch, or, do we need a primitive for the application to say to MAC that it is starting a new ranging block and to "do the channel switch now" | Add a description of how the MAC knows it is time to (autonomously) do the channel switch or add a primitive for the upper layer to tell it to do it. If a primitive is not needed, then we still should add a MAC PIB attribute to control the enable/disable the (autonomous) MAC channel switch function. I would recommend for the higher layer to set the allowed channel list and the seed for the switching, and then invoke a primitive to give next channel switch. To be considered whether the primitive writes this to the phycurrentchannelinfo, or the higher layer does it at the appropriate time. |

Discussion: The commenter suggested in an earlier comment that the next higher layer should be in control of the timing of packet transmissions and we have applied changes to the draft text accordingly. If the next higher layer is in control of the timing of packet transmissions, then the next higher layer should also be in control of the frequency of packet transmissions. The commenter has also proposed in DCN 552 the removal of the FormatSpecificParameters for the sending of MMS packets, and when the discussion suggested that the associated primitive would contain insufficient information for the MAC layer to send the packet, that the MLME interface merely is a "logical interface". To be consistent here, we can follow the same argument and say we don't need a channel parameter in the MLME interface because it's just a "logical interface".

Proposed resolution: Rejected.

Disposition detail: Higher layer controls time and frequency of MLME-DATA.request.

# CID 1177 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1177 | 71 | 10.38.7.4.1 | 22 | It is not clear whether channel switching is a mandatory part of NBA, i.e., do all NBA devices have to support this, is it enabled/disabled by default, etc. | Add in to this overview text to specify whether channel switch support is mandatory requirement for NBA UWB MMS, (which can be enabled/disabled |

Discussion: Good idea to clarify.

Proposed resolution: Revised.

Disposition detail: Add text after p.71 l.25:

Channel switching is optional and can be disabled by setting to allow a single NB channel only in the NB Channel Map in the ranging session configuration.

# CID 1199, 476 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1199 | 79 | 10.38.9.2.1 | 12 | This is talking about using multiple IRK to resolve the hash (using AES) which implies a certain computational load. This load will increase depending on the number of IRK searched. This might be done in software and take an appreciable amount of time. The standard should specify the number of IRK that a compliant device needs to support, and specify the response time that a device needs to comply with, (which must assume the RPA resolution is on the final IRK in the list to be tested). | Specify minimum number of IRK, and specify response time (RX to TX) to take account of processing involved to validate a hash, and well and any other processing needs. |
| Tero Kivinen | 476 | 79 | 10.38.9.2.1 | 18 | If devices carry multiple IRKs that will make address resolution even more expensive. The devices are already required to loop through all IRKs they have trying to find a match, and if there are multiple IRKs per device this will multiply this effect. | Add note, that multiplying number of IRKs will also exponentially multiply number of time required for resolving every single incoming frame. |

Discussion: The situation described only occurs during initialization and setup while the responder device is listening for possible multiple initiators. In this case there is no requirement that the responder sends a ADV-RESP on the very first occasion of receiving a ADV-POLL. E.g. if the responder needs more time it can respond to any of the following ADV-POLL packets. Note also that the Initialization Slot Duration is a variable that could be set to a higher duration via OOB methods. In another NB standard where a similar address resolution scheme is employed responders typically support 8 IRKs, but the standard does not define this implementation dependent limit.

As for #476 the claim of exponentially multiplicating complexity is unsubstantiated and mathematically wrong in my humble opinion, therefore the proposed change to be rejected.

Proposed resolution: Rejected.

Disposition detail: Implementation dependent.

# CID 1200, 1022, 1021 (Revised)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1200 | 79 | 10.38.9.2.1 | 15 | This talking about the RPA being marked as unresolved (and discarding the packet), but maybe it is the frame's hash that is not resolved, and the frame that is marked? Clause 10.38.9.2.3 is talking about the frame being marked as resolved, which is probably the same thing but not clearly so. It would be better for the receive processing steps to be laid out in clause 6.6.2 (which has to be updated anyway) since clause 6.6.2 is where it talks about what is checked, and discarding the frame etc. When the text is in clause 6, it should not be repeated here (since double specification can be a source of error) so some of the text here should be removed. | Merge the step by step flow of compact frame receive processing into clause 6.6.2, showing the changes to that clause that allow both normal and compact frame reception to operate correctly together as they should. When that is done the processing steps should not be repeated here and can largely be deleted. The split I envisage for example would be to have Clause 6 describe how the hash is checked against various IRK as specified in 10.38.9.x.x to yield an RPA match or if this fails that the frame discarded. And, have the clause 10 text detail what are the IRKs and give the process steps for of finding a match for the hash). |
| Billy Verso | 1022 | 15 | 6.6.2 | 15 | This clause in the base standard describes reception steps. It needs to be amended to also cover compact frame reception. | Review and amend appropriately. |
| Billy Verso | 1021 | 15 | 6.6.1 | 15 | This clause in the base standard describes transmission steps. It needs to be amended to also cover compact frame transmission. | Review and amend appropriately. At the very least it need to refer to the appropriate security clause, but it may need other actions also. |

