IEEE P802.11  
Wireless LANs

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| MAC-PDT-CR for ICF/ICR rules with multiple modes | | | | |
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Abstract

This document contains proposed draft text and some comment resolutions for the following CIDs related to ICF/ICR rules.

* TBD.

Rev 0: Initial version of the document. Contains also suggested changes for the acknowledgment subclause that may need to be transferred to [11-25/910r1](https://mentor.ieee.org/802.11/dcn/25/11-25-0910-01-00bn-cc50-cr-for-clause-37-4.docx)

Rev 1: Incorporates feedback/suggestions received from Mark, Michail, Po-Kai, and Gaius. Most changes highlighted in green (deletions are not tracked).

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| **CID** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
|  |  |  |  |  |  | Revised –  Agree in principle.  TGbn editor to make the changes shown in 11-25/1071r1 under all headings that include CID X. |
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**Discussions***.*

***TGbn editor: Please insert the following subclause:***

## 37.6a Rules for initial Control and initial Control response frames

### 37.6a.1 General

UHR defines four initial Control frames (ICFs) that are used for different modes of operation, namely RTS, MU-RTS Trigger, BSRP Trigger, and BSRP NTB Trigger frames. An ICF can be used for more than one mode and a mode can use more than one ICF subject to the rules that are explicitly stated in this subclause.

A UHR non-AP STA that is required to send an ICF to an AP for AP DPS, or NPCA shall use an RTS, or BSRP NTB Trigger frame as the ICF subject to the following:

* If the ICF is sent on the BSS primary channel, then the ICF shall satisfy the requirements defined in 37.15.1 (Dynamic power save (DPS) operation) if the AP has enabled DPS.
* If the ICF is sent on the NPCA primary channel, then the ICF shall additionally satisfy the requirements defined in 37.16 (Non-primary channel access (NPCA).
  + RTS is not allowed in the NPCA primary channel
* If Control frame protection has been negotiated with the AP, then the ICF shall be a protected BSRP NTB Trigger frame that additionally satisfies the requirements defined in 12.6.22 (Protection of Control frames).

NOTE—A UHR non-AP STA might send a BSRP NTB Trigger frame as an ICF to carry unsolicited DUO feedback subject to the requirements defined in 37.17.2 (Dynamic Unavailability Operation (DUO) mode).

A UHR AP that is required to send an ICF to a non-AP STA, for non-AP DPS, NPCA, EMLSR, DUO, or DSO, shall use an RTS, MU-RTS, BSRP, or BSRP NTB Trigger frame as the ICF subject to the following:

* If the ICF is sent on the BSS primary channel then the ICF shall satisfy the requirements defined in 37.15.1 (Dynamic power save (DPS) operation) if the STA has enabled DPS, the requirements defined in 37.19 (Enhanced multi-link single-radio (EMLSR) operation for a UHR non-AP MLD) if the STA has enabled eMLSR, and the requirements defined in 37.17.2 (Dynamic Unavailability Operation (DUO) mode) if the STA has enabled DUO.
  + RTS frame is not allowed unless the STA has only enabled DPS with zero length DPS padding
  + MU-RTS Trigger frame is not allowed if DUO is enabled, while BSRP NTB Trigger frame is only allowed if DUO is enabled or Control frame protection has been negotiated
* If the ICF is sent on the NPCA primary channel, then the ICF shall additionally satisfy the requirements defined in 37.16 (Non-primary channel access (NPCA).
  + RTS is not allowed in the NPCA primary channel, while BSRP NTB Trigger is only allowed if DUO is enabled or Control frame protection has been negotiated
* If the ICF is intended to cause the STA to switch to a DSO subband then the ICF shall additionally satisfy the requirements defined in 37.24 (Dynamic Subband Operation).
  + RTS, MU-RTS Trigger and BSRP NTB Trigger frames are not allowed
* If Control frame protection has been negotiated with the non-AP STA, then the ICF shall be a protected BSRP Trigger or a BSRP NTB Trigger frame that additionally satisfies the requirements defined in 12.6.22 (Protection of Control frames).
  + RTS and MU-RTS Trigger are not allowed

A UHR STA that transmits an ICF that is an MU-RTS Trigger, BSRP Trigger, or BSRP NTB Trigger frame, in addition to satisfying the requirements defined in 35.5.2.2.3 (Padding for a Trigger frame), shall also satisfy any applicable requirements that are defined in 37.20 (Padding for an ICF), and in the subclauses below.

