IEEE P802.11
Wireless LANs

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| --- |
| SB01 resolutions for various comments |
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Abstract

This document proposes resolutions for various comments from SB01.

Editing instructions based on P802.11ac/D5.0.

## CID 10229

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10229 | 2.11 | 3.1 | What is an "associated" MPDU? "Associated" has a definite meaning in 802.11, and this usage doesn't seem to match. Either use another term or delete "associated". | Delete "associated" from this definition. | ACCEPTED |

### Context with proposed edit

**aggregate medium access control (MAC) protocol data unit (A-MPDU) subframe**: A portion of an A-MPDU containing a delimiter and optionally containing an MPDU.

## CID 10357

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10357 |  | 3.2 | Inconsistency with VHT (and HT ) long forms -- some have hyphens and some are missing hyphen b/w "high" and "thoughtput". | Pls correct inconsistencies. (Or defer this to the next 11m ballot comment.) | REJECTED – Since the baseline itself is inconsistent in the use of high-throughput vs high throughput, it is suggested that this be taken up with TGmc. Further discussion is presented in 13/727. |

### Discussion

The commenter points to the inconsisitent use of “high-throughput” in the baseline and “very high throughput” in the TGac draft. While the majority of the usage in the baseline does have the hyphenated form, there are a few instances where the non-hyphenated form is used:

* “high throughput” is listed as a keyword in the frontmatter
* The title of Clause 20 is “High Throughput (HT) PHY”
* “40 MHz high throughput” is a defined term in subclause 3.2
* The acronym HT is defined as “high throughput” in 3.3
* The acronym HTC is defined as “high throughput control” in 3.3
* The BSS Information field has a subfield labelled “High Throughput”

The most obvious inconsistencies between the baseline and the TGac draft is

4.3.10a Very High Throughput (VHT) station (STA) vs 4.3.10 High-Throughput (HT) station (STA)

I would suggest we have TGmc fix the inconsistencies.

## CID 10259

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10259 | 44.62 | 8.2.5.2 | What is a "feedback segment"? The concept at least needs to be introduced before it is used to define a part of a frame. | Introduce "feedback segment" before making this reference in this definition. Include the relationship of this concept to Beamforming Report Poll frames. | REVISED – The forward reference provides the necessary detail. Change “(see 9.31.5 (VHT sounding protocol)) to (as defined in 9.31.5.3 (Rules for fragmented feedback in VHT sounding procol sequences)) so that the reference is more specific. |

### Context

**8.2.5.2 Setting for single and multiple protection under enhanced distributed channel access (EDCA)**

**….**

The estimated duration for a VHT Compressed Beamforming frame response is determined by assuming that:

* All feedback segments (as defined in 9.31.5.3 (Rules for fragmented feedback in VHT sounding protocol sequences)) are transmitted, even if a Beamforming Report Poll frame is used and not all the bits in the Feedback Segment Retransmission Bitmap field therein are equal to 1.
* …

### Discussion

The forward reference to 9.31.5 after the term “feedback segments” refers the reader to the section of text that defines the term. This section was since broken into subclauses. The suggestion is that we update the reference to the specific subclause (9.31.5.3 (Rules for fragmented feedback in VHT sounding protocol sequences)) that deals with feedback segments.

## CID 10276

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10276 | 75.10 | 8.4.2.10 | The letter 'Q' is best kept as a variable indicating a spatial mapping matrix. | Replace "Qx3" in this figure with "3n", replace "Q" on line 35 with "n" (in italics), the usual variable indicating an integer number, and replace "One or more" at the top of Figure 8-90a with "n" (The meaning of this variable in Figure 8-90a is already explained in the text above the figure.) | REJECTED – In describing the inclusion of these subfields, Q, M, P and N are all used as variable names. The variables are clearly defined in the text. |

### Context



…

If dot11OperatingClassesRequired is false, then the Triplet field is a single Subband Triplet Sequence field, as shown in Figure 8-90a, that is composed of *Q* Subband Triplet fields, where *Q* is one or more. The format of the Subband Triplet field is shown in Figure 8-90b.

