IEEE P802.11
Wireless LANs

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| Resolutions for some comments on 11mc/D5.0 (SBmc1) |
| Date: 2016-02-22 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Mark RISON | Samsung Cambridge Solution Centre | SJH, CB4 0DS, U.K. | +44 1223 434600 | at samsung (a global commercial entity) I'm the letter emme then dot rison |

Abstract

This submission proposes resolutions for CIDs 7177, 7202, 7292, 7320, 7349, 7379, 7396, 7399, 7400, 7419, 7427, 7429, 7468, 7477, 7478, 7499, 7500, 7504, 7529, 7532, 7549, 7572, 7595, 7596, 7597, 7603, 7604, 7608, 7746, 7795, 7796 on 11mc/D5.0. Green indicates material agreed to in the group, yellow material to be discussed, red material rejected by the group and cyan material not to be overlooked. The “Final” view should be selected in Word.

r1: changes made during BRC meeting on 2016-02-22. Added CIDs 7349, 7429.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7177Mark RISON10.161342.21 | In order to reduce power consumption, there should be a dynamic mechanism to request to a peer that it not transmit to the requesting device using LDPC | Add a mechanism, based on extending Operating Mode Notification or otherwise |

Discussion:

LDPC provides additional link margin, but is very computationally intensive on receive compared with BCC, and hence significantly less power-efficient. It is therefore desirable for a receiver to be able to indicate to a transmitter that LDPC need not be used.

This can be done by extending the Operating Mode Notification element. Unfortunately, this has no reserved bits left. Fortunately, this is extensible. Unfortunately, the Operating Mode Notification frame is not trivially extensible, as it uses the Operating Mode field rather than the Operating Mode Notification element, and it might be followed by VSIEs etc.

Proposed changes:

Change 9.4.2.166 as follows:

**9.4.2.166 Operating Mode Notification element**

~~The Operating Mode Notification element is used to notify STAs that the transmitting STA is changing its operating channel width, the maximum number of spatial streams it can receive, or both.~~ The format of the Operating Mode Notification element is defined in Figure 9-570 (Operating Mode Notification element).

***Editor: In Figure 9-570—Operating Mode Notification element add a cell on the right saying “Extended Operating Mode” and show this as 0 or 1 octets.***

The Element ID and Length fields are defined in 9.4.2.1 (General).

The Operating Mode field is defined in 9.4.1.53 (Operating Mode field).

The Extended Operating Mode field is defined in 9.4.1.53b (Extended Operating Mode field) and is optional.

Add a new Subclause 9.4.1.53b as follows:

**9.4.1.53b Extended Operating Mode field**

The Extended Operating Mode field is shown in Figure 9-117b (Extended Operating Mode field).

***Editor: Insert a figure like Figure 9-117 but with just a b0 saying “No LDPC” and b1-b7 reserved.***

The No LDPC field is set to 1 to indicate that the STA transmitting this field prefers not to receive LDPC-encoded PPDUs; it is set to 0 otherwise.

Add a new row to Table 9-76—Element IDs:

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| --- | --- | --- | --- |
| Extended Operating Mode Notification (see 9.4.2.166b (Extended Operating Mode Notification element)) | <ANA> | <ANA> | Yes |

Add a new Subclause 9.4.2.166b as follows:

**9.4.2.166b Extended Operating Mode Notification element**

The format of the Extended Operating Mode Notification element is defined in Figure 9-570b (Extended Operating Mode Notification element).

***Editor: Copy Figure 9-570 as Figure 9-570b here, changing “Operating Mode” to “Extended Operating Mode”.***

The Element ID and Length fields are defined in 9.4.2.1 (General).

The Extended Operating Mode field is defined in 9.4.1.53b (Extended Operating Mode field).

Change the start of 9.6.23.4 as follows:

**9.6.23.4 Operating Mode Notification frame format**

The Operating Mode Notification frame is an Action frame of category VHT. It is used to notify STAs that the transmitting STA is changing one or more of its operating channel width, the maximum number of spatial streams it can receive, ~~or both~~and its LDPC receive preference.

Add a row at the end of Table 9-417—Operating Mode Notification frame Action field format:

|  |  |
| --- | --- |
| 4 | Zero or one Extended Operating Mode Notification element |

Add the following as the penultimate paragraph of 10.16 LDPC operation:

A STA should not transmit a frame with the TXVECTOR parameter FORMAT set to HT\_MF, HT\_GF or VHT and the TXVECTOR parameter FEC\_CODING set to LDPC\_CODING if the RA of the frame corresponds to a STA from which it has received a frame containing an Extended Operating Mode field and the most recent Extended Operating Mode field it has received from that STA had the No LDPC field equal to 1.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7177 in <this document>, which effect the requested change.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7379Mark RISON11.24.6.31766.56 | "In the case of requests for 160 MHz bandwidth, the initiating STA can indicate whether it uses a single or two separate RF LOs." -- it not only can but shall (i.e. it shall not lie). Ditto the rSTA shall so indicate | Change "can" to "shall" and extend the statement to cover the responding STA too |

Discussion:

It is important for maximum FTM accuracy that both sides know whether the other side is using separate LOs.

Proposed changes:

Change from 1766.56 as follows:

In the case of requests for 160 MHz bandwidth, the initiating STA shall~~can~~ indicate in the FTM Format and Bandwidth field whether it uses a single or two separate RF LOs. In the cases when the responding STA indicates ~~advertises~~ use of ~~transmission of Fine Timing Measurement frames with~~ 160 MHz bandwidth~~transmissions~~, the responding STA shall indicate in the FTM Format and Bandwidth field whether it uses a single or two separate RF LOs.~~chooses the appropriate entry in the FTM Format and Bandwidth field depending on the number of RF LOs used by the responding STA.~~

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7379 in <this document>, which effect the requested change.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7396Mark RISON10.3.2.91281.32 | "After transmitting an MPDU that requires an Ack frame as a response (see Annex G), the STA shall wait for an AckTimeout interval" -- isn't a BA analogue of this needed? | Extend this para to cover the case where a BA is required |

Discussion:

There are detailed rules, including rules on error-handling, for Acks in 10.3.2.9. However, there are almost no rules for BlockAcks in 10.3.2.10.