Discussion: Agree to add the treatment for unresolved RPAs in compact frames to 6.6.2. But I think it doesn't harm to say here too that the frame is discarded. 6.6.1 transmission is adding compact frames.

Proposed resolution: Revised.

Disposition detail: In [15.4-2024] p.69, add after option d) 5):

5) The device is the PAN coordinator, only source addressing field is included in a Multipurpose

frame and the destination PAN ID matches *macPanId*.

6) The received frame is a compact frame and the RPA is marked as resolved.

e) If the frame type indicates that the frame is a Beacon frame and the source PAN ID is present, the

source PAN ID shall match *macPanId* unless *macPanId* is equal to the broadcast PAN ID, in which

case the Beacon frame shall be accepted regardless of the source PAN ID.

In [15.4-2024] p.68, add after the third paragraph:

The Destination Address field, if present, shall contain the address of the intended recipient of the frame,

which may be either a short address or an extended address. If the Destination Address field is not present,

the recipient of the frame shall be assumed to be the PAN coordinator (unless *macImplicitBroadcast* is set to

TRUE on the receiver), and the Source Address field shall contain the address of the originator.

The RPA Hash and RPA Prand field, if present, shall contain the RPA generated as described in **10.38.9.2** for Compact frames.

The PAN ID compression field, the Source PAN ID field, and the Destination PAN ID field are set as

indicated in 7.2.2.6

# CID 539 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Tero Kivinen | 539 | 92 | 10.38.9.4 | 9 | Is there similar indication that if message control field value of 0x10 is used, then certain compact frame id field values are supported? If not, how does the received know which values are supported? | It seems only some subset of compact frame ids are supposed to be supported, but how does the transmitted know whether the other end supports specific frame ids. If there is some kind of set of frame ids (like 0x01-0x06) then there should be table that lists those requirements. Of course those will be present in the PICS when they are added, but having that also in the text would be good. |

Discussion: The comment is a question and suggests no text change.

Proposed resolution: Rejected.

Disposition detail: The supported subset of MessageControlVersions is signaled during intialization and setup via the mutual exchange of SMC TLVs fields. See 10.38.3.8 for details.

# CID 1221 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Billy Verso | 1221 | 99 | 10.38.9.9 | 20 | The four (non-secure) Report messages have similar generic format. Each begins with an RPA Hash and a Message Control Octet, the latter of which is a sparse set of values. Seems we have an opportunity to use a common Compact Frame ID field value for all of these saving on Compact Frame ID space over half of which are used up already. | Change to single "Report" ID in Table 1, and use the Message Control field (octet) to identify the meaning and encoding for the different flavours of secure report: One-to-one Initiator, One-to-one Responder, One-to-many Initiator and One-to-many Responder. |

Discussion: I checked with the original authors of the various One-to-many sections, they prefer to keep One-to-many and one-to-one clearly separated via different Compact frame IDs.

Proposed resolution: Rejected.

Disposition detail: More clear separation between O2O and O2M frames.

# CID 214 (Rejected)

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| **Name** | **Index #** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** |
| Srivathsa Masthi Parthasarathi | 214 | 60 | 10.38.3.4 | 2 | the initiator should choose…, this needs to be mandatory | "the initiator shall choose…" |

Discussion: The initiator is recommended to use the values conveyed by the responder in ADV-RESP for starting the ranging session via SOR. However, as stated in the text, the initiator has the authority to override the ADV-RESP field values and set it's own values, e.g. for ranging block duration. The responder in turn is not required to start the ranging session with the values set by the initiator.

Proposed resolution: Rejected.

Disposition detail: Initiator can override responder ranging configuration.