…

If dot11OperatingClassesRequired is true, then the Triplet field is composed of zero or more Subband Triplet fields followed by one or more Operating/Subband Sequences, as shown in Figure 8-90c. Each Operating/Subband Sequence is composed of one Operating Triplet field followed by one Subband Triplet Sequence field, as shown in Figure 8-90d. Each Subband Triplet Sequence field is composed of zero or more Subband Triplet fields. If dot11OperatingClassesRequired is true, the number of triplets in the Triplet field is

where *N* is the total number of Subband Triplet fields and *M* is the total number of Operating/Subband Sequences contained in Country element and *P(m)* is the number of Subband Triplet fields making up Operating/Subband Sequence field *m*.

## CID 10023

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10023 | 122.05 | 9.2.1 | Subclause 9.2.1 is amended by IEEE Std 802.11ad-2012 and need to be amended by 802.11ac. | Modify the 1st paragraph of 9.2.1 and Figure 9-1 as following.--- proposed text ----The MAC architecture is shown in Figure 9-1. When operating with any of the Clause 14 through 20 PHYs or Clause 22 PHY, ....---- Figure 9-1 modification ----Replace the text in the left lowest box by "FHSS, IR, DSSS, OFDM, HR/DSSS, ERP, HT or VHT PHY". | ACCEPTED |

### Context



## CID 10294

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10294 | 126.22 | 9.3.2.9a | Claiming to \_ensure\_ anything is very strongly discouraged in an IEEE standard. If you want to keep that term, bring your lawyers. | Replace "ensure that there can only be an immediate response to one" with "are designed to prevent an immediate response to more than one". | REVISED – replace with “prevent an immediate response to more than one” |

### Context with proposed change

**9.3.2.9a MU acknowledgement procedure**

The acknowledgement procedure performed by a STA that receives MPDUs that were transmitted within a

VHT MU PPDU is the same as the acknowledgement procedure for MPDUs that were not transmitted within a VHT MU PPDU.

NOTE—All MPDUs transmitted within a VHT MU PPDU are contained within A-MPDUs and the rules specified in

8.6.3 (A-MPDU contents) prevent an immediate response to more than one of the A-MPDUs.

## CID 10328

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10328 | 159.44 | 9.25.1 | The content of this NOTE appears more to be a normative statement that should be made directly. | Replace NOTE 2 with:"If the RD responder is a VHT AP, the RD response burst may contain VHT MU PPDUs." If this statement is entailed by some other normative text, include a pointer to that location. | REJECTED – The behavior described in the note is supported by standard, albeit not explicitly, so the note adds a useful clarification. |

### Context with proposed change

**9.25.1 Reverse direction (RD) exchange sequence**

***Change the note and add a note as follows:***

NOTE 1—An RD initiator might include multiple RD exchange sequences within a single TXOP. Each RD exchange sequence within a single TXOP might be addressed to a different recipient, and any single recipient might be given more than one RDG within a single TXOP.

NOTE 2—If the RD responder is a VHT AP, the RD response burst can contain VHT MU PPDUs.

## CID 10329

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10329 | 162.21 | 9.28.3 | There are far too many somewhat-informative NOTEs in 9.28.3. If the notes are that important, then either make their content normative or include that information in an informative annex. | Delete all of the NOTEs in 9.28.3. | REVISED |

### Context with proposed change

**9.28.3 Link adaptation using the VHT variant HT Control field**

**…**

The MFB requester may set the MRQ field to 1 in the VHT variant HT Control field of a frame to request a STA to provide link adaptation feedback. In each request the MFB requester shall set the MSI/STBC field to a value in the ranges 0 to 6, 0 to 2 or 0 to 3, depending on the settings in the Unsolicited MFB and STBC fields (see 8.2.4.6.3 (VHT variant)). The choice of MSI value is implementation dependent.

