IEEE P802.11
Wireless LANs

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| Comment Resolution for Subclause 9.7  |
| Date: 2014-1-17 |
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Abstract

This submission proposes resolutions for comments in clause 9.7 of TGah Draft 1.0 with the following CIDs:

1197, 1198, 1199, 1200, 1471, 1472, 1473, 1474, 1475, 1721, 1722, 2495, 2589, 2590, 2591, 2871

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGah Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGah Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGah Editor: Editing instructions preceded by “TGah Editor” are instructions to the TGah editor to modify existing material in the TGah draft. As a result of adopting the changes, the TGah editor will execute the instructions rather than copy them to the TGah Draft.***

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| **CID** | **Page.Line** | **Subclause** | **Comment** | **Propose Change** | **Resolution** |
| 1197 | 162.48 | 9.7.6.5.5 | Unused heading | delete it | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1198 | 162.56 | 9.7.6.6 | "is allowed"1. Wrong verb type for a normative effect2. Passive voice is considered dangerous | Reword without the passive voice as a "may" statement. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1199 | 163.06 | 9.7.6.6 | "is not allowed".Two problems here: 1) passive voice. 2) improper verb for normative requirement | Review all "not allowed" and replace with "shall not" where it describes behavior. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1200 | 163.14 | 9.7.6.6 | "indicate the OBSS mitigation support" -- too many articles | delete "the". | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1471 | 162.08 | 9.7.5.3 | MCS selection rules for group addressed data and management frames are undefined for 11ah. | With reference to REVmc D1.1 add the following at the end of subclause 9.7.5.3: "If the BSSBasicS1GMCS\_NSSSet is not empty, the frame shall be transmitted in a S1G PPDU using one of the <S1G-MCS, NSS> tuples included in the BSSBasicS1GMCS\_NSSSet parameter." | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1472 | 162.08 | 9.7.5.6 | MCS selection rules for individually addressed data and management frames are undefined for 11ah. | With reference to 802.11ac D5.0 subclause 9.7.5.6: Add another bullet after the second bullet: - "A STA shall not transmit a frame using a <S1G-MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported S1G-MCS and NSS Set field in management frames transmitted by the receiver STA."Add another bullet after the 7th bullet: - "Except as described below, an S1G STA that is a member of a BSS shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received S1G Operation element."Change the 2nd subbullet of the 8th bullet to: - "Transmissions by a VHT or S1G STA on a TDLS link follow the rules described in 10.22.1 and 10.22.6.4"Add the corresponding typles for S1G immediately after the ones for VHT in the before last paragraph, namely,", or a <S1G-MCS, NSS> tuple in the BSSBasicS1GMCS\_NSSSet parameter" and ", and the BSSBasicS1GMCS\_NSSSet". | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1473 | 162.13 | 9.7.6.5 | Define the correct MCS selection Rules for control responses for S1G STAs | as in the comment | The MCS Negotiation is introduced for the power imbalance situations. The 11ac behavior is extended for other cases in 11ah.Revised:TGah editor to make changes shown in 11-14-0139r0 |
| 1474 | 162.55 | 9.7.6.6 | The indication in the S1G Capabiltiy element for a STA do indicate that it uses 1MHz control response frames is missing | Add indication in the S1G Capability element to signal 1MHz control responses. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1475 | 163.13 | 9.7.6.6 | When OBSS Mitigation Support is indicated the receiver may also respond with NDP BlockAck frames for which the receiver has the same limitations as the NDP ACK frames. Hence, also NDP BLockAck frames must be allowed to be sent in a similar way as NDP ACKs. | Replace "NDP ACK" with "NDP ACK or NDP BlockAck". | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1721 | 162.55 | 9.7.6.6 | Per the IEEE Style Manual permissions are stated in terms of the verb "may", not "is allowed". In addition, the statement "1MHz preamble transmission as the reseponse of >= 2MHz short/long preamble is allowed" is confused. | Replace this statement with a clear normative statement using the term "may" and eliminating "is allowed". | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 1722 | 163.18 | 9.7.6.6 | How does a frame elicit a response? If the idea is just that it is a request frame, then specify that directly. | Replace the text about eliciting a response with a specification of the frame -- perhaps as a request frame. | Reject:The sentence is clear and there is no need to modify. |
| 2495 | 162.27 | 9.7.6.5.2 | The change is incomplete - a new condition for the MCS selection of the response is being added, and it includes a qualifier for when the new condition is to be used. The old MCS selection rule listed here now needs a qualifier too, one that has the inverse value of the new qualifier. | Change to "When not performing asymmetric Block Ack Operation the STA may select an alternate rate according to the rules in 9.7.6.5.4. and the STA shall transmit the non-HT PPDU BlockAck control response frame at either the primary rate or the alternate rate, if one exists." | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 2589 |  | 9.7.5.1 | The subclause 9.7.5.1 (Rate selection for non-STBC Beacon and non-STBC PSMP frames) of the IEEE P802.11mc D1.1 specifies that the frame shall be transmitted in a non-HT PPDU using one of the mandatory PHY rates If the BSSBasicRateSet parameter is empty.This is not applicable to an S1G STA as it does not support non-HT PPDU.A (Short) Beacon shall be transmitted in a PPDU which is mandatory supported by all S1G non-AP STAs. | Insert the subclause 9.7.5.1 (Rate selection for non-STBC Beacon and non-STBC PSMP frames), and insert a following text as the 1st paragraph of the 9.7.5.1:---For an S1G STA, a non-STBC PSMP frame or a non-STBC (Short) Beacon shall be transmitted in an S1G 1MHz PPDU, an S1G 2MHz PPDU with short preamble, an S1G 1 MHz Duplicated PPDU or an S1G 2 MHz Duplicated PPDU with short preamble using one of the mandatory PHY rates. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 2590 |  | 9.7.5.3 | The subclause 9.7.5.3 (Rate selection for other group addressed data and management frames) of the IEEE P802.11ac D5.0 specifies that the frame shall be transmitted in a non-HT PPDU using one of the mandatory PHY rates If the BSSBasicRateSet parameter, the BSSBasicMCSSet parameter and the BSS basic VHT-MCS and NSS set are empty.This is not applicable to an S1G STA as it does not support non-HT PPDU. | Insert the subclause 9.7.5.3 (Rate selection for other group addressed data and management frames), and insert a following text as the 3rd last paragraph of the 9.7.5.3:---For S1G STA, if the BSS basic S1G-MCSand NSS set are empty, the frame shall be transmitted in an S1G 1MHz PPDU, an S1G 2MHz PPDU with short preamble, an S1G 1 MHz Duplicated PPDU or an S1G 2 MHz Duplicated PPDU with short preamble using one of the mandatory PHY rates. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 2591 |  | 9.7.6.1 | The subclause 9.7.6.1 (General rules for rate selection for control frames) of the IEEE P802.11ac D5.0 does not specify proper rule for an S1G STA. | Insert the subclause 9.7.6.1 (General rules for rate selection for control frames) , and modify the 2nd paragraph as follows:---The following rules determine whether a control frame is carried in an HT PPDU, non-HT, HT, VHT or S1G PPDU: a) A control frame shall be carried in an S1G PPDU when the control frame is transmitted by an S1G STA. b) .. | Agree with the commenterRevised:TGah editor to make changes shown in 11-14-0139r0 |
| 2871 | 162.08 | 9.7 | The rate selection rule for a S1G PPDU transmission is not described. | Update the sub-clause 9.7 for the S1G PPDU transmission. | It is defined in this document.Revised:TGah editor to make changes shown in 11-14-0139r0 |

