IEEE P802.11
Wireless LANs

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| GCR NDP Feedback |
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Abstract

This submission proposes the solution for GCR NDP feedbacks to reduce overhead for an AP soliciting acknowledgment s from a large number of multicast recipients

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 TGbc Draft. This introduction is not part of the adopted material.

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

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

**Discussion: the changes are made based on the mechanism discussed in IEEE 802.11-20/1976r2**.

**9.3.1.22.9 NFRP Trigger frame format**

**TGbc Editor: *Change Figure 9-64l as follows:***

9

12

0 or 8

0 or 16

1

4

7

7

Starting AID

Reserved

Feedback Type

Reserved

UL Target Receive Power

Multiplexing Flag

GCR Ack Starting Sequence Control (optional)

GCR Ack Sequence Span

(optional)

Bits：

**TGbc Editor: *Insert a new row in Table 9-31k (Feedback Type subfield encoding) as follows and update the Reserved row as appropriate:***

*Table 9-31k – Feedback Type subfield encoding*

|  |  |
| --- | --- |
| **Value** | **Description** |
| 1 | GCR acknowledgment request |

**TGbc Editor: *Insert the following paragraphs at the end of this subclause:***

The GCR Ack Starting Sequence Control subfield and the GCR Ack Sequence Span subfield are present if the Feedback Type subfield is 1; they are not present otherwise. The GCR Ack Starting Sequence Control subfield has the same format as the Block Ack Starting Sequence Control subfield in Figure 9-37. The Starting Sequence Number subfield of the GCR Ack Starting Sequence Control subfield contains the sequence number of the first MSDU or A-MSDU for which this NFRP frame is sent. The Fragment Number subfield of the GCR Ack Starting Sequence Control subfield is set to 0. The GCR Ack Sequence Span subfield indicates the number of MSDUs or A-MSDUs that need to be acknowledged, starting from the MSDU or A-MSDU with the sequence number indicated in GCR Ack Starting Sequence subfield.

**9.4.2.248.2 HE MAC Capabilities Information field**

**TGbc Editor: *Change the corresponding part of Figure 9-788b as follows:***

~~Reserved~~

GCR NDP Feedback Report Support

OM Control Support

OFDMA RA Support

Maximum A-MPDU Length Exponent Extension

A-MSDU Fragmentation Support

Flexible TWT Schedule Support

Rx Control Frame To MultiBSS

BSRP BQRP A-MPDU Aggregation

Bits：

1

1

1

2

1

1

1

1

B24

B25

B26

B27

B28

B29

B30

B31

B32

**TGbc Editor: *Change Table 9-322a (Subfields of the HE MAC Capabilities Information field) as follows:***

*Table 9-322a – Subfields of the HE MAC Capabilities Information field*

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| NDP Feedback Report Support | For an AP, indicates support for NDP feedback report for resource request.For a non-AP STA, indicates support for responding to an NFRP Trigger frame for resource request. | Set to 1 if supported.Set to 0 otherwise. |
| GCR NDP FeedbackReport Support | For an AP, indicates support for NDP feedback report for GCR acknowledgment request.For a non-AP STA, indicates support for responding to an NFRP Trigger frame for GCR acknowledgment request. | Set to 1 if supported.Set to 0 otherwise |

**26.5.7 NDP feedback report procedure**

26.5.7.2 STA behavior

**TGbc Editor: change the first paragraph of this subclause as follows**

A non-AP STA shall set the NDP Feedback Report Support subfield in the HE Capabilities element to 1 if it supports NDP feedback report for resource request and set it 0, otherwise. A non-AP STA shall set the GCR NDP Feedback Report Support subfield in the HE Capabilities element to 1 if it supports NDP feedback report for GCR acknowledgment request and set it 0, otherwise.

A non-AP 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 and the NDP feedback report poll response is SIFS. A non-AP STA shall commence the transmission of an NDP feedback report response at the SIFS time boundary after the end of a received PPDU, if all the following conditions are met:

— The received PPDU contains an NFRP Trigger frame

— The non-AP STA is scheduled by the NFRP Trigger frame

— The NDP feedback report support subfield in HE MAC Capabilities Information field is set to 1 if the Feedback Type subfield of the NFRP Trigger frame indicates resource request or

— The GCR NDP Feedback Report Support subfield in HE MAC Capabilities Information field is set to 1 if the Feedback Type subfield of the NFRP Trigger frame indicates GCR acknowledgment request.

— The non-AP STA intends to provide a response to the type of the NDP feedback contained in the NFRP Trigger frame, as described in 26.5.7.4 (NDP feedback report for a resource request) and 26.5.7.4a (NDP feedback report for a GCR acknowledgment request).

26.5.7.3 AP behavior

**TGbc Editor: change the first paragraph of this subclause as follows**

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

**26.5.7.4 NDP feedback report for a resource request**

**TGbc Editor: change caption of Table 26-3as follows**

**Table 26-3—FEEDBACK\_STATUS description when Feedback Type subfield indicates resource request**

|  |  |
| --- | --- |
| **FEEDBACK\_STATUS** | **Condition** |
| 0 | The STA is in the awake state and reports buffered octets for transmission not exceeding the resource request buffer threshold.NOTE—The STA can use this value to indicate that it is in the awake state even if it does not have any buffered octets for transmission, for example to solicit delivery of BUs known to be buffered at the AP. |
| 1 | The STA is in the awake state and reports buffered octets for transmission exceeding the resource request buffer threshold. |

**TGbc Editor: *Inset new subclause following 26.5.7.4 NDP feedback report for a resource request as follows:***

26.5.7.4a NDP feedback report for a GCR acknowledgment request

If an NFRP Trigger frame is received and the Feedback Type subfield in the User Info field of the NFRP Trigger frame is 1, a STA that is scheduled and has indicated support for responding to an NFRP Trigger frame for GCR acknowledgment request should send an NDP feedback report response in order to signal to the AP that it is in the awake state and whether it received all MSDUs or A-MSDUs indicated in NFRP Trigger frame.