…

An MFB responder that discards or abandons the MFB estimates computed in response to an MRQ may indicate that it has done so by setting the VHT-MCS to 15 and NUM\_STS to 7 in the MFB subfield in the next frame addressed to the MFB requester that includes the VHT variant HT Control field. The value of the MFSI is set to the value of the MSI/STBC subfield of the frame that contains an MRQ for which the computation was abandoned, regardless of whether the MSI/STBC subfield contains an MSI or a Compressed MSI and STBC Indication subfields.

NOTE—The MFB requester advertises the maximum number of spatial streams that it can transmit in its Supported

VHT-MCS and NSS Set in the VHT Capabilities element.

The STA receiving MFB may use the received MFB to compute the appropriate VHT-MCS, SNR, and

NUM\_STS.

NOTE—An MFB responder that receives a VHT MU PPDU can compute the interference level from the VHT-LTF field. In this case the value in the SNR subfield indicates the averaged signal to interference and noise ratio (SINR).

…

In an unsolicited MFB response the GID-L, GID-H, Coding Type, STBC Indication, FB Tx Type and BW fields are set according to the RXVECTOR parameters of the received PPDU from which the VHT-MCS, SNR, BW and NUM\_STS are estimated, as follows:

* If the VHT-MCS, SNR, BW and NUM\_STS are estimated from a VHT MU PPDU, then the GID-L field is set to the 3 least significant bits and the GID-H field to the 3 most significant bits of the parameter GROUP\_ID
* If the VHT-MCS, SNR, BW and NUM\_STS are estimated from an SU PPDU, then the GID-L field and GID-H field are set to all 1s
* The Coding Type field is set to 0 if the parameter FEC\_CODING is equal to BCC\_CODING and set to 1 if equal to LDPC\_CODING
* The STBC Indication field is set to 1 if the parameter STBC is equal to 1 and set to 0 if the STBC parameter is equal to 0
* The FB TX Type field is set to 1 if the parameter BEAMFORMED is equal to 1 and set to 0 if equal to 0
* The BW field shall indicate a bandwidth equal to or less than the bandwidth indicated by the parameter CH\_BANDWIDTH

…

A STA may respond immediately to a current request for MFB with a frame containing an MFSI field value and an MFB field value that correspond to a request that precedes the current request.

NOTE 1—If a STA does not respond immediately to an MRQ, it can send an unsolicited MFB, which is computed based on the most recent PPDU matching the GID, Coding type, STBC and FB type of the PPDU that carried the MRQ, or can send an MFB that signals that the MRQ has been discarded (VHT-MCS = 15, NUM\_STS = 7, and MFSI equal to the MSI in the PPDU that carried the MRQ).

NOTE 2—If an MRQ is included in the last PPDU in a TXOP and there is not enough time for a response, the recipient can transmit the response MFB in a subsequent TXOP.

NOTE 3—Bidirectional request/responses are supported. In this case, a STA acts as the MFB requester for one direction of a duplex link and an MFB responder for the other direction and transmits both an MRQ and an MFB in the same VHT data frame.

## CID 10332

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10332 | 165.03 | 9.29.1 | As much as we'd like some entities to be doing some thinking, it's a bit too anthropomorphic to believe that subclauses can be doing assuming, or not. | Replace "This subclause assumes that only HT PPDUs are used and any HT Control field is an HT variant HT Control field." with "The rules in this subclause apply only to HT PPDUs and PPDUs with HT Control fields that are HT variant HT Control fields." | REVISED – In 9.29.1, delete the sentence “This subclause assumes… HT Control field.” In 9.29.2.1 replace the sentence “This subclause assumes…” with “The procedures for HT transmit beamforming with implicit feedback use only HT and non-HT PPDUs and the HT Control field, when present, is the HT variant HT Control field.” In 9.30.1, replace the sentence “This subclause assumes…” with “The procedures for antenna selection use only HT and non-HT PPDUs and the HT Control field, when present, is the HT variant HT Control field.” |