**Discussion:** *None.*

*TGah Editor to make the following changes based on 802.11ac rev5*

* 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 BSSBasicVHTMCS\_NSSSet. If the mesh STA is also a S1G STA, it should adopt <S1G-MCS, NSS> tuples formed from the mandatory S1G-MCSs and NSS = 1 as the default BSSBasicS1GMCS\_NSSSet.

Once the mesh STA establishes a mesh peering with a mesh STA, it shall not change ~~neither~~ the BSSBasicRateSet, ~~nor the~~ BSSBasicMCSSet, BSSBasicVHTMCS\_NSSSet or BSSBasicS1GMCS\_NSSSet parameters.

* Rate selection for data and management frames

**9.7.5.1 Rate selection for non-STBC Beacon and non-STBC PSMP frames**

***TGah Editor to insert the following at the beginning of the subclause:***

For an S1G STA, non-STBC PSMP frames and non-STBC (Short) Beacons shall be transmitted in an S1G 1MHz PPDU, an S1G 2MHz PPDU with short preamble, an S1G 1 MHz Duplicated PPDU or an S1G 2 MHz Duplicated PPDU with short preamble using one of the mandatory PHY rates.

* Rate selection for other group addressed data and management frames

Change the last three 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 BSSBasicVHTMCS\_NSSSet is not empty, the frame shall be transmitted in a VHT PPDU using one of the <VHT-MCS. NSS> tuples included in the BSSBasicVHTMCS\_NSSSet parameter. For non S1G STA, if ~~both~~ the BSSBasicRateSet parameter, ~~and~~ the BSSBasicMCSSet parameter and the BSSBasicVHTMCS\_NSSSet parameter 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.

For an S1G STA, if the BSSBasicS1GMCS\_NSSSet parameter is empty (e.g., a scanning STA that is not yet associated with a BSS), the frame shall be transmitted in an S1G PPDU using one of the mandatory PHY rates.

If the BSSBasicS1GMCS\_NSSSet is not empty, the frame shall be transmitted in a S1G PPDU using one of the <S1G-MCS, NSS> tuples included in the BSSBasicS1GMCS\_NSSSet parameter.

* Rate selection for data frames sent within an FMS stream

Data frames sent within an FMS stream are sent at a rate negotiated during the establishment of the FMS stream. See 10.23.7.

