IEEE P802.11
Wireless LANs

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| CR for 27.5.6 |
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Abstract

This document provides CR for CIDs 15621 15818 15819 15830 15836 15837 16057 16394 17126 15622 16783.

R1: addition of CR15622 and 16783

1. **Introduction**

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 TGax Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

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

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

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 15621 | 9.3.1.23.8 | 108.00 | Note about Multiplexing Flag subfield doesn't make sense - it is just one bit, but the note says that it indicates the number of STAs that are multiplexed with P-matrix codes on the same set of times in the same RU. With one bit, this subfield can only be 1 or 2. Is that what was intended? | Clarify if one bit is sufficient for this flag. | Reject – There is either 1 or 2 STAs that are multiplexed in the same RU. 1 bit is therefore sufficient. |
| 15818 | 27.5.6 | 300.03 | NDP feedback report procedure should be defined for unassociated STAs. | Include the description of the procedure for NDP feedback report for unassociated STAs | Revised – agree with the commenter. Apply the changes as proposed in doc 1498r1. |
| 15819 | 27.5.6.2 | 300.19 | 20MHz only STAs can respond without restrictions to NFRP triggers, but it is not explicit in the spec | Add a note that describes the constraints for 20MHz-only STAs | Revised – agree with the commenter. Add a simple note to indicate that the restrictions are no longer there. |
| 15830 | 27.5.6.2 | 300.19 | A STA can be in PS mode and doze state and respond to an NDP feedback report. There needs to be some clarification of what this means for the power state of the STA. A response to NFRP should be considered as an indication that the STA is in the awake state. | Define that a response to NFRP by a PS STA is considered as a switch to active state for the different power save modes defined in 802.11. | Revised – agree with the commenter. Add a subclause for power save operation related to NDP Feedback Report. Apply the changes as defined in doc 1498r1. |
| 15836 | 27.5.6.3.1 | 301.53 | It is not clear why the NDP feedback report element is included or not and what is the impact on NFRP operation | Clarify that NDP feedback report can work without this element being sent, and that if this element is sent, the parameters are changed for NDP feddback report operation. | Revised – agree with the comment. Apply the changes as proposed in doc 1498r1. |
| 15837 | 27.5.6.4 | 302.13 | There should be a specific type for NDP feedback report to report a change of PS state | Define a new type for a STA to indicate that it is in the awake state. | Revised – agree with the comment. Apply the changes as proposed in doc 1498r1. |
| 16057 | 9.3.1.23.8 | 107.57 | "The Number Of HE-LTF Symbols And Midamble Periodicity subfield of the Common Info field indicates the number of HE-LTF symbols present in the NDP feedback report response and is set to 1 for two 4x HE-LTF symbols." -- that setting contains the number of symbols, not their length. In any case, we don't specify the meaning of values for other fields | Delete "for two 4x HE-LTF symbols" from the cited text at the referenced location | Revised – agree with the commenter. Apply the changes as proposed in doc 1498r1. |
| 16394 | 9.3.1.23.8 | 107.52 | "The CS Required subfield of the NFRP Trigger frame can be set to 0 or 1." does not really help.If it has no specific role or it is not reserved, consider deleting this sentence and its default behavior (defined in subclause 9.3.1.23) will apply. | As in comment. | Revised – include a reference to the section the defines the normative text. Apply the change as proposed in doc 1498r1. |
| 17126 | 27.5.6.4.1 | 302.51 | in the last sentence of the paragraph, there is a scenario that AP send the NDP Feedback Report Parameter Set element, but STA dosen't received it. So it is better to modified the last sentence, and descripe it from the STA side. | Change the last sentence to "The resource request buffer thresholdis equal to 256 octets if a STA doesn't received NDP Feedback Report Parameter Set element from the AP to whichthe STA is associated." | Revised – agree with the comment. Apply the changes as proposed in doc 1498r1. |
| 15622 | 9.3.2.23.8 | 108 | P-matrix codes are only mentioned in this one note. Clarify what the relevant P-matrix codes are. | Define P-matrix codes or remove this discussion. | Revised – agree with the comment. Apply the changes as proposed in doc 1498r1. |
| 16783 |  | 399.26 | Shouldn't entry on column "RXVECTOR" be "MU" instead of "Y" for NDP\_REPORT? | Change | Rejected – Only Y or N are in the column RXVECTOR. The commenter failed to identify a problem. |

1. **Proposed changes**

***11ax Editor: Modify clause 9.3.1.23.8 NDP Feedback Report Poll (NFRP) variant as below***

* NDP Feedback Report Poll (NFRP) variant

The NFRP Trigger frame(#13318) format is defined in Figure 9-52c (Trigger frame).