### Context with proposed change

**9.29.1 ~~General~~ HT steering matrix calculations**

In order for an HT beamformer to calculate an appropriate steering matrix for transmit spatial processing when transmitting to a specific HT beamformee, the HT beamformer needs to have an accurate estimate of the channel over which it is transmitting. Two methods of calculation are defined as follows:

* *Implicit feedback*: When using implicit feedback, the beamformer receives long training symbols transmitted by the HT beamformee, which allow the MIMO channel between the HT beamformee and HT beamformer to be estimated. If the channel is reciprocal, the HT beamformer can use the training symbols that it receives from the HT beamformee to make a channel estimate suitable for computing the transmit steering matrix. Generally, calibrated radios in MIMO systems can improve reciprocity. See 9.29.2.
* *Explicit feedback*: When using explicit feedback, the HT beamformee makes a direct estimate of the channel from training symbols sent to the HT beamformee by the HT beamformer. The HT beamformee may prepare CSI or steering feedback based on an observation of these training symbols. The HT beamformee quantizes the feedback and sends it to the HT beamformer. The HT beamformer can use the feedback as the basis for determining transmit steering vectors. See 9.29.3.

An HT STA shall not transmit a PPDU with the TXVECTOR EXPANSION\_MAT parameter present if dot11BeamFormingOptionActivated is false.

**9.29.2 HT t~~T~~ransmit beamforming with implicit feedback**

**9.29.2.1 General**

 The procedures for HT transmit beamforming with implicit feedback use only HT and non-HT PPDUs and the HT Control field, when present, is the HT variant HT Control field.

…

**9.30 Antenna selection (ASEL)**

**9.30.1 Introduction**

***Insert the following as the 1st paragraph:***

 The procedures for antenna selection use only HT and non-HT PPDUs and the HT Control field, when present, is the HT variant HT Control field.

…

## CID 10296, 10335, 10342, 10343 and 10345

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10296 | 128.50 | 9.7.4 | BSSBasicVHTMCS\_NSSSet (as a term, not the name of a parameter) has not been defined in the main body of text (definition in 3.2 doesn't count -- that is just a review list of defined concepts). This term (a) needs to be defined in the main body of the draft before this point in the text and (b) needs to be replaced by a term that is not just a mashed-togehther number of words (hopefully engineers' abilities in the language have grown beyond stringing words together to make up 'new' words). | Replace "BSSBasicVHTMCS\_NSSSet" with "VHT set" in the main text that is not talking about the formally defined parameter of the MLME-START.request primitive. Also define this term somewhere in the main body before this pont in the text. | REVISED – The definition is complete, however, some additional information could be provided on how an individual STA determines the set. The commenter’s suggestion to not create a term from concatenated words is accepted in principle. See discussion and editing instructions in <this document> |
| 10335 | 187.32 | 10.39.1 | "indicated by the BSSBasicVHTMCS\_NSSSet": what is the "BSSBasicVHTMCS\_NSSSet" here? Is it the parameter in the MLME-START.request, inside another parameter in the MLME-JOIN, inside a MIB variable, or what? | State precisely what "BSSBasicVHTMCS\_NSSSet" refers to here -- if it is the value of the parameter in the MLME-START.request primitive invocation, then say "BSSBasicVHTMCS\_NSSSet parameter in the MLME-START.request invocation". | REVISED – The text should refer to the Basic VHT-MCS and NSS Set field in the VHT Operation parameter in the MLME-START.request primitive. Editing instructions in <this document>  |
| 10342 | 192.41 | 10.39.7 | "BSSBasicVHTMCS\_NSSSet" here is not the primitive with that name, but a general concept that is not defined in the main body of this draft. Further, we don't call an access point "STAThatControlsAnInfrastructureBSS", so use an unique but more succinct name. | Replace "BSSBasicVHTMCS\_NSSSet" with "VHT set" and define this term somewhere in the main body somewhere before this subclause. | REVISED – A term is defined and used here. See discussion and editing instructions in <this document> |
| 10343 | 192.51 | 10.39.7 | "BSSBasicVHTMCS\_NSSSet" here is not the primitive with that name, but the name of a field in the BSSDescription. That needs to be made clear to the reader. | Replace "BSSBasicVHTMCS\_NSSSet transmitted by the AP." by "BSSBasicVHTMCS\_NSSSet in the BSSDescription transmitted by the AP." | REVISED – The AP transmits a VHT Operation element that includes a Basic VHT-MCS and NSS Set field. The text is modified accordingly with instructions in <this document> |
| 10345 | 208.38 | 13.2.7 | "uses the same BSSBasicVHTMCS\_NSSSet as the received Beacon or Probe Response frame indicates": it is not at all clear how the Beacon or Probe Response frame indicates any such thing. Are there multiple ways of indicating? If so, which one takes precedence? | Replace "as the received Beacon or Probe Reaponse frame indicates for the neighbor mesh STA." with "value as the value of the BSSBasicVHTMCS\_NSSSet field in the BSSDescription contained in the Beacon or Probe Response frame transmitted by the neighbor mesh STA." | REVISED – The STA transmits a VHT Operation element that includes a Basic VHT-MCS and NSS Set field. The text is modified accordingly with instructions in <this document> |