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

Change as follows:

A data or management frame not identified in 9.7.5.1 through 9.7.5.5a (Rate selection for data frames sent within an FMS stream) shall be sent using any data rate, MCS, <VHT-MCS, NSS> or <S1G-MCS, NSS> tuple subject to the following constraints:

* A STA shall not transmit a frame using a rate or MCS that is not supported by the receiver STA, as reported in any Supported Rates element, Extended Supported Rates element or Supported MCS Set field in management frames transmitted by the receiver STA.
* A STA shall not transmit a frame using a <VHT-MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported VHT-MCS and NSS Set field in management frames transmitted by the receiver STA.
* A STA shall not transmit a frame using a <S1G-MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported S1G-MCS and NSS Set field in management frames transmitted by the receiver STA.
* If at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 was received from the receiver STA:
* A STA shall not transmit a frame with the number of spatial streams greater than that indicated in the Rx NSS(#7360) subfield in the most recently received Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 from the receiver STA.
* If at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 1 was received from the receiver STA:
* A STA shall not transmit an SU PPDU frame using a beamforming steering matrix with the number of spatial streams greater than that indicated in the Rx NSS(#7360) subfield in the most recently received Operating Mode field with the Rx NSS Type(#7360) subfield equal to 1 from the receiver STA if the beamforming steering matrix was derived from a VHT Compressed Beamforming report(#7377) with Feedback Type subfield indicating MU in the VHT Compressed Beamforming frame(s).
* A STA shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not supported by the receiver STA, as reported in any HT Capabilities element,VHT Capabilities element or S1G Capabilities element received from the intended receiver.
* Except as described below, an HT STA that is a member of a BSS and that is not a VHT STA shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received HT Operation element.
* Except as described below a VHT STA that is a member of a BSS shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received VHT Operation element.
* Except as described below an S1G STA that is a member of a BSS shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received S1G Operation element.
* Exceptions:
* Transmissions on a TDLS off-channel link follow the rules described in 10.22.6.1 and 10.22.6.2
* Transmissions by a VHT or S1G STA on a TDLS link follow the rules described in 10.22.1 and 10.22.6.4
* If at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 was received from the receiver STA:
* A STA shall not transmit a frame using a value for the TXVECTOR parameter CH\_BANDWIDTH that is not supported by the receiver STA as reported in the most recently received Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 from the receiver STA.
* A STA shall not initiate transmission of a frame at a data rate higher than the greatest rate in the OperationalRateSet, or using an MCS that is not in the HTOperationalMCSSset or using a <VHT-MCS, NSS> tuple that is not in the OperationalVHTMCS\_NSSSet, or using a <S1G-MCS, NSS> tuple that is not in the OperationalS1GMCS\_NSSSet, which are parameters of the MLME-JOIN.request primitive.

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 BSSBasicVHTMCS\_NSSSet parameter, or a <S1G-MCS, NSS> tuple in the BSSBasicS1GMCS\_NSSSet parameter, or a rate from the mandatory rate set of the attached PHY if ~~both~~ the BSSBasicRateSet, ~~and~~ the BSSBasicMCSSet , the BSSBasicVHTMCS\_NSSSet and the BSSBasicS1GMCS\_NSSSet are empty.

The rules in this subclause also apply to A-MPDUs that aggregate MPDUs of type Data or Management with any other types of MPDU.

* Rate selection for control frames
* General rules for rate selection for control frames

Change the 1st two paragraphs as follows:

*TGah Editor to change the 2nd paragraph as follows:*

The following rules determine whether a control frame is carried in a~~n HT PPDU or~~ non-HT, HT, VHT or S1G PPDU:

* A control frame shall be carried in an S1G PPDU using short preamble, long GI, no LDPC coding, non-STBC format, with no traveling pilots and with NSS=1 when the control frame is transmitted by an S1G STA:
* Rate selection for control frames that are not control response frames

Change the 1st paragraph as follows:

This subclause describes the rate selection rules for control frames that are not control response frames, are not the frame that initiates a TXOP, are not the frame that terminates a TXOP, and are either a VHT single MPDU or not carried in an A-MPDU.

Change the last paragraph and insert a subsequent paragraph as follows:

A frame that is carried in an HT PPDU shall be transmitted by the STA using an MCS supported by the receiver STA, as reported in the Supported MCS field in the HT Capabilities element ~~in management frames transmitted by~~ received from that STA. When the supported ~~rate~~ MCS set of the receiving STA or STAs is not known, the transmitting STA shall transmit using an MCS in the BSSBasicMCSSet parameter.

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 BSSBasicVHTMCS\_NSSSet parameter.

A frame that is carried in a S1G PPDU shall be transmitted by the STA using a <S1G-MCS, NSS> tuple supported by the receiver STA, as reported in the Supported S1G-MCS and NSS Set field in the S1G Capabilities element received from that STA. When the Supported S1G-MCS for NSS=1 set of the receiving STA or STAs is not known, the transmitting STA shall transmit using a <S1G-MCS, NSS> tuple in the BSSBasicS1GMCS\_NSSSet parameter.