A UHR STA responds to an RTS frame and to an MU-RTS Trigger frame as defined in 10.3.2.9 (CTS and DMG CTS procedure) and in 35.2.2 (MU-RTS Trigger/CTS frame exchange procedure for EHT STAs), respectively, and responds to a BSRP Trigger and BSRP NTB Trigger frames as defined in the subclauses below.

### 37.6a.2 BSRP Trigger frame soliciting a TB PPDU

A UHR AP that transmits a BSRP Trigger frame to a UHR non-AP STA shall allocate, within the BSRP Trigger frame, sufficient resources for the STA to generate a TB PPDU response that:

* Contains one or more QoS Null frames as required by 26.5.2.4 (A-MPDU contents in an HE TB PPDU) if the UHR non-AP STA has not enabled DUO, has not enabled LLI and has not negotiated Control frame protection
* Contains one Multi-STA BlockAck frame, in addition to the one or more QoS Null frames required by 26.5.2.4 (A-MPDU contents in an HE TB PPDU), if the non-AP STA has enabled DUO or has enabled LLI or has negotiated Control frame protection, wherein the Multi-STA BlockAck frame is expected to contain all the following Per AID TID Info fields:
  + One Per AID TID Info field with Ack Type equal to 1 and TID equal to 13 *[2 octets]*
  + One Per AID TID Info field that carries DUO feedback if the non-AP STA has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode)) *[8 octets]*
  + One Per AID TID Info field that carries LLI feedback if the non-AP STA has enabled LLI (see 37.22 (Low Latency Indication)) *[8 octets]*
  + One Per AID TID Info field that carries PN And MIC if the AP and the non-AP STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames)) *[36 octets]*
  + Zero or more Per AID TID Info fields that carry padding, wherein the padding shall be sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding)) *[variable octets].*

A UHR non-AP STA that receives a BSRP Trigger frame from its associated UHR AP, which addresses the STA in a User Info field of the BSRP Trigger frame, shall respond, subject to the rules defined in 26.5.2 (UL MU operation), with a TB PPDU that:

* Contains one or more QoS Null frames as required by 26.5.2.4 (A-MPDU contents in HE TB PPDU) if the non-AP STA has not enabled DUO, has not enabled LLI, and has not negotiated Control frame protection
* Contains an Multi-STA BlockAck frame, in addition to the one or more QoS Null frames required by 26.5.2.4 (A-MPDU contents in an HE TB PPDU), if the non-AP STA has enabled DUO or has enabled LLI or has negotiated Control frame protection, wherein the Multi-STA BlockAck frame shall be the first MPDU of the A-MPDU and shall contain the following Per AID Info fields:
  + Zero or one Per AID TID Info field with Ack Type equal to 1 and TID equal to 13 *[2 octets]*
  + Zero or one Per AID TID Info field that carries DUO feedback if non-AP STA has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode) *[8 octets]*
  + Zero or one Per AID TID Info field that carries LLI feedback if the non-AP STA has enabled LLI (see 37.22 (Low Latency Indication) *[8 octets]*
  + One Per AID TID Info field that carries PN And MIC if the AP and the non-AP STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames) *[36 octets]*
  + Zero or more Per AID TID Info fields that carry padding, wherein the padding is sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding) and may also be used to ensure that the length of the response TB PPDU is equal to the UL Length field of the soliciting BSRP Trigger frame *[variable octets].*
    - The non-AP STA may also use A-MPDU padding to satisfy any of these requirements.
  + The total number of Per AID TID Info fields in the BA Information field of the Multi-STA BlockAck frame shall be greater than zero, the Per AID TID Info fields shall appear in the BA Information field in the same order of appearance as in the above list except that LLI feedback may appear before DUO feedback, and no other Per AID TID Info fields shall appear after any Per AID TID Info fields that carry padding.