The RA field is set to the broadcast address.

The Common Info field of the NFRP Trigger frame(#13318) is defined in Figure 9-52d (Common Info field).

The UL BW subfield(#11372) indicates the bandwidth of the NDP feedback report response and is defined in Table 9-25c (UL BW subfield encoding).

The CS Required subfield of the NFRP Trigger frame(#13318) can be set to 0 or 1, as described in 27.5.3.5 UL MU CS mechanism(#12294). (#16394)

The STBC, LDPC Extra Symbol Segment, Packet Extension, Spatial Reuse, and Doppler subfields are reserved.(#11894)

The Number Of HE-LTF Symbols And Midamble Periodicity subfield of the Common Info field indicates the number of HE-LTF symbols present in the NDP feedback report response and is set to 1.(#13540, #12380)

The GI and LTF Type subfield of the Common Info field is set to 2.

The Trigger Dependent Common Info subfield is not present.

The User Info field for NFRP Trigger frame(#13318) is defined in Figure 9-52n (User Info field for the NFRP Trigger frame) by renaming the fields of the User Info field defined in Figure 9-52g (User Info field).(#11542)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  | Starting AID | Reserved | Associated/Unassociated | Feedback Type | Reserved | Target RSSI | Multiplexing Flag |
| Bits: | 12 | 8 | 1 | 4 | 7 | 7 | 1 |
|  | * User Info field for the NFRP Trigger frame(#13318)
 |

The Feedback Type subfield encoding is defined in Table 9-25j (Feedback Type subfield encoding).

|  |
| --- |
| * Feedback Type subfield encoding
 |
| Value | Description |
| 0 | Resource request |
| 1 | Power save |
| 2-15 | Reserved |

The Associated/Unassociated subfield is set to 0 to indicate that the scheduled STAs either are HE non-AP STAs associated with the BSSID indicated in the TA field of the NFRP Trigger frame or are HE non-AP STAs with dot11MultiBSSIDActivated set to true and that are associated with a nontransmitted BSSID of a multiple BSSID set and the TA field of the NFRP Trigger frame is set to the transmitted BSSID of that multiple BSSID set.

The Associated/Unassociated subfield is set to 1 to indicate that the scheduled STAs either are HE non-AP STAs that are not associated with the BSSID indicated in the TA field of the NFRP Trigger frame or are HE non-AP STAs that are not associated with a nontransmitted BSSID of a multiple BSSID set and the TA field of the NFRP Trigger frame is set to the transmitted BSSID of that multiple BSSID set. (#15818)

If the Associated/Unassociated subfield is set to 0, the scheduled non-AP HE STAs(#14217) are identified by a range of AIDs. In such case, the Starting AID field defines the first AID of the range of AIDs that are scheduled to respond to the NFRP Trigger frame(#13318).

If the Associated/Unassociated subfield is set to 1, any HE non-AP STAs unassociated with the AP transmitting the trigger frame are scheduled. In such case, the Starting AID field defines the first temporary AID of the range of temporary AIDs that are given to the scheduled STAs that respond to the NDP Feedback Report Poll Trigger frame. The starting AID field is set to a value higher or equal to 2048 and lower than 4095. (#15818)

The UL Target RSSI subfield(#11372) indicates the target received signal power of the NDP feedback report response for all scheduled STAs. The resolution for the UL Target RSSI subfield(#11372) is 1 dB. The UL Target RSSI subfield(#11372) encoding is defined in Table 9-25i (UL Target RSSI subfield encoding).

The Multiplexing Flag subfield indicates the number of STAs that are multiplexed on the same set of tones in the same RU, and is encoded as the number of STAs minus 1. (#15622)

If the Associated/Unassociated subfield is set to 0, the total number of STAs, *NSTA*, that are scheduled to respond to the NFRP Trigger frame(#13318) is calculated using Equation (9-ax1).

* *NSTA* = 18  2*BW*  (*MultiplexingFlag + 1*)(#14197)

where *BW* is the value of the UL BW subfield(#11372) in the Common Info field of the NFRP Trigger frame(#13318), and *MultiplexingFlag* is the value of(#14197) the Multiplexing Flag subfield.

***11ax Editor: Modify clause 27.5.6 NDP feedback report procedure as below***

* NDP feedback report procedure
* General

The NDP feedback report is a mechanism for an HE AP to collect feedback from multiple HE STAs in a more efficient manner than with an HE TB PPDU. The feedback is not for channel sounding.(#13199)

An HE AP sends an NFRP Trigger frame(#13318) to solicit NDP feedback report response from many STAs that are identified by a range of scheduled AIDs in the Trigger frame. The NDP feedback report response from a non-AP HE STA(#14217) is an HE TB NDP feedback PPDU (see 28.3.17 (HE TB NDP feedback PPDU))(#14130). A non-AP HE STA(#14217) uses the information carried in the NFRP Trigger frame(#13318) to know if it is scheduled, and in this case, to derive the parameters for the transmission of the response.