* Rate selection for control response frames
* Introduction

Change as follows:

Subclauses 9.7.6.5.2 through 9.7.6.5.5 describe the rate selection rules for control response frames that are either a VHT single MPDU or not carried in an A-MPDU.

* Selection of a rate or MCS

Change the 2nd bullet of the 1st paragraph as follows:

* If a BlockAck frame is sent as an immediate response to either an implicit BlockAck request or to a BlockAckReq frame that was carried in an HT or VHT PPDU and the BlockAck frame is carried in a non- HT PPDU, the primary rate is defined to be the highest rate in the BSSBasicRateSet parameter that is less than or equal to the rate (or non-HT reference rate; see 9.7.9) of the previous frame. If no rate in the BSSBasicRateSet parameter meets these conditions, the primary rate is defined to be the highest mandatory rate of the attached PHY that is less than or equal to the rate (or non-HT reference rate; see 9.7.9) of the previous frame. The STA may select an alternate rate according to the rules in 9.7.6.5.4. The STA shall transmit the non-HT PPDU BlockAck control response frame at either the primary rate or the alternate rate, if one exists.
* If a BlockAck frame is sent as an immediate response to either an implicit BlockAck request or to a BlockAckReq frame that was carried in an S1G PPDU, the primary rate is defined to be the highest rate in the BSSBasicS1GMCS\_NSSSet parameter that is less than or equal to the rate of the previous frame. If no rate in the BSSBasicS1GMCS\_NSSSet parameter meets these conditions, the primary rate is defined to be the highest mandatory rate of the attached PHY that is less than or equal to the rate of the previous frame. The STA may select an alternate rate according to the rules in 9.7.6.5.4. The STA shall transmit the BlockAck control response frame at either the primary rate or the alternate rate, if one exists.
* When in asymmetric Block Ack Operation, the STA shall transmit the S1G PPDU BlockAck control response frame at the MCS according to the rules in 9.7.6.5.4a (MCS for asymmetric Block Ack Operation).
* When not performing asymmetric Block ACK
* The STA that receives an Accept in the Control Response MCS Negotiation Response frame from a responding STA shall transmit the S1G PPDU BlockAck control response frame to the responding STA with the rate described in 9.7.6.5.3
* Otherwise, the STA shall transmit the S1G PPDU BlockAck control response frame at either the primary rate or the alternate rate (according the rules in 9.7.6.5.4), if one exists.

TGah Editor to add the following after the 6th bullet:

* If the control response frame is carried in an S1G PPDU, then it is transmitted using an <S1G-MCS, NSS> tuple as determined by the procedure defined in 9.7.6.5.3.

Change the 2nd paragraph as follows:

The modulation class of the control response frame shall be selected according to the following rules:

* If the received frame is of a modulation class other than HT, VHT or S1G and the control response frame is carried in a non-HT PPDU, the control response frame shall be transmitted using the same modulation class as the received frame. In addition, the control response frame shall be sent using the same value for the TXVECTOR parameter PREAMBLE\_TYPE as the received frame.
* If the received frame is of the modulation class HT or VHT and the control response frame is carried in a non-HT PPDU, the control response frame shall be transmitted using one of the ERP-OFDM or OFDM modulation classes.
* If the control response frame is carried in an HT PPDU, the modulation class shall be HT.
* If the control response frame is carried in a VHT PPDU, the modulation class shall be VHT.
* If the control response frame is carried in a S1G PPDU, the modulation class shall be S1G.
* Control response frame MCS computation

Change as follows:

If a control response frame is to be transmitted within an HT or VHT PPDU, the channel width (CH\_BANDWIDTH parameter of the TXVECTOR) shall be selected first according to 9.7.6.6, and then the MCS or <VHT-MCS, NSS> tuple shall be selected from a set of MCSs and <VHT-MCS, NSS> tuples called the *CandidateMCSSet* as described in this subclause.

If a control response frame is to be transmitted within an S1G PPDU, the channel width (CH\_BANDWIDTH parameter of the TXVECTOR) shall be selected first according to 9.7.6.6, and then the <S1G-MCS, NSS> tuple shall be selected from a set of <S1G-MCS, NSS> tuples called the *CandidateMCSSet* as described in this subclause.

If the frame eliciting the response was transmitted by an HT STA that is not a VHT STA, t~~T~~he Rx Supported MCS Set ~~of the STA that transmitted the frame eliciting the response~~ is determined from the ~~its s~~Supported MCS Set field in the HT Capabilities element received from the STA, as follows:

* If a bit in the Rx MCS Bitmask subfield is equal to 0, the corresponding MCS is not supported.
* If a bit in the Rx MCS Bitmask subfield is equal to 1 and the integer part of the data rate (expressed in megabits per second) of the corresponding MCS is less than or equal to the rate represented by the Rx Highest Supported Data Rate subfield, then the MCS is supported by the STA on receive. If the Rx Highest Supported Data Rate subfield is equal to 0 and a bit in the Rx MCS Bitmask is equal to 1, then the corresponding MCS is supported by the STA on receive.