Proposed changes:

Change 10.3.2.9 and 10.3.2.10 as follows (note that CID 7089 might make changes here too):

**10.3.2.9 Acknowledgement procedure**

The cases when an Ack or BlockAck frame can be generated are shown in the frame exchange sequences listed in Annex G.

A STA shall not transmit an Ack or BlockAck frame in response to ~~On receipt of~~ a Management frame of subtype Action No Ack~~, a STA shall not send an Ack frame in response~~. A non-AP STA shall not transmit an Ack or BlockAck frame in response to a group addressed frame. An AP shall not transmit an Ack or BlockAck frame in response to a frame that has the To DS subfield equal to 0.

Otherwise, u~~U~~pon reception of a frame of a type that requires acknowledgment ~~with the To DS subfield set~~, a~~n~~ STA~~AP~~ shall transmit~~generate~~ an Ack or BlockAck frame~~. An Ack frame shall be transmitted by the destination non-AP STA when it successfully receives an individually addressed frame of a type that requires acknowledgment, but not if it receives a group addressed frame of such type.~~~~After a reception of a frame requiring acknowledgment, transmission of the Ack frame shall commence~~ after a SIFS, without regard to the busy/idle state of the medium. (See Figure 10-10 (Individually addressed data/Ack frame).)

***Editor: in Figure 10-10 change “Ack” to “Ack/BA” twice (once in figure and once in caption).***

After transmitting an MPDU that requires an Ack or BlockAck frame as a response (see Annex G), the STA shall wait for an AckTimeout interval, with a value of aSIFSTime + aSlotTime + aRxPHYStartDelay. This interval begins when the MAC receives a PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the AckTimeout interval, the STA concludes that the transmission of the MPDU has failed, and this STA shall invoke its backoff procedure upon expiration of the AckTimeout interval. If a PHY-RXSTART.indication primitive does occur during the AckTimeout interval, the STA shall wait for the corresponding PHY-RXEND.indication primitive to determine whether the MPDU transmission was successful. The recognition of a valid Ack or BlockAck frame sent by the recipient of the MPDU requiring acknowledgment, corresponding to this PHY-RXEND.indication primitive, shall be interpreted as successful acknowledgment, permitting the frame exchange sequence to continue, or to end without retries, as appropriate for the particular frame exchange sequence in progress. The recognition of anything else, including any other valid frame, shall be interpreted as failure of the MPDU transmission. In this instance, the STA shall invoke its backoff procedure at the PHY-RXEND.indication primitive and may process the received frame. An exception is that recognition of a valid Data or Management frame sent by the recipient of a PS-Poll frame shall also be accepted as successful acknowledgment of the PS-Poll frame.

NOTE 1—The backoff procedure in the specific case of reception of a corrupted Ack or BlockAck frame results in EIFS rather than DIFS or AIFS being used after the AckTimeout interval and subsequent reception of the corrupted Ack or BlockAck frame (see 10.3.4.3 (Backoff procedure for DCF) and 10.22.2.4 (Obtaining an EDCA TXOP) respectively).

NOTE 2—The receiver STA performs the acknowledgement~~Ack~~ procedure on all received frames requiring acknowledgment, even if an MSDU or A-MSDU is carried partly or wholly within the frame and is subsequently discarded due to drop eligibility (see DEI subfield in 9.2.4.5 (QoS Control field)).

**~~10.3.2.10 Block ack procedure~~**

~~Upon reception of a frame of a type that requires an immediate block ack response, the receiving STA shall transmit a BlockAck frame after a SIFS, without regard to the busy/idle state of the medium. The rules that specify the contents of this BlockAck frame are defined in 10.24 (Block acknowledgment (block ack)).~~

At 1293.48, 1293.61, 1295.62, 1926.10, 1302.27 change “Ack procedure” to “acknowledgement procedure”.

At 578.19, 2841.44 change “10.3.2.10 (Block ack procedure)” to “10.3.2.9 (Acknowledgement procedure)”.

At 606.33 change “Block Ack frame” to “BlockAck frame”.

At 1389.39 change “block ack frame exchange sequence” to “block ack sequence”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7396 in <this document>, which unify the procedures for Ack and BlockAck frames.

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| Identifiers | Comment | Proposed change |
| CID 7399Mark RISON9.4.2.1541045.09 | Why is a No-LLC field needed? Doesn't a zero-length LLC Header Copy field already indicate this? | Delete the No-LLC header field |

Discussion:

It isn’t. Yes it does.

Proposed changes:

At 1045.18, delete “The No-LLC field is set to 1 to indicate that MSDUs do not contain the LLC (Logical Link Control) header. It is set to 0 otherwise.”

In Figure 9-549—Upper layer protocol identification (U-PID) element format delete the No-LLC field.

Change 10.11 as follows:

**10.11 MSDU processing**

A STA can use the U-PID element transmitted in ADDTS Request and ADDTS Response frames to indicate the protocol responsible for handling MSDUs corresponding to the TID indicated within the frame carrying the U-PID element (see 11.4.4.4 (TS setup procedures for both AP and non-AP STA initiation)). A STA that participates in a successful ADDTS exchange that included a U-PID element ~~with the No-LLC field equal to 1~~ shall strip the LLC header from an MSDU corresponding to the TID indicated in the ADDTS exchange before transmission of the MSDU. A STA that participates in a successful ADDTS exchange that included a U-PID element ~~with the No-LLC field equal to 1~~ and that receives an MSDU corresponding to the TID indicated in the ADDTS exchange shall add the header indicated by the U-PID element before delivery of the MSDU at the MAC-SAP.