### Discussion

It appears that the broth has been spoiled. Never fear, we can fix things by adding a new cook.

In some contexts, BSSBasicVHTMCS\_NSSSet is used as a term (defined in the definitions section) and in others it is used as if it were a parameter. Digging into its use as a parameter uncovered a bunch of additional errors.

Firstly, BSSBasicVHTMCS\_NSSSet does not exist as a parameter in the MLME-START.request primitive. Instead, the information is provided in the VHT Operation parameter of this primitive. The definition of the VHT Operation parameter (in the primitive) references the VHT Opeartion element. In other words, the information in the parameter is what appears in the element when it gets transmitted. The field in the VHT Operation element that contains the “BSSBasicVHTMCS\_NSSSet” is called the Basic VHT-MCS and NSS Set field.

Furthermore, BSSBasicVHTMCS\_NSSSet is used as if it were an element of BSSDescription (in MLME-SCAN.confirm). It is not, but VHT Operation is present.

In the proposed edits I largely follow the commenter’s suggestion. I keep the definition, but make it look like a term (instead of a parameter) by added spaces: “BSS basic VHT-MCS and NSS set”. According to the commenter, mashing words together is sub-par for an engineer.

I elaborate on the definition in 10.39.7, adding text that helps the reader understand how the BSS basic VHT-MCS and NSS set is determined by an individual STA (it is different for the STA starting the BSS and the STA joining the BSS).

We could get away without having the term defined, but then we would have to refer in long hand to the MLME primitives (MLME-START.request and MLME-SCAN or MLME-JOIN) and for the Basic VHT-MCS and NSS Set field buried there.

### Context with proposed changes

**3.2 Definitions specific to IEEE 802.11**

**basic service set (BSS) basic very high throughput (VHT) modulation and coding scheme (MCS) and number of spatial stream (NSS) set (BSS basic VHT-MCS and NSS set)**: The set of MCS and number of spatial stream (NSS) tuples that are supported by all VHT stations (STAs) that are members of a VHT basic service set (BSS).