If the frame eliciting the response was transmitted by a VHT STA, the Rx Supported MCS Set is determined for VHT PPDUs as described in 9.7.11 (Rate selection constraints for VHT STAs) and for HT PPDUs from the supported MCS Set field in the HT Capabilities element received from the STA as follows:

* If a bit in the Rx MCS Bitmask subfield is equal to 0, the corresponding MCS is not supported.
* If a bit in the Rx MCS Bitmask subfield is equal to 1 and the integer part of the data rate (expressed in megabits per second) of the corresponding MCS is less than or equal to the rate represented by the Rx Highest Supported Data Rate subfield, then the MCS is supported by the STA on receive. If the Rx Highest Supported Data Rate subfield is equal to 0 and a bit in the Rx MCS Bitmask is equal to 1, then the corresponding MCS is supported by the STA on receive.

The Rx Supported MCS Set is determined for S1G PPDUs as described in 9.7.12 (Rate selection constraints for S1G STAs).

The CandidateMCSSet is determined using the following rules:

* If the frame eliciting the response was an STBC frame and the Dual CTS Protection bit is equal to 1, the CandidateMCSSet shall contain only the basic STBC MCS.
* If the frame eliciting the response had an L-SIG duration value (see 9.23.5) and initiates a TXOP, the CandidateMCSSet is the MCS Set consisting of the intersection of the Rx Supported MCS Set of the STA that sent the frame that is eliciting the response and the set of MCSs that the responding STA is capable of transmitting.
* For S1G STAs, If none of the above conditions is true, the CandidateMCSSet is the BSSBasicS1GMCS\_NSSSet parameters. If the frame eliciting the response was an RTS frame, then the CandidateMCSSet may additionally include the <S1G-MCS, NSS> tuple with the same MCS and number of spatial streams as the S1G PPDU. If the combined BSSBasicMCSSet parameter is empty, the CandidateMCSSet shall consist of the set of mandatory <S1G-MCS, NSS> tuples corresponding to the mandatory S1G PHY MCSs with NSS = 1.
* For non-S1G STAs, If none of the above conditions is true, the CandidateMCSSet is the combination of the BSSBasicMCSSet and the BSSBasicVHTMCS\_NSSSet parameters. If the frame eliciting the response was an RTS frame carried in a VHT PPDU, then the CandidateMCSSet may additionally include the <VHT-MCS, NSS> tuple with the same MCS and number of spatial streams as the VHT PPDU. If the combined BSSBasicMCSSet parameter is empty, the CandidateMCSSet shall consist of
* the set of mandatory HT PHY MCSs, if the STA eliciting the response is an HT STA that is not a VHT STA;
* the set of mandatory HT MCSs plus the set of <VHT MCS, NSS> tuples corresponding to the mandatory VHT PHY MCSs with NSS = 1, if the STA eliciting the response is a VHT STA.

MCS values from the CandidateMCSSet that cannot be transmitted with the selected CH\_BANDWIDTH parameter value shall be eliminated from the CandidateMCSSet.

The choice of a response MCS is made as follows:

* If the frame eliciting the response is within a non-HT PPDU,
* Eliminate from the CandidateMCSSet all <VHT-MCS, NSS> tuples. Moreover, eliminate all MCSs that have a data rate greater than the data rate of the received PPDU (the mapping of MCS to data rate is defined in 20.6).
* Find the highest indexed MCS from the CandidateMCSSet. The index of this MCS is the index of the MCS that is the primary MCS for the response transmission.
* If the CandidateMCSSet is empty, the primary MCS is the lowest indexed MCS of the mandatory MCSs.
* If the frame eliciting the response is within an HT PPDU,
* Eliminate from the CandidateMCSSet all <VHT-MCS, NSS> tuples. Moreover eliminate all MCSs that have an index that is higher than the index of the MCS of the received frame. Also eliminate all MCSs that have a number of spatial streams greater than that indicated in the Rx NSS(#7360) subfield in the most recent Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 from the intended receiver STA, if at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 was received from the intended receiver STA.
* Determine the highest number of spatial streams (*NSS*) value of the MCSs in the CandidateMCSSet that is less than or equal to the *NSS* value of the MCS of the received frame. Eliminate all MCSs from the CandidateMCSSet that have an *NSS* value that is not equal to this *NSS* value. The mapping from MCS to *NSS* is dependent on the attached PHY. For the HT PHY, see 20.6.
* Find the highest indexed MCS of the CandidateMCSSet for which the modulation value of each stream is less than or equal to the modulation value of each stream of the MCS of the received frame and for which the coding rate ~~value~~ is less than or equal to the coding rate ~~value~~ of the MCS from the received frame. ~~The index of this MCS is the index of the MCS that~~This is the primary MCS for the response transmission. The mapping from MCS to modulation and coding rate is dependent on the attached PHY. For the HT PHY, see 20.6. For the purpose of comparing modulation values, the following sequence shows increasing modulation values: BPSK, QPSK, 16-QAM, 64-QAM.
* If no MCS meets the condition in step 3), remove each MCS from the CandidateMCSSet that has the highest value of *NSS* in the CandidateMCSSet. If the resulting CandidateMCSSet is empty, then set the CandidateMCSSet to the HT PHY mandatory MCSs. Repeat step 3) using the modified CandidateMCSSet.
* If the frame eliciting the response is within a VHT PPDU,
* Eliminate from the CandidateMCSSet all MCSs and all <VHT-MCS, NSS> tuples that meet any of the following conditions:
* Have a data rate that is higher than the data rate of the <VHT-MCS, NSS> tuple of the received frame using the largest possible value of CH\_BANDWIDTH that is no larger than the value of CH\_BANDWIDTH of the received frame
* Have a number of spatial streams greater than that indicated in the Rx NSS(#7360) subfield in the most recent Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 from the intended receiver STA, if at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 0 was received from the intended receiver STA
* Have a number of spatial streams greater than that indicated in the Rx NSS(#7360) subfield in the most recent Operating Mode field with the Rx NSS Type(#7360) subfield equal to 1 from the intended receiver STA if at least one Operating Mode field with the Rx NSS Type(#7360) subfield equal to 1 was received from the receiver STA and the control response frame is an SU PPDU frame with a beamforming steering matrix and the beamforming steering matrix was derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the VHT Compressed Beamforming frame(s)(#MDR)
* Determine the highest number of spatial streams (*NSS*) value of the MCSs and <VHT-MCS, NSS> tuples in the CandidateMCSSet that is less than or equal to the *NSS* value of the received frame. Eliminate all MCSs from the CandidateMCSSet that have an *NSS* value that is not equal to this *NSS* value. The mapping from MCS to *NSS* is dependent on the attached PHY. For the HT PHY, see 20.6.
* Find the highest rate MCS or <VHT-MCS, NSS> tuple of the CandidateMCSSet for which the modulation value of each stream is less than or equal to the modulation value of each stream of the MCS of the received frame and for which the coding rate is less than or equal to the coding rate of the MCS from the received frame. This MCS or <VHT-MCS, NSS> tuple is the primary MCS for the response transmission. The mapping from MCS or <VHT-MCS, NSS> tuple to modulation and coding rate is dependent on the attached PHY. For the HT PHY, see 20.6; for the VHT PHY, see 22.5 (Parameters for VHT-MCSs). For the purpose of comparing modulation values, the following sequence shows increasing modulation values: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM.
* If no MCS meets the condition in step 3), remove each MCS or <VHT-MCS, NSS> tuple from the CandidateMCSSet that has the highest value of *NSS* in the CandidateMCSSet. If the resulting CandidateMCSSet is empty, then set the CandidateMCSSet to the VHT PHY mandatory MCSs. Repeat step 3) using the modified CandidateMCSSet.
* If the frame eliciting the response is within an S1G PPDU,
* Eliminate from the CandidateMCSSet all MCSs and all <S1G-MCS, NSS> tuples that meet any of the following conditions:
* Have a data rate that is higher than the data rate of the <S1G-MCS, NSS> tuple of the received frame using the largest possible value of CH\_BANDWIDTH that is no larger than the value of CH\_BANDWIDTH of the received frame
* Have a number of spatial streams greater than one (#MDR)
* Find the highest rate MCS or <S1G-MCS, NSS> tuple of the CandidateMCSSet for which the modulation value of each stream is less than or equal to the modulation value of each stream of the MCS of the received frame and for which the coding rate is less than or equal to the coding rate of the MCS from the received frame. This MCS or <S1G-MCS, NSS> tuple is the primary MCS for the response transmission. The mapping from MCS or <S1G-MCS, NSS> tuple to modulation and coding rate is dependent on the attached PHY; see 24.5 (Parameters for S1G-MCSs). For the purpose of comparing modulation values, the following sequence shows increasing modulation values: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM.
* If no MCS meets the condition in step 2), then set the CandidateMCSSet to the S1G PHY mandatory MCSs. Repeat step 3) using the modified CandidateMCSSet.

Once the primary MCS, <VHT-MCS, NSS> or <S1G-MCS, NSS> tuple has been selected, the STA may select an alternate MCS according to 9.7.6.5.4. The STA that has not negotiated the Control Response MCS Negotiation as described in 9.7.6.5.6 or that has received a Reject indication in the Control Response MCS Negotiation Response shall transmit the ~~HT PPDU~~ control response frame using either the primary MCS or the alternate MCS, if one exists. The STA that receives an Accept indication in the Control Response MCS Negotiation Response from a responding STA, shall transmit the control response frame to the responding STA using the negotiated MCS or alternative MCS provided that the duration of the frame at the alternate MCS is the same as the duration of the frame at the negotiated MCS, if one exists. Negotiated MCS is computed as the highest MCS less than or equal to the MCS which is MCSDifference lower than the primary MCS if one exists, or the MCS10 otherwise.