NOTE—If the LLC Header Copy field in the U-PID element has zero length, there are no LLC headers in those MSDUs.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7399 in <this document>, which effect the requested change.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7477Mark RISON10.3.71296.42 | aRxTxTurnaroundTime = aTxPHYDelay + aRxTxSwitchTime + aTxRampOnTime so the spec should make it clear these 4 parameters are not independent (the PHY characteristics tables say they are implementation-dependent and refer back to 10.3.7, but 10.3.7 does not show the dependency (it's buried in the table in 6.5.4.2) | As it says in the comment |

Discussion:

Relationships like this should not be hidden.

Proposed changes:

At 534.32 change “The following equation is used to derive the RxTxTurnaroundTime *[sic]*:

aTxPHYDelay + aRxTxSwitchTime + aTxRampOnTime” to “See 10.3.7 (DCF timing relations).”.

At 1296.62 delete “— aRxTxTurnaroundTime”.

At 1297.34 change “in Equation 10-2 and Equation 10-3” to “in Equation 10-2, Equation 10-3 and Equation 10-3b”.

At 1297.47 insert:

aRxTxTurnaroundTime = aTxPHYDelay + aRxTxSwitchTime + aTxRampOnTime (10-3b)

At 1297.51 change “aSlotTime and aSIFSTime” to “aSlotTime, aSIFSTime and aRxTxTurnaroundTime”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7477 in <this document>, which effect the requested change.

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| Identifiers | Comment | Proposed change |
| CID 7478Mark RISON11.2.2.11574.36 | "When a STA enters normal (non-APSD) PS mode, any downlink block ack agreement without an associated schedule is suspended for the duration of this PS mode." -- what does "suspended" mean? For example, does this mean fragmentation is allowed? | Change to say that A-MPDUs shall not be used for that BA agreement |

Discussion:

It is indeed not clear what “suspended” means here. Presumably the intent is that only one MSDU is sent per PS-Poll (might be sent in a VHT single MPDU).

Proposed changes:

Change 1574.36 as follows:

When a STA is in~~enters~~ normal (non-APSD) PS mode, only one MSDU is sent in response to a PS-Poll frame for any downlink block ack agreement without an associated schedule ~~is suspended for the duration of this PS mode~~.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7478 in <this document>, which state instead that only one MSDU is sent in response to a PS-Poll.

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| Identifiers | Comment | Proposed change |
| CID 7595Mark RISON11.1.4.3.51568.45 | This para is duplicated in the next 2 | Delete this para |
| CID 7596Mark RISON11.1.4.3.51568.50 | What about other things that need to be tied specifically to the probe request? | Add " If dot11RadioMeasurementActivated is true and the RSNI element was requested, an RSNI element containing the RSNII of the Probe Request frame shall be included (see 9.4.x.x (RSNI element) and Table 9-x (RSNI values)).NOTE--If no RSNI measurement result is available, the RSNI value is set to indicate "Measurement not available" (seeTable 9-x (RCPI values))." and similarly for any other frame-dependent elements |
| CID 7597Mark RISON11.30.11842.42 | What about other things that need to be tied specifically to the probe request? | Add " If dot11RadioMeasurementActivated is true and the RSNI element was requested, an RSNI element containing the RSNII of the Probe Request frame shall be included (see 9.4.x.x (RSNI element) and Table 9-x (RSNI values)).NOTE--If no RSNI measurement result is available, the RSNI value is set to indicate "Measurement not available" (seeTable 9-x (RCPI values))." and similarly for any other frame-dependent elements |

Discussion:

For all things that can be Requested that are specific to a frame, it is necessary to state which frame they are specific to and what value is used of the request cannot be satisfied.

It is true that there appears to be some duplication.

Proposed changes:

Change 11.1.4.3.5 Contents of a probe response from 1568.45 as follows:

— If dot11RadioMeasurementActivated is true and the RCPI element was requested, an RCPI element containing the RCPI of the Probe Request frame shall be included. If no measurement result is available, the RCPI value shall be set to indicate that a measurement is not available (see 9.4.2.38 (RCPI element)).

~~— If dot11RadioMeasurementActivated is true and the RCPI element was requested, an RCPI element containing the RCPI of the Probe Request frame shall be included (see 9.4.2.38 (RCPI element) and Table 9-153 (RCPI values)).~~

~~NOTE—If no RCPI measurement result is available, the RCPI value is set to indicate "Measurement not available" (see Table 9-153 (RCPI values)).~~

— If dot11RadioMeasurementActivated is true and the RSNI element was requested, an RSNI element containing the RSNI of the Probe Request frame shall be included. If no measurement result is available, the RSNI value shall be set to indicate that a measurement is not available (see 9.4.2.41 (RSNI element)).

Change 11.30.1 Information Request and Response from 1842.42 as follows:

— If dot11RadioMeasurementActivated is true and the RCPI element was requested, an RCPI element containing the RCPI of the Probe Request frame shall be included ~~(see 9.4.2.38 (RCPI element) and Table 9-153 (RCPI values))~~. If no measurement result is available, the RCPI value shall be set to indicate that a measurement is not available (see 9.4.2.38 (RCPI element)).