* Scan
* MLME-SCAN.confirm
* Semantics of the service primitive

Insert the following rows at the end of the second table in this subclause:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Type | Valid range | Description | IBSS adoption |
| VHT Capabilities | As defined in frame format | As defined in 8.4.2.160 (VHT Capabilities element) | The values from the VHT Capabilities element. The parameter is present if dot11VHTOptionImplemented is true and a VHT Capabilities element was present in the Probe Response or Beacon frame from which the BSSDescription was determined, and not present otherwise. | Do not adopt |
| VHT Operation | As defined in frame format | As defined in 8.4.2.161 (VHT Operation element) | The values from the VHT Operation element. The parameter is present if dot11VHTOptionImplemented is true and a VHT Operation element was present in the Probe Response or Beacon frame from which the BSSDescription was determined, and not present otherwise. | Adopt |

* Start
* MLME-START.request
* Semantics of the service primitive

Change the primitive parameter list and associated table (only rows with changes are shown in the table):

The primitive parameters are as follows:

MLME-START.request(

SSID,
SSIDEncoding,
BSSType,
BeaconPeriod,
DTIMPeriod,
CF parameter set,
PHY parameter set,
IBSS parameter set,
ProbeDelay,
CapabilityInformation,
BSSBasicRateSet,
OperationalRateSet,
Country,
IBSS DFS Recovery Interval,
EDCAParameterSet,
DSERegisteredLocation,
HT Capabilities,
HT Operation,
BSSMembershipSelectorSet,
BSSBasicMCSSet,
HTOperationalMCSSet,
Extended Capabilities,
20/40 BSS Coexistence,
Overlapping BSS Scan Parameters,
MultipleBSSID,
InterworkingInfo,
AdvertismentProtocolInfo,
RoamingConsortiumInfo,
Mesh ID,
Mesh Configuration,
QMFPolicy,(11ae)
DMG Capabilities,(11ad)
Multi-band,(11ad)
Multiple MAC Addresses,(11ad)
DMG Operation,(11ad)
Clustering Control,(11ad)
CBAP Only,(11ad)
PCP Association Ready,(11ad)
VHT Capabilities,
VHT Operation,
VendorSpecificInfo
)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid range | Description |
| VHT Capabilities | As defined in VHT Capabilities element | As defined in 8.4.2.160 (VHT Capabilities element) | Specifies the parameters in the VHT Capabilities element that are supported by the STA. The parameter is present if dot11VHTOptionImplemented is true, not present otherwise. |
| VHT Operation | As defined in VHT Operation element | As defined in 8.4.2.161 (VHT Operation element) | Provides additional information for operating the VHT BSS. The parameter is present if dot11VHTOptionImplemented is true, not present otherwise. |

* DCF
* General

All STAs that are members of a BSS are able to receive and transmit at all the data rates in the BSSBasicRateSet parameter of the MLME-START.request primitive or BSSBasicRateSet parameter of the BSSDescription representing the SelectedBSS parameter of the MLME-JOIN.request primitive; see 6.3.4.2.4 (Effect of receipt) and 6.3.11.2.4 (Effect of receipt). All HT STAs and DMG STAs(11ad) that are members of a BSS are able to receive and transmit using all the MCSs in the BSSBasicMCSSet parameter of the MLME-START.request primitive or BSSBasicMCSSet parameter of the BSSDescription representing the SelectedBSS parameter of the MLME-JOIN.request primitive; see 6.3.4.2.4 (Effect of receipt) and 6.3.11.2.4 (Effect of receipt). All VHT STAs that are members of a BSS are able to receive and transmit using all the <VHT-MCS, NSS> tuples in the BSS basic VHT-MCS and NSS set (see 10.39.7). To support the proper operation of the RTS/CTS by non-DMG STAs, RTS/DMG CTS by DMG STAs(11ad) and the virtual CS mechanism, all STAs shall be able to interpret control frames with the Subtype field equal to RTS or CTS and all DMG STAs shall be able to interpret control frames with the Subtype field ~~set~~ equal to RTS or DMG CTS(11ad).

* Multirate support
* Basic Rate Set and Basic MCS Set for mesh STA

Change the last two paragraphs as follows:

Mesh STAs should adopt the mandatory PHY rates as the default BSSBasicRateSet to reduce the risk that a candidate peer mesh STA utilizes a different BSSBasicRateSet. If the mesh STA is also an HT STA, it should adopt the ~~MCSs of~~ mandatory HT MCSs as the default BSSBasicMCSSet. If the mesh STA is also a VHT STA, it should adopt <VHT-MCS, NSS> tuples formed from the mandatory VHT-MCSs and NSS = 1 as the default BSS basic VHT-MCS and NSS set (see 10.39.7).