In this subclause, the NDP feedback report procedure is described.

* STA behavior

A STA shall set the NDP Feedback Report Support subfield in the HE Capabilities element to 1 if it supports NDP feedback report and set it 0, otherwise.

A STA shall not transmit an NDP feedback report response unless it is explicitly enabled by an AP in one of the operation modes described in this subclause. The inter frame space between a PPDU that contains an NFRP Trigger frame(#13318) and the NDP feedback report poll response is SIFS. A STA shall commence the transmission of an NDP feedback report response at the SIFS time boundary after the end of a received PPDU, when all the following conditions are met:

* The received PPDU contains an NFRP Trigger frame(#13318)
* The STA is scheduled by the NFRP Trigger frame(#13318)
* The NDP feedback report support subfield in HE MAC Capabilities Information field is set to 1
* The STA intends to provide a response to the type of the NDP feedback contained in the NFRP Trigger frame(#13318), as described in 27.5.6.4 (NDP feedback report types).

A STA that does not satisfy all of the above conditions shall not respond to the NFRP Trigger frame(#13318).

If the Associated/Unassociated subfield in the eliciting NDP Feedback Report Poll Trigger frame is set to 0, a STA is scheduled to respond to the NFRP Trigger frame(#13318) if all the following conditions are met:

* The STA is associated with the BSSID indicated in the TA field of the NFRP Trigger frame or the STA has dot11MultiBSSIDActivated set to true and is associated with a nontransmitted BSSID of a multiple BSSID set and the TA field of the NFRP Trigger frame is set to the transmitted BSSID of that multiple BSSID set
* The STA’s AID is greater than or equal to the starting AID and less than starting AID + *NSTA*, using the Starting AID subfield in the eliciting Trigger frame, and with *NSTA* the total number of STAs that are scheduled to respond to the NFRP Trigger frame(#13318). *NSTA* is calculated by the following equation, with UL BW subfield(#11372) and Multiplexing Flag subfield from the eliciting Trigger frame:
*NSTA* = 18  2*BW*  (*Multiplexing Flag + 1*)(#13547, #14198)

A non-AP HE STA shall obtain NDP Feedback Report parameter values from the most recently received NDP Feedback Report Parameter Set element carried in the Management frames received from its associated AP. A non-AP HE STA with dot11MultiBSSIDActivated set to true and associated with a nontransmitted BSSID of a multiple BSSID set shall inherit the NDP Feedback Report parameter values from the NDP Feedback Report Parameter Set element when carried in the Management frames that have a TA whose value is equal to the transmitted BSSID of that multiple BSSID set if the NDP Feedback Report Parameter Set element is not carried in the nontransmitted BSSID profile for that BSSID. If the NDP Feedback Report Parameter Set element is not received in a Management frame that has a TA whose value is equal to the BSSID of the associated AP or to the transmitted BSSID of the multiple BSSID set, the non-AP HE STA shall use default values for the NDP Feedback Report parameters.

If the Associated/Unassociated subfield in the eliciting NDP Feedback Report Poll Trigger frame is set to 1, a STA is scheduled to respond to the NDP Feedback Report Poll Trigger frame either if the STA is not associated with the BSSID indicated in the TA field of the NFRP Trigger frame or if the STA has dot11MultiBSSIDActivated set to true and is associated with a nontransmitted BSSID of a multiple BSSID set and the TA field of the NFRP Trigger frame is set to the transmitted BSSID of that multiple BSSID set. (#15818) (#12994)

* Transmission of the HE NDP feedback report response for associated STAs.

The procedure described in this subclause is valid when the Associated/Unassociated subfield in the eliciting NDP Feedback Report Poll Trigger frame is set to 0.

An NDP feedback report response is an HE TB NDP feedback PPDU, as defined in 28.3.17 (HE TB NDP feedback PPDU).