~~NOTE—If no RCPI measurement result is available, the RCPI value is set to indicate "Measurement not available" (see Table 9-153 (RCPI values)).~~

— If dot11RadioMeasurementActivated is true and the RSNI element was requested, an RSNI element containing the RSNI of the Probe Request frame shall be included. If no measurement result is available, the RSNI value shall be set to indicate that a measurement is not available (see 9.4.2.41 (RSNI element)).

Proposed resolution for CID 7595:

REVISED

Make the changes shown under “Proposed changes” for CID 7595 in <this document>, which instead delete the other two paras.

Proposed resolution for CIDs 7596 and 7597:

REVISED

Make the changes shown under “Proposed changes” for CIDs 7596 and 7597 in <this document>, which effect the requested changes.

Note to the commenter: no elements other than the RCPI and RSNI elements pertain to the Probe Request frame.

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| Identifiers | Comment | Proposed change |
| CID 7603Mark RISON11.24.6.31766.49 | A STA should be required to specify a FTM Format and Bandwidth that it (and the BSS, if associated) support | As it says in the comment |

Discussion:

A DMG STA had better not request or select VHT format, and an 80 MHz-only VHT STA had better not request or select 160 MHz bandwidth. For coexistence reasons, the format and bandwidth should be compatible with the BSS. However, it seems acceptable to specify something the devices’ BSS (if any) does not support, if the two devices are not associated with each other.

Proposed changes:

Change 1766.49 as follows:

Neither the initiating STA nor the responding STA shall indicate, in the FTM Format and Bandwidth field, a format and bandwidth that it does not support or, if the initiating STA and the responding STA are associated with each other, that the BSS does not support.

The responding STA should indicate the same~~'s selection of the~~ format and bandwidth in the FTM Format and Bandwidth field ~~should be the same~~ as that requested by the initiating STA. The responding STA shall not indicate~~choose~~ a bandwidth wider than requested. The responding STA shall not indicate~~choose~~ a VHT format if DMG, HT-mixed or non-HT format was requested. The responding STA shall not indicate~~choose~~ an HT format if DMG or non-HT format was requested. The responding STA shall not indicate a DMG format if VHT, HT-mixed or non-HT format was requested.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7603 in <this document>, which effect the requested change.

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| Identifiers | Comment | Proposed change |
| CID 7500Mark RISON9.4.2.9738.13 | Coverage class can only be specified in units of about 900 m.  This is not useful for medium-size BSSes (of the order of 100 m, say).  Brian HART adds "And it doesn't deal with OBSS, where slotted Aloha becomes heterogeneously slotted Aloha (aka unslotted Aloha)." | Add coverage class values providing finer control |

Discussion:

The smallest air propagation time that can be specified with a coverage class is 900 m. A 900 m BSS would be very large indeed. A 1.8 km BSS would be extremely large. A 28 km BSS is ludicrous. Typical BSSen have diameters of a few tens of metres max. Being able to specify an air propagation time of anything from 10 m to 900 m in steps of 10 m would be more useful.

Proposed changes:

Change Table 9-78—Coverage Class field parameters at 738.8 as follows:

|  |  |
| --- | --- |
| **Coverage class value** | **aAirPropagationTime (µs)** |
| 0–31 | *n* × 3,where *n* is the value of the coverage class |
| 33-121 | (*n* – 32) / 30,where *n* is the value of the coverage class |
| 32,122–255 | Reserved |

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7500 in <this document>, which effect the requested change, allowing specification of coverage classes up to 900 m in 10 m increments.

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| Identifiers | Comment | Proposed change |
| CID 7572Mark RISON6.3.19.1222.31 | "If the Direction element of the SetKeyDescriptor indicates Transmit or Both then the MAC uses the key information for the transmission of all subsequent frames to which the key applies." -- it should be clearer this applies to the Key ID also, i.e. all subsequent frames transmitted for that type and peer specify the Key ID given | As it says in the comment |
| CID 7604Mark RISON6.3.20.1.2224.15 | Why is "Valid range" N/A for the Key ID in MLME-DELETEKEYS.request? | Copy the corresponding cell in MLME-SETKEYS.request |

Discussion:

Something needs to specify the Key ID to be used for transmission of encrypted frames. As far as I can tell, this has to be the MLME-SETKEYS.request primitive, since no other request primitive, other than MLME-DELETEKEYS.request, seems to carry a Key ID.

However, in turn this means things get hairy with MLME-DELETEKEYS.request if that allows a specific Key ID to be deleted. So I assume this is supposed to delete all the keys of the relevant type.

MLME-MICHAELMICFAILURE.indication, MLME-PN-EXHAUSTION.indication and MLME-PN-WARNING.indication all have N/A for the Key ID, which needs to be addressed too.

Proposed changes:

Change 223.44 as follows:

— If the Direction element of a~~the~~ SetKeyDescriptor indicates Transmit or Both then the MAC uses the

key information (as defined by the Key, Length and Key ID elements) for the transmission of all subsequent frames to which the key applies (as defined by the Key Type and Address elements).

Change 224.34 as follows:

Receipt of this primitive causes the MAC to delete all the temporal keys identified by each~~the~~ DeleteKeyDescriptor~~s~~ in the Keylist (as defined by the Key Type and Address elements), and to cease using them.

At 224.15 delete the “Key ID” row.

At 484.5 and 484.46 change “N/A” to

“0–3 shall be used

with WEP, TKIP,

CCMP, and

GCMP;

4–5 with BIP; and

6–4095 are

reserved”.

Proposed resolution for CID 7572:

REVISED

Make the changes shown under “Proposed changes” for CID 7572 in <this document>, which effect the requested changes.