Once the mesh STA establishes a mesh peering with a mesh STA, it shall not change ~~neither~~ the BSSBasicRateSet parameter, ~~nor the~~ BSSBasicMCSSet parameter or BSS basic VHT-MCS and NSS set.

* Rate selection for data and management frames
* Rate selection for other group addressed data and management frames

Change the last two paragraphs as follows:

If the BSSBasicRateSet parameter is empty and the BSSBasicMCSSet parameter is not empty, the frame shall be transmitted in an HT PPDU using one of the MCSs included in the BSSBasicMCSSet parameter.

If the BSSBasicRateSet parameter is empty and the BSSBasicMCSSet parameter is empty and the BSS basic VHT-MCS and NSS set is not empty, the frame shall be transmitted in a VHT PPDU using one of the <VHT-MCS. NSS> tuples included in the BSS basic VHT-MCS and NSS set.

If ~~both~~ the BSSBasicRateSet parameter, ~~and~~ the BSSBasicMCSSet parameter and the BSS basic VHT-MCS and NSS set are empty (e.g., a scanning STA that is not yet associated with a BSS), the frame shall be transmitted in a non-HT PPDU using one of the mandatory PHY rates.

* Rate selection for other individually-addressed data and management frames

When the supported rate set of the receiving STA is not known, the transmitting STA shall transmit using a rate in the BSSBasicRateSet parameter, or an MCS in the BSSBasicMCSSet parameter, or a <VHT-MCS, NSS> tuple in the BSS basic VHT-MCS and NSS set, or a rate from the mandatory rate set of the attached PHY if ~~both~~ the BSSBasicRateSet parameter, ~~and~~ the BSSBasicMCSSet parameter and BSS basic VHT-MCS and NSS set are empty.(#10299)

* Rate selection for control frames that initiate a TXOP

When transmitting a VHT PPDU, a STA shall select a <VHT-MCS, NSS> tuple from the BSS basic VHT-MCS and NSS set when protection is required (as defined in 9.23) and shall select a <VHT-MCS, NSS> tuple supported by the receiver STA, as reported in the Supported VHT-MCS and NSS Set field in the VHT Capabilities element received from that STA.

* Rate selection for control frames that are not control response frames

A frame that is carried in a VHT PPDU shall be transmitted by the STA using a <VHT-MCS, NSS> tuple supported by the receiver STA, as reported in the Supported VHT-MCS and NSS Set field in the VHT Capabilities element received from that STA. When the Supported VHT-MCS and NSS set of the receiving STA or STAs is not known, the transmitting STA shall transmit using a <VHT-MCS, NSS> tuple in the BSS basic VHT-MCS and NSS set (see 10.39.7).

**10.3 STA authentication and association**

**10.3.5 Association, reassociation, and disassociation**

**10.3.5.3 PCP/AP association receipt procedures**

***Change the 2nd paragraph by inserting a new list element h) following element g) and re-lettering subsequent elements as follows:***

Upon receipt of an Association Request frame from a non-PCP/non-AP STA for which the state is State 2, State 3, or State 4, the PCP/AP's MLME shall associate with the non-PCP/non-AP STA using the following procedure:

g) The SME shall refuse an association request from an HT STA that does not support all the MCSs in the BSSBasicMCSSet parameter.

h) The SME shall refuse an association request from a VHT STA that does not support all the <VHT-MCS, NSS> tuples indicated by the Basic VHT-MCS and NSS Set field of the VHT Operation parameter in the MLME-START.request primitive.