### 37.6a.3 BSRP NTB Trigger frame soliciting a non-HT (duplicate) PPDU

A UHR STA that transmits a BSRP NTB Trigger frame to a peer UHR STA shall set the UL length field of the BSRP NTB Trigger frame to the expected value of the L-SIG LENGTH field of the response non-HT (duplicate) PPDU, and shall ensure that the value is calculated assuming that the response PPDU is sent using a rate that is equal to the primary rate, which is defined below, and that the PPDU includes a Multi-STA BlockAck frame that contains all the following Per AID TID Info fields:

* One Per AID TID Info field with Ack Type equal to 1 and TID equal to 13 *[2 octets]*
* One Per AID TID Info field that carries DUO feedback if the peer STA is a non-AP STA that has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode)) *[8 octets]*
* One Per AID TID Info field that carries LLI feedback if the peer STA is a non-AP STA that has enabled LLI (see 37.22 (Low Latency Indication)) *[8 octets]*
* One Per AID TID Info field that carries PN And MIC if the STA and the peer STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames)) *[36 octets]*
* Zero or more Per AID TID Info fields that carry padding wherein the padding is sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding)) *[variable octets].*

A UHR STA that receives a BSRP NTB Trigger frame from its peer UHR STA, which addresses the STA in a User Info field of the BSRP NTB Trigger frame, shall respond, subject to the rules defined in 26.5.2.5 (UL MU CS mechanism), with a non-HT (duplicate) PPDU that:

* Has the L-SIG LENGTH equal to the value of the UL Length field of the soliciting BSRP NTB Trigger frame
* Has a rate that is equal to either the primary rate or the alternate rate, if one exists, wherein:
  + The primary rate is defined as the highest rate in the BSSBasicRateSet parameter that is less than or equal to the rate (or non-HT reference rate; see 10.6.11 (Non-HT basic rate calculation)) of the BSRP NTB Trigger 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 10.6.11 (Non-HT basic rate calculation)) of the BSRP NTB Trigger frame.
  + The alternate rate is defined as the rate that is selected following the rules in 10.6.6.5.4 (Selection of an alternate rate or MCS for a control response frame).
* Carries an individually addressed Multi-STA BlockAck frame that contains:
  + Zero or one Per AID TID Info field with Ack Type equal to 1 and TID equal to 13 *[2 octets]*
  + Zero or one Per AID TID Info field that carries DUO feedback if the peer STA is a non-AP STA that has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode) *[8 octets]*
  + Zero or one Per AID TID Info field that carries LLI feedback if the peer STA is a non-AP STA that has enabled LLI (see 37.22 (Low Latency Indication) *[8 octets]*
  + One Per AID TID Info field that carries PN And MIC if the STA and the peer STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames) *[36 octets]*
  + Zero or more Per AID TID Info fields that carry padding, wherein the padding is sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding) and shall also be used to ensure that the length of the response PPDU is equal to the UL Length field of the BSRP NTB Trigger frame *[variable octets]*.
* The total number of Per AID TID Info fields in the BA Information field shall be greater than zero, the Per AID TID Info fields shall appear in the BA Information field in the same order of appearance as in the above list except that LLI feedback may appear before DUO feedback, and no other Per AID TID Info fields shall appear after any Per AID TID Info fields that carry padding.