Each STA that is scheduled is assigned a STARTING\_STS\_NUM and an RU\_TONE\_SET\_INDEX to transmit a FEEDBACK\_STATUS bit.

The meaning of the FEEDBACK\_STATUS bit is defined in Table 26-3a (FEEDBACK\_STATUS description when Feedback Type subfield indicates GCR acknowledgment request):

Table 26-3a – FEEDBACK STATUS description when Feedback Type subfield indicates GCR acknowledgment request

|  |  |
| --- | --- |
| **FEEDBACK\_STATUS** | **Condition** |
| 0 | The STA is in the awake state and reports reception of all MSDUs or A-MSDUs indicated in NFRP Trigger frame. |
| 1 | The STA is in the awake state and reports that at least one of the MSDUs or A-MSDUs indicated in NFRP Trigger frame was not received. |

**10.25.9.4 GCR block ack BlockAckReq and BlockAck frame exchanges**

**TGbc Editor: change paragraphs 2-3 of this subclause as follows**

If the retransmission policy for a group address is GCR Block Ack, an originator shall not transmit more than the GCR buffer size number of A-MSDUs with RA field set to the GCR concealment address and the DA field of the A-MSDU subframe set to the GCR group address before sending a BlockAckReq frame to one of the STAs that has a GCR block ack agreement for this group address. The RA field of the BlockAckReq frame shall be set to the MAC address of the destination STA. Upon reception of the BlockAck frame, an originator may send a BlockAckReq frame to another STA that has a block ack agreement for this group address, and this process may be repeated multiple times. If the originator has a GCR block ack agreement with one or more of the HE STAs for this group address, the originator may send a GCR MU-BAR Trigger frame to one or more of the HE STAs that are in the awake state. Upon reception of the BlockAck frame from one or more HE STAs, the originator may send a GCR MU-BAR Trigger frame to one or more other HE STAs that have a GCR block ack agreement, and this process may be repeated multiple times. If the originator and one or more of the HE STAs have indicated support for GCR NDP feedback report, the originator may send an NFRP Trigger frame for GCR acknowledgment request to one or more of the HE STAs that are in the awake state. Upon reception of the NDP feedback report responses from one or more HE STAs, the originator may send a NFRP Trigger frame for GCR acknowledgment request to one or more other HE STAs that have indicated support for GCR NDP feedback report, and this process may be repeated multiple times.

NOTE—If the originator sends a BlockAckReq frame to a STA with a MAC address that matches the SA in any of the A-MSDUs transmitted during the GCR TXOP, the Block Ack Bitmap subfield does not indicate the MSDUs sourced from this STA. This is because the STA will have discarded all group addressed MPDUs transmitted by the AP that have the source address equal to their MAC address (see 10.3.6 (Group addressed MPDU transfer procedure)).

If a recipient receives a BlockAckReq frame with the GCR Group Address subfield equal to a GCR group address, the recipient shall transmit a BlockAck frame at a delay of SIFS after the BlockAckReq frame. The BlockAck frame acknowledges the STA’s reception status of the block of group addressed frames requested by the BlockAckReq frame. If an HE STA receives a GCR MU-BAR Trigger frame with the AID12 subfield set to the 12 LSBs of the AID of the HE STA, the HE STA shall include the BlockAck frame in the HE TB PPDU sent in response to the Trigger frame. The BlockAck frame acknowledges the HE STA's reception status of the block of group addressed frames requested by the GCR MU-BAR Trigger frame. If an HE non-AP STA receives a NFRP Trigger frame for GCR acknowledgment request and the conditions defined in 26.5.7.2 (STA behavior) are met, the HE STA should include NDP feedback report information in an HE TB feedback NDP in response to the Trigger frame. The NDP feedback report information indicates the HE STA's reception status of the block of group addressed frames requested by the NFRP Trigger frame.

**TGbc Editor: Insert the following paragraph and associated figure after the 5th paragraph**

Figure 10-37b (Example of a frame exchange with NFRP Trigger frames for GCR acknowledgment request) shows another example of a frame exchange when the NFRP Trigger frame for GCR acknowledgment request is used. The HE AP sends several A-MSDUs using the GCR block ack retransmission policy. The HE AP then sends a NFRP Trigger frame for GCR acknowledgment request to all 5 group members of the GCR group and waits for the NDP feedback report responses, by which the HE AP knows which group member failed to receive at least one of the A-MSDUs. In this example, the responses from group members 1, 3 and 4 are 0s, indicating that all A-MSDUs are received; the response from group member 3 is 1, indicating that at least one A-MSDU was not received; group member 5 did not send any response due to reception failure of the NFRP Trigger frame. Then the HE AP sends a GCR MU-BAR Trigger frame to group members 3 and 5 and waits for the BlockAck frames. After receiving the BlockAck frames, the HE AP determines whether any A-MSDUs need to be retransmitted and sends additional A-MSDUs (some of which might be retransmissions of previous A-MSDUs).

AP

GCR group member 1

GCR group member 2

GCR group member 3

GCR group member 4

GCR group member 5

Data

**---**

GCR NFRP Trigger

Data

NDP feedback

NDP feedback

NDP feedback

NDP feedback

GCR MU-BAR Trigger

Block Ack

Block Ack

Data transmission and/or retransmission

Figure 10-37b—Example of a frame exchange with NFRP Trigger frames for GCR acknowledgment request