Proposed resolution for CID 7604:

ACCEPTED

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7796Mark RISON | The distinctions made in the specification w.r.t. TS/TC/TSID/TID are incomprehensible | Make the definitions comprehensible. E.g. what does "UP for either TC or TS" mean? |

Discussion:

Here is what the spec has to say about these four terms:

**traffic category (TC):** A label for medium access control (MAC) service data units (MSDUs) that have a distinct user priority (UP), as viewed by higher layer entities, relative to other MSDUs provided for delivery over the same link. Traffic categories are meaningful only to MAC entities that support quality of service (QoS) within the MAC data service. These MAC entities determine the UP for MSDUs belonging to a particular traffic category using the priority value provided with those MSDUs at the MAC service access point (MAC SAP).

**traffic stream identifier (TSID):** Any of the identifiers usable by higher layer entities to distinguish medium access control (MAC) service data units (MSDUs) to MAC entities for parameterized quality of service (QoS) [i.e., the traffic stream (TS) with a particular traffic specification (TSPEC)] within the MAC data service.

The QoS facility supports eight priority values, referred to as *UPs*. The values a UP may take are the integer values from 0 to 7 and are identical to the IEEE Std 802.1D priority tags. An MSDU with a particular UP is said to belong to a traffic category (TC) with that UP. The UP is provided with each MSDU at the medium access control service access point (MAC SAP) either directly, in the UP parameter, or indirectly, in a TSPEC or SCS Descriptor element designated by the UP parameter.

Priority parameter and TID subfield values 0 to 7 are interpreted as UPs for the MSDUs. Outgoing MSDUs with UP values 0 to 7 are handled by MAC entities at STAs in accordance with the UP. Priority parameter and TID subfield values 8 to 15 specify TIDs that are also TS identifiers (TSIDs) and select the TSPEC for the TS designated by the TID.

The TID subfield identifies the TC or TS to which the corresponding MSDU (or fragment thereof) or A-MSDU in the Frame Body field belongs.

|  |  |  |
| --- | --- | --- |
| Access policy | Usage | TID subfield |
| EDCA | UP for either TC or TS,regardless of whether admission control is required | 0-7 |
| HCCA, SPCA | TSID | 8-15 |
| HEMM, SEMM | TSID,regardless of the access mechanism used | 8-15 |

The TID subfield contains the value of the TC or TS for which the BlockAck frame is being requested.

The TID subfield indicates the TSID or the UP for which the block ack has been originally set up.

The TSID subfield is 4 bits in length and contains a value that is a TSID. Note that the MSB (bit 4 in TS Info field) of the TSID subfield is always set to 1 when the TSPEC element is included within an ADDTS Response frame.

When present in the ADDTS Request frame, the Upper Layer Protocol Identification (U-PID) element indicates the upper layer protocol associated with the TID/TSID specified within the TSPEC element contained in this frame.

When present in the ADDTS Response frame, the Upper Layer Protocol Identification (U-PID) element indicates the upper layer protocol associated with the TID/TSID specified within the TSPEC contained in this frame.

A QoS STA shall maintain a short retry counter and a long retry counter for each MSDU, A-MSDU, or MMPDU that belongs to a TC that requires acknowledgment.

The TID in the QoS Control fields of these frames shall indicate the TC or TS to which the MPDU belongs.

The AP may reallocate TXOPs if the request belongs to TS or update the EDCA parameter set if the above request belongs to TC.

The block ack record shall be updated irrespective of the acknowledgment type (Normal or Block Ack) for the TID/TSID with a block ack agreement.

Following a successful negotiation, a TS is created, identified within the non-AP STA by its TSID and direction, and identified within the HC by a combination of TSID, direction, and STA address.

Following a successful TS setup initiated by a non-AP STA, the TS becomes active, and either the non-AP STA or the HC may transmit QoS Data frames whose TID contains this TSID (according to the Direction field). In the case of EDCA, the TID contains the UP value.

When using transparent mode to transfer an FST session corresponding to a TID/TSID, the Direction subfield within the TSPEC element, if any, used to set up the TID/TSID should not be set to indicate a bidirectional link. This enables the SME to use the TID/TSID in conjunction with the source and destination MAC addresses in both the old and new frequency band/channel to uniquely identify the FST session.

The BlockAck is identified by the TID/TSID and MAC addresses of the Originator and the Recipient used in the band and channel indicated in the Multi-band element included in ADDBA Request and ADDBA Response frames.

What I think is:

* A TS is a traffic stream
* A TSPEC is a definition of a traffic stream
* The UP is a number in the range 0-7 specifying a user priority
* The TC is a number also in the range 0-7 but identifying a user priority or a frame that is not part of a defined traffic stream (not 100% sure how this differs from a UP, really)
* The TSID is a number in the range 8-15 identifying a defined traffic stream or a frame that is part of this stream (but the frames in this stream are, in EDCA, identified over the air by the UP for that stream)
* The TID is a number in the range 0-15 that is a UP if it is <8 and is a TSID otherwise
* BA is set up and identified on a per-UP (not per-TSID) basis even for defined traffic streams (hm, so why 16 replay counters? Or maybe you can have BAs under HCCA/HEMM/SPCA/SEMM?)

Proposed changes:

Get the points in yellow resolved first.

Proposed resolution:

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7202Mark RISON9.4.2.1671065.16 | 11.24.6.4 only requires that "Within a burst instance, consecutive Fine Timing Measurement frames shall be spaced at leastMin Delta FTM apart." However, the cited location suggests it also applies to FTM frames in different bursts or not in a burst | Change "The Min Delta FTM field indicates the minimum time between consecutive Fine Timing Measurement frames." to "The Min Delta FTM field indicates the minimum time between consecutive Fine Timing Measurement frames in a burst instance." |

Discussion:

It is preferable to make Min Delta FTM apply to all FTM frames, including the first FTM frame in a non-ASAP FTM session (which is not in a burst instance) and the frames at the end of one burst instance and the start of the next, as this ensures the initiating STA will not be overloaded.