A STA transmitting an NDP feedback report in response to a Trigger frame, shall set the TXVECTOR parameter as for transmitting an HE TB PPDU in response to a Trigger frame as described in 27.5.3.3 (STA behavior for UL MU operation), except for the following parameters:

* The FORMAT parameter shall be set to HE\_TB(#12602)
* The APEP\_LENGTH parameter shall be set to 0(#13768)
* The RU\_ALLOCATION parameter shall be set to be maximum RU size for the BW
* The RU\_TONE\_SET\_INDEX parameter shall be set with the following equation, with the value of the Starting AID subfield in the User Info field of the eliciting Trigger frame:
* RU\_TONE\_SET\_INDEX = (AID  Starting AID) mod (18  2*BW*)
* The NUM\_STS parameter shall be set to 1
* The SPATIAL\_REUSE parameter shall be set to SRP\_DISALLOW
* The STARTING\_STS\_NUM parameter shall be set with the following equation, with the values of the Starting AID subfield in the User Info field of the eliciting Trigger frame:
* STARTING\_STS\_NUM = (AID  Starting AID) / 18 / 2*BW*
* The MCS parameter shall be set to 0
* The DCM parameter shall be set to 0
* The FEC\_CODING parameter shall be set to 0
* The TXPWR\_LEVEL\_INDEX parameter shall be set to the value based on the Transmit Power Control for HE TB PPDU and based on the value of the AP Tx Power subfield and the UL Target RSSI subfield(#11372) in the User Info field of the eliciting Trigger Frame (see 28.3.14.2 (Power pre-correction))

Note –20MHz operating non-AP HE STAs don’t have restrictions in the use of RU\_TONE\_SET indexes.

27.5.6.2.2 Transmission of the HE NDP feedback report response for unassociated STAs

The procedure described in this subclause is valid when the Associated/Unassociated subfield in the eliciting NDP Feedback Report Poll Trigger frame is set to 1.

A STA transmitting an NDP feedback report response in response to a Trigger frame, shall set the TXVECTOR parameter as described in 27.5.6.2.1 (Transmission of the HE NDP feedback report response for associated STAs), except for the following parameters:

* The RU\_TONE\_SET\_INDEX parameter shall be randomly selected among all available RU\_TONE\_SET\_INDEX values in Table 28-28 (HE-LTF tone mapping for the HE TB NDP feedback PPDU) for the bandwidth BW.
* The STARTING\_STS\_NUM parameter shall be randomly selected between 0 and the Multiplexing Flag subfield in the User Info field of the eliciting Trigger Frame.

27.5.6.2.3 NDP feedback report poll sequence for unassociated STAs

If an unassociated STA is transmitting an NDP Feedback Report response in response to an NDP Feedback Report Poll Trigger frame with the Associated/Unassociated subfield set to 1, following the procedure defined in 27.5.6.2.2 (Transmission of the HE NDP feedback report response for unassociated STAs), then the AP may send a Basic Trigger frame with the AID12 field of a User Info field that is equal to the NFRP AID of the unassociated STA after the transmission of the NDP Feedback Report response and before the end of the TxOP, with the NFRP AID which shall be calculated based on the following equation to identify the unassociated STA, using the Starting AID in the eliciting NDP Feedback Report Poll trigger frame:

* NFRP AID = Starting AID + RU\_TONE\_SET\_INDEX + STARTING\_STS\_NUM x 18 x 2BW

The unassociated STA that is scheduled shall send a single management frame in response to this Basic Trigger frame following the procedure described in 27.5 (MU operation). If the AP acknowledges the frame from the unassociated STA with a Multi-STA BlockAck frame, it shall follow the pre-association ack context procedure for the STA as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame), setting the AID subfield to 2045. (#15818)

* AP behavior
* General

An AP shall set the NDP Feedback Report Support subfield in the HE Capabilities element to 1 if it supports NDP feedback report and set it 0, otherwise.

An AP may include the NDP Feedback Report Parameter Set element in Beacon frames, Probe Responses frames and (Re)Association frames in order to modify parameters for NDP Feedback Report operation. The procedure of NDP Feedback report described in this subclause allows operation even if the NDP Feedback Report Parameter Set element is not sent by the AP. (#15836)(#12994)

The NFRP Trigger frame shall be transmitted in a non-HT PPDU or HT PPDU, or as an EOF-MPDU in a VHT, HE ER SU PPDU or HE SU PPDU.(#14270)

An AP that transmits an NFRP Trigger frame shall set the TA field of the frame to the MAC address of the AP, except when dot11MultiBSSIDActivated is true and the Trigger frame is directed to STAs from at least two different BSSs of a multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.(#12994)

* Reception of NDP feedback report responses

Following the transmission from an AP of an NFRP Trigger frame(#13318), multiple STAs may simultaneously send NDP feedback report responses to the AP. Based on the RXVECTOR parameter NDP\_REPORT, which provides the detected status array for the resources of each spatial stream and tone set assigned by the Trigger frame, the AP can derive the list of AIDs from the resources of which an NDP feedback report response was sent, and their response.