*Instruction to the Editor: TGah editor to to add the following subcluases:*

9.7.6.5.6 Control Response MCS Negotiation

Control Response MCS Negotiation allows two STA with power imbalance to send the control responses with different MCSs than the primary MCS as defined by the rules in 9.7.6.5.3. A STA may initiate the Control Response Negotiation by sending a Control Response MCS Request frame. After reception of a Control Response MCS Response frame that indicates Accept, the STA sends the control response frames with the Negotiated MCS as defined in subclause 9.7.6.5.3.

An S1G STA with dot11MCSNegotiation equal to true shall set the MCS Negotiation Support field of the S1G Capabilities element to 1. An S1G STA with dot11MCSNegotiation equal to false shall set the MCS Negotiation Support field of the S1G Capabilities element to 0.

An S1G STA shall not transmit a Control Response MCS Negotiation Request to another S1G STA unless the MCS Negotiation Support field of the most recent S1G Capabilities element received from that STA contained a value of 1 and dot11MCSNegotiation is true.

An S1G STA shall transmit the Control Response MCS Negotiation Response frame to a STA from which it has received a Control Response MCS Negotiation Request. The STA shall include a value that indicates either Accept or Reject in the Command field of the Response frame as defined in Table 4 (Command Values).

*Instruction to the Editor: TGah editor to Change the provided Text in 11ah D1.0 as following:*

* Channel Width selection for control frames

***Insert the following paragraphs at the end of sub-clause 9.7.6.6:***

 An S1G STA that has set the 1MHz Control Response Preamble Support field to 1 in the most recently transmitted S1G Capabilities element to its peer STA shall use 1MHz preamble transmission as the response of >= 2MHz short/long preamble as follows:

* An S1G STA that sends a control frame in response to a frame carried in an S1G PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to indicate a channel width that is the same or lower as the channel width indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.
* Channel Bandwidth of PPDU during the multiple frame exchange sequences in a TXOP shall be the same or narrower than the Channel Bandwidth of the preceding PPDU.

Otherwise, in S1G BSS, 1MHz preamble transmission as the response of >= 2MHz short/long preamble is not allowed and the S1G STA behaves as follows:

* An S1G STA that sends a control frame in response to a frame carried in an S1G PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to indicate a channel width that is the same as the channel width indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.

When both transmitting STA and receiving STA indicate OBSS mitigation support in the OBSS mitigation support subfield of the S1G Capabilities element, the receiving STA operating in a 2/4/8/16MHz BSS that sends a (duplicated) >= 2MHz NDP ACK or NDP BA in response to a frame carried in an S1G PPDU may set the TXVECTOR parameter CH\_BANDWIDTH to indicate a channel width that is less than or equal to the channel width indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.

*Instruction to the Editor: TGah editor to to add the following subcluases with respect to the 11ac D5.0:* (#882)

**9.7.12 Rate selection constraints for S1G STAs**

**9.7.12.1 RX supported S1G-MCSS and NSS set**

The Rx Supported S1G-MCS and NSS Set of a S1G STA is determined for each <S1G-MCS, NSS> tuple NSS = 1, …, 4 and bandwidth (1 MHz, 2 MHz, 4 MHz, 8 MHz and 16 MHz) from its Supported S1G-MCS and NSS Set field as follows:

* If support for the S1G-MCS for NSS spatial streams at that bandwidth is mandatory (see 25.5 (Parameters for S1G-MCSs)), then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on receive.
* Otherwise, if the Max S1G-MCS For *n* SS subfield (*n* = NSS)(#7285) in the Rx S1G-MCS Map field indicates support and the Rx Highest Supported Long GI Data Rate subfield is equal to 0, then the <S1G-MCS, NSS*>*(#7285) tuple at that bandwidth is supported by the STA on receive.
* Otherwise, if the Max S1G-MCS For *n* SS subfield (*n* = NSS)(#7285) in the Rx S1G-MCS Map subfield indicates support and the data rate (expressed in megabits per second) for long GI of the MCS for NSS(#7285) spatial streams at that bandwidth (if the data rate is not an integer, the data rate value is rounded down to the next integer) is less than or equal to the rate represented by the Rx Highest Supported Long GI Data Rate subfield, then the <S1G-MCS, NSS>(#7285) tuple at that bandwidth is supported by the STA on receive.
* Otherwise the <S1G-MCS, NSS> tuple at that bandwidth is not supported by the STA on receive.

A S1G STA shall not, unless explicitly stated otherwise, transmit a S1G PPDU unless the <S1G-MCS, NSS> tuple and bandwidth used are in the Rx Supported S1G-MCS and NSS Set of the receiving STA(s).