Proposed resolution:

REVISED

At 1768.30 change “Within a burst instance, consecutive Fine Timing Measurement frames shall be spaced at least Min Delta FTM apart.” to “Consecutive Fine Timing Measurement frames shall be spaced at least Min Delta FTM apart.”

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| Identifiers | Comment | Proposed change |
| CID 7468Mark RISON9.4.2.1671066.30 | "The FTM Format And Bandwidth field indicates the requested or allocated packet format and bandwidth used by all Fine Timing Measurement frames in an FTM session" -- this is not true, since FTM frames can use a simpler or narrower format than indicated. | Change to "The FTM Format And Bandwidth field indicates the requested or allocated PPDU format and bandwidth that can be used by Fine Timing Measurement frames in an FTM session" |

Proposed resolution:

ACCEPTED

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7504Mark RISON11.24.61764.23 | There should be a mechanism to allow the responding STA to ask the initiating STA to re-initiate an FTM session (because it wants to change the parameters) | As it says in the comment. A bit in the FTM frame could be used to signal this |

Proposed resolution:

REJECTED

Such a mechanism is not necessary. If the responding STA wishes to change the parameters, it can terminate the FTM session using an FTM frame with the Dialog Token set to 0, and if the initiating STA wishes to continue doing FTM it will send an FTM Request frame to start a new FTM session, allowing the responding STA to specify new parameters.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7419Mark RISON | 10.8 says "For MSDUs or A-MSDUs belonging to the service class of QoSAck when the receiver is a QoS STA, the QoS Data frames that are used to send these MSDUs or A-MSDUs shall have the Ack Policy subfield in the QoS Control field set to Normal Ack, Block Ack, Implicit Block Ack Request, or PSMP Ack." But 5.1.1.4 says "When an MSDU is received from the MAC SAP with [QoSAck] and the recipient STA is a QoS STA [...] the MSDU is transmitted using a QoS Data frame with the Ack Policy subfield in the QoS Control field set to either Normal Ack (normal acknowledgment) or Block Ack." | Work out which is right and make the other one say the same.  Even better, avoid the duplication |

Discussion:

Subclause 10.8 MSDU transmission restrictions says (reformatted for clarity; my emphasis):

For MSDUs or A-MSDUs belonging to the service class of QoSAck when the receiver is a QoS STA, the QoS Data frames that are used to send these MSDUs or A-MSDUs shall have the Ack Policy subfield in the QoS Control field set to **Normal Ack, Block Ack, Implicit Block Ack Request, or PSMP Ack**.

For MSDUs or A-MSDUs belonging to the service class of QoSNoAck when the receiver is a QoS STA, the QoS Data frames that are used to send these MSDUs or A-MSDUs shall have the Ack Policy subfield in the QoS Control field set to No Ack.

Subclause 5.1.1.4 Interpretation of service class parameter in MAC service primitives in a STA says (ditto):

When an MSDU is received from the MAC SAP with one of the following service class indications, and the recipient STA is a QoS STA:

— QoSAck, the MSDU is transmitted using a QoS Data frame with the Ack Policy subfield in the QoS

Control field set to either **Normal Ack (normal acknowledgment) or Block Ack**.

— QoSNoAck, the MSDU is transmitted using a QoS Data frame with the Ack Policy subfield in the

QoS Control field set to No Ack (no acknowledgment).

Oh, and Subclause 9.2.4.5.4 Ack Policy subfield says (ditto):

An MSDU is sent in a QoS Data frame with the Ack Policy subfield

set to **Normal Ack, Implicit Block Ack Request, PSMP Ack or Block Ack** if the service class parameter in the MA-UNITDATA.request primitive is QoSAck and

set to No Ack if the service class parameter in the MA-UNITDATA.request primitive is equal to QoSNoAck.

So it’s not duplicated, it’s triplicated. And one of the copies does not agree with the other two. And that copy assumes the MSDU fits in an MPDU; it doesn’t consider the possibility that it might be fragmented.

The last copy seems to be behaviour and as such shouldn’t be in Clause 9.

I would argue that we should also delete the 5.1.1.4 text, but the other Mark disagrees, opining that “Clause 5 is supposed to describe the SAP, and how the SAP parameters are mapped to behaviors inside the MAC.”

Proposed changes:

**Option 1**

Delete the second paragraph of 9.2.4.5.4 Ack Policy subfield (the one starting “An MSDU is sent in”).

Change the second and third paragraphs of 5.1.1.4 Interpretation of service class parameter in MAC service primitives in a STA as follows:

When an MSDU is received from the MAC SAP with one of the following service class indications, and the recipient STA is a QoS STA:

— QoSAck, the MSDU is transmitted using one or more~~a~~ QoS Data frame(s) with the Ack Policy subfield in the QoS Control field set to ~~either~~ Normal Ack or Implicit Block Ack Request, PSMP Ack, ~~(normal acknowledgment)~~ or Block Ack.

— QoSNoAck, the MSDU is transmitted using one or more~~a~~ QoS Data frame(s) with the Ack Policy subfield in the QoS Control field set to No Ack ~~(no acknowledgment)~~.

When an MSDU is received from the MAC SAP and the recipient STA is not a QoS STA, the MSDU is transmitted using one or more~~a~~ non-QoS Data frame(s).

**Option 2**

Delete the second paragraph of 9.2.4.5.4 Ack Policy subfield (the one starting “An MSDU is sent in”).

Change the second and third paragraphs of 5.1.1.4 Interpretation of service class parameter in MAC service primitives in a STA to:

When an MSDU is received from the MAC SAP and the recipient STA is a QoS STA, the MSDU is transmitted using one or more QoS Data frame(s) (see 10.8).