The AP shall not send any acknowledgment(#11208) in response to the reception of NDP feedback report responses, except when the NDP feedback report responses are sent in response to an NDP Feedback Report poll with the type subfield set to "1" for "Power save".

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* NDP feedback report types
* NDP feedback report with resource request type

An HE AP may send an NFRP Trigger frame(#13318) with the type subfield set to "0" for "resource request".

If the Feedback Type subfield in the User Info field of the NFRP Trigger frame(#13318) is set to 0 for "resource request", a STA that is scheduled may send an NDP feedback report response in order to signal to the AP that it has packets in its queues and would like to be triggered in UL MU. If the STA does not have a resource request to make or does not have any nonzero buffer status to report, it shall not respond to the NFRP Trigger frame(#14290).(#14132)

Each STA that is scheduled is assigned a STARTING\_STS\_NUM and an RU\_TONE\_SET\_INDEX to transmit a FEEDBACK\_STATUS bit.(18/149r3)

The meaning of the FEEDBACK\_STATUS bit is defined in Table 27-3 (FEEDBACK\_STATUS description):

|  |
| --- |
| * FEEDBACK\_STATUS description
 |
| FEEDBACK\_STATUS | Description |
| 0 | Resource request with buffered bytes for transmission between 1 and the resource request buffer threshold. |
| 1 | Resource request with buffered bytes for transmission above the resource request buffer threshold. |

The resource request buffer threshold is equal to 2(Resource request buffer threshold exponent) octets, using the Resource Request Buffer Threshold Exponent subfield in the most recently received NDP Feedback Report Parameter Set element sent by the AP to which the STA is associated. The resource request buffer threshold is equal to 256 octets if the STA didn’t receive anNDP Feedback Report Parameter Set element from the AP to which the STA is associated.

* NDP feedback report with power save type

An HE AP may send an NDP Feedback Report Poll Trigger frame with the type subfield set to "1" for "Power save".

If the Feedback Type subfield in the User Info field of the NDP Feedback Report Poll Trigger frame is set to 1 for "Power save", a PS STA that is scheduled may send an NDP feedback report response in order to signal to the AP that it is in the awake state.

Each STA that is scheduled is assigned a STARTING\_STS\_NUM and an RU\_TONE\_SET\_INDEX to transmit a FEEDBACK\_STATUS bit.(18/149r3)

The meaning of the values of that bit *b* is defined in Table 27-1 (Meaning of the values for FEEDBACK\_STATUS with the Power save type):

|  |
| --- |
| * Meaning of the values for FEEDBACK\_STATUS with the Power save” type
 |
| Value | Description |
| 0 | Indicates that the PS STA transitions to active mode. |
| 1 | Indicates that the PS STA is in the awake state. |

The HE AP shall respond, after a SIFS after the NDP Feedback Report responses, either with a Data or Management frame or with an Ack or a Multi-STA BA for each of the HE STAs that sent an NDP Feedback Report response with a FEEDBACK\_STATUS equal to 1.

**27.5.6.5 Power Save Operation with NDP Feedback Report procedure (#15830, #15837)**

An HE AP shall consider the reception of an NDP Feedback Report response with FEEDBACK\_STATUS equal to 1 in response to a NDP Feedback Report Poll trigger frame with the type subfield set to “1” and the reception of an NDP Feedback Report response with FEEDBACK\_STATUS equal to 0 or 1 in response to a NDP Feedback Report Poll trigger frame with the type subfield set to “0” as an indication that the STA is in the awake state and uses that indication for all power management operation described in 11.2.3 Power management in a non-DMG infrastructure nework and 27.7 TWT operation. When sent outside of a TWT SP, this indication shall be equivalent to the reception of a PS-Poll if the STA operates with the normal (non-APSD) PS mode (11.2.3.1 General) and is equivalent to a U-APSD trigger frame allowing delivery of BUs from all ACs if the STA operates with APSD (11.2.3.5 Power management with APSD). When sent during an announced TWT SP, this indication shall signal that the STA is in the awake state during the TWT SP.

An HE AP shall consider the reception of an NDP Feedback Report response with FEEDBACK\_STATUS equal to 0 in response to a NDP Feedback Report Poll trigger frame with the type subfield set to “1” as equivalent to the reception of a frame with the Power Management bit set to 0 in the Frame Control field, and shall consider the STA as being in active mode.

An HE STA in PS mode that sent an NDP Feedback Report response with FEEDBACK\_STATUS equal to 0 in response to a NDP Feedback Report Poll trigger frame with the type subfield set to “1” and that successfully receives an acknowledgement from the AP to this NDP Feedback Report response shall transition to active mode.