NOTE—Support for a <S1G-MCS, NSS> tuple at a given bandwidth implies support for long GI

* + - 1. Tx Supported S1G-MCS and NSS Set

The Tx Supported S1G-MCS and NSS Set of a S1G STA is determined for each <S1G-MCS, NSS> tuple NSS = 1, …, 4 and bandwidth (1MHz, 2 MHz, 4 MHz, 8 MHz and 16 MHz) from its Supported S1G-MCS and NSS Set field as follows:

* If support for the <S1G-MCS, NSS> tuple at that bandwidth is mandatory (see 24.5 (Parameters for S1G-MCSs)), then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.
* Otherwise if the Max S1G-MCS for *n* SS subfield (*n* = NSS)(#7285) in the Tx S1G-MCS Map subfield indicates support and the Tx Highest Supported Long GI Data Rate subfield is equal to 0, then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.
* Otherwise if the Max S1G-MCS for *n* SS subfield (*n* = NSS)(#7285) in the Tx S1G-MCS Map subfield indicates support and the data rate (expressed in megabits per second) for long GI of the <S1G-MCS, NSS>(#7006) tuple at that bandwidth (if the data rate is not an integer, the data rate value is rounded down to the next integer) is less than or equal to the rate represented by the Tx Highest Supported Long GI Data Rate subfield, then the <S1G-MCS, NSS>(#7006) tuple at that bandwidth is supported by the STA on transmit.
* Otherwise the <S1G-MCS, NSS>(#7006) tuple at that bandwidth is not supported by the STA on transmit.

***Change the subclause 9.7.10 (TGac D5.0) as follows:***

* Channel Width in non-HT and non-HT duplicate PPDUs

***Insert the following paragraph after the 2nd paragraph of the subclause 9.7.10 as follows:***

An S1G STA shall set the Bandwidth Indication field in the Frame Control field of an S1G Control frame to the value of the TXVECTOR's parameter CH\_BANDWIDTH. An S1G STA shall set the Dynamic Indication field in the Frame Control field of S1G Control frames, other than RTS, to 0.

TGah editor to add the following subcluases:

**8.5.27 Control Response MCS Negotiation frame details:**

**8.5.27.1 Control Response MCS Negotiation Action field:**

Table 1: Control Response MCS Negotiation Action field values

|  |  |
| --- | --- |
| MCS Negotiation action field Value | Description |
| 0 | Control Response MCS Negotiation Request |
| 1 | Control Response MCS Negotiation Response |
| 2-255 | Reserved |

**8.5.27.2 Control Response MCS Negotiation Request frame format**

The Control Response MCS Negotiation Request frame is used by a STA to send the Control Responses with a lower MCS due to power imbalance with its peer STA as defined in 9.7.6.5.3. The frame format of this frame is shown in Table 2:

Table 2: Control Response Negotiation Request frame

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Category |
| 2 | Control Response MCS Negotiation Action |
| 3 | MCSDifference |

The Category field is 1 octet and is set to the value in Table 8-38 (Category values) for category Control Response MCS Negotiation Action.

The Control Response MCS Negotiation Action is one octet and it is set to the value in Table 3 (Control Response Negotiation Response frame)representing Control Response MCS Negotiation Request.

The MCSDifference field is 1 octet and is set to a value that represents the MCS difference of the primary MCS and the transmited Control Response frame as described in 9.7.6.5.6.

**8.5.27.3 Control Response MCS Negotiation Response frame format**

The Control Response MCS Negotiation Response frame is used to indicate a response to a received Control Response MCS Negotiation Request which is either Accept or Reject, and the MCSDifference proposed by the Requesting STA. The frame format of this frame is shown in Table 3:

Table 3: Control Response Negotiation Response frame

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Category |
| 2 | Control Response MCS Negotiation Action |
| 3 | Command |

The Category field is 1 octet and is set to the value in Table 8-38 (Category values) for category Control Response MCS Negotiation Action.

The Control Response MCS Negotiation Action is one octet and it is set to the value in Table xx (Control Response MCS Negotiation Action values) representing Control Response MCS Negotiation Response.

The Command field is 1 octet and is set to a value from the following Table to represent accepting or rejecting the proposed MCSDifference by the Control Response MCS Negotiation Request frame as described in 9.7.6.5.6.

Table 4: Command Values

|  |  |
| --- | --- |
| **Values** | **Description** |
| 0 | Reject |
| 1 | Accept |
| 2-255 | Reserved |

TGah Editor to add the following two rows to the Table 8-191d—Subfields of the S1G Capabilities Info field

|  |  |  |
| --- | --- | --- |
| **Encoding** | **Definition** | **Encoding** |
| MCS Negotiation Support | Indicates if the STA support Control Response MCS Negotiation feature | Set to 0 if not supportedSet to 1 if supported |
| 1MHz Control Response Preamble Support | Indicates if the STA support Receiving control response with 1MHz preamble as the response of >=2MHz PPDUs | Set to 0 if not supportedSet to 1 if supported |