When an MSDU is received from the MAC SAP and the recipient STA is not a QoS STA, the MSDU is transmitted using one or more non-QoS Data frame(s).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7419 in <this document>, which are fabulous.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7320Mark RISON9.2.2564.1 | Like ASCII strings, UTF-8 strings should not be terminated | Add "or UTF-8" after "ASCII" |
| CID 7400Mark RISON9.4.2.1541045.22 | Is Table 9-244 normative, i.e. are no other LLC Header Copy field sizes allowed, and are no other LLC header types allowed? | Make the table informative |
| CID 7292Mark RISON6144.1 | There are some parameters called "SupportedRate", but this concept is not defined | Change to "OperationalRateSet" for MLME-(RE)ASSOCIATE.indication and MLME-DLS.\* |
| CID 7499Mark RISON8.3.4.4549.25 | "At most 4 bits out of 8 may be set to 1." for ACTIVE\_RXCHAIN\_SET - does this mean that a VHT STA with > 4 receive chains can't use SMPS (because a STA with SMPS is required to enable all rx chains when not in SMPS mode)? | Delete this restriction |
| CID 7532Mark RISON11.421880.47 | "A  STA  that  is  not  a  VHT  STA  shall  setdot11OperatingModeNotificationImplemented  to  false." -- there is no justification for this.  Why can't an HT non-VHT STA do OMN? | Delete this sentence |
| CID 7549Mark RISON9.6.8.161146.29 | The TDLS Discovery Response frame format  (which is the only TDLS frame which is not tunnelled in a Data frame) does not have space for VSIEs.  Note this is not the usual thing where you have an Action field being described, where the Action frame containing the Action field can have some VSIEs after it | Allow for VSIEs at the end of the frame |
| CID 7746Mark RISON10.3.71297.34 | " provided  that  the  CCAsensitivity specification for the attached PHY is met (see 15.4.6.5 (CCA), 16.3.8.5 (CCA), 17.3.10.6 (CCArequirements), 18.4.6 (CCA performance) and 19.3.19.5 (CCA sensitivity))." -- what about Clauses 20 and 21 and 22? | Add references to the CCA bit of these.  Or just delete the parenthesis |
| CID 7795Mark RISON | "A STA shall support the concurrent reception of fragments of at least three MSDUs or MMPDUs." -- frankly, this is not good enough nowadays, even for non-AP STAs (consider QoS, for example) | Add "A STA should support the concurrent reception of fragments of at least one MSDU per access category.  An AP should support the concurrent reception of at least on MSDU per access category per associated STA." |
| CID 7608Mark RISON6.5.4.2534.55 | "The relationship between aMACProcessingTime and the IFS and slot timing is described in 9.3.7 (DCF timing relations) and illustrated in Figure 9-19 (DCF timing relationships)." -- needs to be extended to EDCA | Add references to the EDCAF timing relations subclause and figure |

Discussion:

564.1: “ASCII strings are not null terminated.”

1045.22: 

177.36: 

246.60: 

549.21: 

1146.1: 

1308.44: 

Proposed resolution:

ACCEPTED

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| Identifiers | Comment | Proposed change |
| CID 7427Mark RISON11.23.11740.44 | "A DMG STA shall not use the TDLS protocol." -- may it use DLS? | Change to "A DMG STA shall not use the DLS or TDLS protocols." |

Discussion:

No, it may not. See 11.7 DLS operation, 11.7.1 General: “Since the channel access in a DMG BSS allows DMG STAs to send frames directly to each other, a DMG STA shall not use the DLS protocol.” But it’s not clear why an excuse is needed (there’s no excuse for TDLS).

Proposed resolution:

REVISED

At 1658.41 change “Since the channel access in a DMG BSS allows DMG STAs to send frames directly to each other, a DMG STA shall not use the DLS protocol.” to “A DMG STA shall not use the DLS protocol.”

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| Identifiers | Comment | Proposed change |
| CID 7529Mark RISON9.3.3.15647.8 | There is no reason Action No Acks can't have MICEs.  While at the moment it may be the case that such frames carry "information [...] that is of time critical but transient value" (resolution of CID 6343), this is not a property of Action No Acks per se | Add MICEs to Table 9-39 as in Table 9-38 |

Discussion:





There are ~70 instances of “Action No Ack”. None of them indicate that Action No Acks are only for “information [...] that is of time critical but transient value”. Indeed, to the contrary, 9.6.20.5 Information Response frame format indicates that an Information Response frame (which has a category of DMG, which per Table 9-47 does not receive privacy) may be broadcast in an Action No Ack.

Proposed changes:

Change Table 9-39—Action No Ack frame body to:

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Action |
| Last – 1 | One or more vendor-specific elements are optionally present. |
| Last | The Management MIC element (MME) is present when management frame protection is enabled at the AP, the frame is a group addressed robust Action No Ack frame, and the category of the Action No Ack frame does not receive privacy as indicated by Table 9-47 (Category values). |

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7529 in <this document>, which effect the requested change.

Note to the commenter: the information in Information Response frames is not “information [...] that is of time critical but transient value”.

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| Identifiers | Comment | Proposed change |
| CID 7349Mark RISON | It was stated during D4.0 comment resolution (\*cough\*Adrian\*cough\*) that "transmission of the Beacon at TBTT is a famously individual and unnamed channel access function" | Add a subclause on this CAF |

Discussion:

The current rules on beacon generation make no mention of any special channel access function. However, it is desirable, on power-saving grounds, for beacons to take precedence over other transmissions.

There are very specific rules for beacons in IBSSen (11.1.3.5) and in DMG BSSen (11.1.3.3 and 11.1.3.4). It is only for non-DMG infrastructure BSSen and MBSSen that the rules are vague.