**10.3.5.5 PCP/AP reassociation receipt procedures**

***Change the 2nd paragraph by inserting a new list element g) following element h) and re-lettering subsequent elements as follows:***

Upon receipt of a Reassociation Request frame from a STA for which the state is State 2, State 3, or State 4, the PCP/AP's MLME shall reassociate with the STA using the following procedure:

f) The SME shall refuse a reassociation request from an HT STA that does not support all the MCSs in the BSSBasicMCSSet parameter.

g) The SME shall refuse a reassociation request from a VHT STA that does not support all the <VHTMCS, NSS> tuples indicated by the Basic VHT-MCS and NSS Set field of the VHT Operation parameter in the MLME-START.request primitive.

**10.39 VHT BSS operation**

**10.39.1 Basic VHT BSS functionality**

A STA that is starting a VHT BSS shall be able to receive and transmit at each of the <VHT-MCS, NSS> tuple values indicated by the Basic VHT-MCS and NSS Set field of the VHT Operation parameter of the MLME-START.request primitive and shall be able to receive at each of the <VHT-MCS, NSS> tuple values indicated by Supported VHT-MCS and NSS Set field of the VHT Capabilities parameter of the MLME-START.request primitive.

…

**10.39.7 BSS basic VHT-MCS and NSS set operation**

The BSS basic VHT-MCS and NSS set is the set of <VHT-MCS, NSS> tuples that are supported by all VHT STAs that are members of a VHT BSS. It is established by the STA that starts the VHT BSS, indicated by the Basic VHT-MCS and NSS Set field of the VHT Operation element in the MLME-START.request primitive. Other VHT STAs determine the BSS basic VHT-MCS and NSS set from the Basic VHT-MCS and NSS Set field of the VHT Operation element in the BSSDescription derived through the scan mechanism (see 10.1.4.1 (Aquiring synchronization, scanning)).

A VHT STA shall not attempt to join (MLME-JOIN.request) a BSS unless it supports (i.e., is able to both transmit and receive using) all the <VHT-MCS, NSS> tuples in the BSS basic VHT-MCS and NSS set.

A VHT STA shall not attempt to (re-)associate (MLME-ASSOCIATE.request and MLME-REASSOCIATE. request) with a VHT AP unless the STA supports (i.e., is able to both transmit and receive using) all the <VHT-MCS, NSS> tuples in the Basic VHT-MCS and NSS Set field in the VHT Operation element transmitted by the AP.

* MLME mesh procedures
* Mesh discovery
* Mesh STA configuration

Change as follows:

The mesh STA configuration consists of the mesh profile (see 13.2.3), the Supported Rates element, the Extended Supported Rates element, and the HT Operations element (if present), and the VHT Operations element (if present).

Mesh STA configurations are identical if the following conditions hold:

* The mesh profiles are identical.
* The BSSBasicRateSet parameters are identical.
* For HT mesh STAs, the BSSBasicMCSSet parameters are identical.
* For VHT mesh STAs, the Basic VHT-MCS and NSS Set fields in the VHT Operation element are identical.
* Candidate peer mesh STA

Change the lettered list in the 2nd paragraph by inserting a new element e) following d) as follows and re-lettering the subsequent element:

The discovered neighbor mesh STA shall be considered a candidate peer mesh STA if and only if all of the following conditions are met:

* If both the scanning mesh STA and the discovered neighbor STA are HT STAs, the mesh STA uses the same BSSBasicMCSSet as the received Beacon or Probe Response frame indicates for the neighbor mesh STA.
* If both the scanning mesh STA and the discovered neighbor STA are VHT STAs, the mesh STA uses the same value for the Basic VHT-MCS and NSS Set field in its VHT Operation element as received in the Beacon or Probe Response frame from the neighbor mesh STA.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10055 | 410.30 | S | Has the MATLAB code in 11-06/1714 been checked to see if it runs under the latest versions of MATLAB? The reason for asking is that it is 6 years old. | Check that this legacy MATLAB code still runs? | REJECTED – The commenter has not identified a problem with the draft. In response to the commenter’s question, it is not known whether the code still runs on the latest version of MATLAB. |