***TGbn editor: Please change the following subclause (suggest adding to 910r1):***

**37.6 UHR Acknowledgement Procedure**

The UHR acknowledgment procedure builds on the features defined for HT-immediate block ack (see 10.25.6 (HT-immediate block ack extensions)), HE acknowledgement (see 26.4 (HE acknowledgment procedure)) and EHT acknowledgement (see 35.4 (EHT acknowledgment procedure)).

A UHR AP that sends a PPDU that solicits an acknowledgment or block acknowledgment from a UHR STA, which has enabled DUO or has enabled LLI or has negotiated Control frame protection with the UHR AP, shall ensure that 1) the value of the Duration/ID field of MPDU(s) carried in the PPDU, and 2) the resources that are allocated in any triggering frames carried in the PPDU, are calculated to account for an immediate response that is a Multi-STA BlockAck frame that, in addition to Per AID TID Info field(s) that contain the solicited (block) acknowledgment context(s), also contains

* One Per AID TID Info field that carries DUO feedback if the non-AP STA has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode)) *[8 octets]*
* One Per AID TID Info field that carries LLI feedback if the non-AP STA has enabled LLI (see 37.22 (Low Latency Indication)) *[8 octets]*
* One Per AID TID Info field that carries PN And MIC if the AP and the non-AP STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames)) *[36 octets]*
* Zero or more Per AID TID Info fields that carry padding, wherein the padding shall be sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding)) *[variable octets].*

A UHR non-AP STA that sends a PPDU that solicits an acknowledgment or block acknowledgment from a peer UHR STA and that has negotiated Control frame protection with that peer UHR non-AP STA, shall ensure that the value of the Duration/ID field of the MPDU(s) carried in the PPDU are calculated to account for an immediate response that is a Multi-STA BlockAck frame that, in addition to the Per AID TID Info field(s) that contain the solicited (block) acknowledgment context(s), also contain:

* One Per AID TID Info field that carries PN And MIC *[36 octets]*
* Zero or more Per AID TID Info fields that carry padding, wherein the padding shall be sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding)) *[variable octets].*

A UHR STA, which has enabled DUO or has enabled LLI or has negotiated Control frame protection, that receives a PPDU that contains frames requiring an acknowledgment or block acknowledgment shall respond with a Multi-STA BlockAck frame that, in addition to the acknowledgment context(s) defined in 26.4.2 (Acknowledgment context in a Multi-STA BlockAck frame, shall contain after the Per AID TID Info fields with acknowledgment context(s):

* Zero or one Per AID TID Info field that carries DUO feedback if the STA is a non-AP STA that has enabled DUO (see 37.12.2 (Dynamic Unavailability Operation (DUO) mode) *[8 octets]*
* Zero or one Per AID TID Info field that carries LLI feedback if the STA is a non-AP STA that has enabled LLI (see 37.22 (Low Latency Indication) *[8 octets]*
* One Per AID TID Info field that carries PN And MIC if the STA and the peer STA have negotiated Control frame protection (see 12.6.22 (Protection of Control frames) *[36 octets]*
* Zero or more Per AID TID Info fields that carry padding, wherein the padding is sufficient to at least satisfy the MIC padding delay (see 12.5.5.7 (Padding) *[variable octets]*
* The total number of Per AID TID Info fields in the BA Information field shall be greater than zero, the Per AID TID Info fields shall appear in the BA Information field in the same order of appearance as in the above list except that LLI feedback may appear before DUO feedback, and no other Per AID TID Info fields shall appear after any Per AID TID Info fields that carry padding.

A UHR STA that receives a Multi-STA BlockAck frame that is a response to frames requiring acknowledgment shall examine Per AID TID Info field received in the Multi-STA BlockAck frame, and shall process each Per AID TID Info field using the procedure defined in 26.4.2 (Acknowledgment context in a Multi-STA BlockAck frame) and Clause 37.17.2 (Dynamic Unavailability Operation (DUO) mode) when non-acknowledgement context is carried in the same Multi-STA BlockAck frame.

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TBD procedure is for UHR ELR PPDU.