Proposed changes:

Change the first para of 11.1.3.2 Beacon generation in non-DMG infrastructure networks as follows:

The AP shall define the timing for the entire BSS by transmitting Beacon frames according to dot11BeaconPeriod. This defines a series of TBTTs exactly dot11BeaconPeriod TUs apart. Time 0 is defined to be a TBTT with the Beacon frame being a DTIM. At each TBTT, the AP shall schedule a Beacon frame as the next frame for transmission by~~. At each TBTT the AP should~~ suspending the transmission of ~~decrementing of the backoff timer for~~ any pending non-B~~b~~eacon frames~~transmission~~, ~~and~~ transmitting the Beacon frame when the DCF backoff timer or an EDCAF backoff timer reaches 0 (according to the medium access rules specified in Clause 10 (MAC sublayer functional description)) and then unsuspending the transmission of any pending non-Beacon frames. The beacon period is included in Beacon and Probe Response frames, and a STA shall adopt that beacon period when joining the BSS, i.e., the STA sets dot11BeaconPeriod to that beacon period.

Change the second para of 14.13.3.1 Beacon generation in MBSSs as follows:

The mesh STA shall define a series of TBTTs exactly dot11BeaconPeriod TUs apart. Time zero is defined to be a TBTT with the Beacon frame containing a DTIM. At each TBTT, the mesh STA shall schedule a Beacon frame as the next frame for transmission by suspending the transmission of any pending non-Beacon frames, transmitting the Beacon frame when an EDCAF backoff timer reaches 0 (according to the medium access rules specified in Clause 10 (MAC sublayer functional description)) and then unsuspending the transmission of any pending non-Beacon frames. The beacon period is included in Beacon and Probe Response frames.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7349 in <this document>, which clarify the CAF for non-DMG infrastructure BSSen and MBSSen.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7429Mark RISON11.2.2.5.21579.25 | "The non-AP STA may transmit multiple ADDTS Request frames to the AP where the last received ADDTS Request frame will override any previously received ADDTS Request frame." -- this seems too general: it only applies if the TID/direction are the same. Any anyway, what is this doing in 11.2.2.5.2 U-APSD coexistence | Confirm the specific rules for one ADDTS Req overriding an earlier one are covered elsewhere, then delete this sentence |

Discussion:

No, they are not covered elsewhere! Oops!

Proposed changes:

At the referenced location delete the cited sentence.

Change the para of 11.4.3 TS life cycle at 1637.21 as follows:

While the TS is active, the non-AP STA can attempt to renegotiate the parameters of the TSPEC characterizing the TS or the parameters of the DMG TSPEC characterizing the allocation carrying the TS ~~can be renegotiated, when the renegotiation is initiated by the non-AP STA. This negotiation might succeed, resulting in a change to the TSPEC or DMG TSPEC, or might fail, resulting in no change to the TSPEC or DMG TSPEC~~.

Change the first para of 11.4.4.4 TS setup procedures for both AP and non-AP STA initiation as follows:

The non-AP STA’s SME decides that a TS needs to be created. How it does this, and how it selects the TSPEC or DMG TSPEC parameters, is beyond the scope of this standard. The SME generates an MLME-ADDTS.request primitive containing a TSPEC or DMG TSPEC. A TSPEC or DMG TSPEC may also be generated autonomously by the MAC without any initiation by the SME. ~~However, if a TSPEC or DMG TSPEC is generated subsequently by the SME and the responding MLME-ADDTS.confirm primitive contains ResultCode=SUCCESS, the TSPEC or DMG TSPEC containing the same TSID generated autonomously by the MAC shall be overridden. If one or more TSPECs or DMG TSPECs are initiated by the SME, the autonomous TSPEC or DMG TSPEC shall be terminated.~~

NOTE—Such a TSPEC or DMG TSPEC might be overridden as a result of a subsequent MLME-ADDTS.request primitive from the SME (see 11.4.4.4b).

Change the paras of 11.4.4.4 TS setup procedures for both AP and non-AP STA initiation at 1641.35 as follows:

The parameters that are set for a TS may be renegotiated in a similar manner (see 11.4.4.b)~~, when such a request is generated by the SME through ADDTS.request primitive. When a request for the modification of the TS parameters is accepted by the HC, it shall reset both the suspension interval and the inactivity interval timers.~~

~~When a request for the modification of the TS parameters is accepted by a non-AP STA, it shall reset the inactivity interval timers.~~

Insert a new subclause 11.4.4.4b TS renegotiation as follows:

A non-AP STA may attempt to modify the parameters of a TSPEC or DMG TSPEC by transmitting an ADDTS Request or DMG ADDTS Request frame respectively. If the Status Code in the corresponding ADDTS Response or DMG ADDTS Response frame is SUCCESS, then any TSPEC or DMG TSPEC with the same TSID is overridden with the TSPEC or DMG TSPEC in the that frame, the HC and non-AP STA shall reset the inactivity interval timer, and the HC shall reset the suspension interval timer.

Change the second para of K.4 TSPEC construction as follows:

Note that a TSPEC can also be generated autonomously by the MAC without any initiation by the SME. However, if a TSPEC is generated subsequently by the SME, the TSPEC generated autonomously by the MAC ~~is~~might be overridden (see 11.4.4.4b). ~~If one or more TSPECs are initiated by the SME, the autonomous TSPEC, containing the same TSID is terminated.~~

At 1577.13 change “overwrites” to “overrides”.

At 848.61 change “TID” to “TSID”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7429 in <this document>, which make the rules for TSPEC overriding clear.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID Mark RISON |  |  |

Discussion:

Proposed changes:

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID in <this document>, which

Font size error at 1766.42 (after “NOTE”).

**References:**

802.11mc/D5.0