IEEE P802.11
Wireless LANs

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| PDT Sounding Procedure and CR for subclause 37.7 |
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Abstract

This document contains Proposed Draft Text (PDT) and comment resolutions (CRs) to comments on P802.11bn D0.1. The changes are based on P802.11bn D0.1.

This submission contains total 130 CIDs.

**Revisions:**

* Rev 0: Initial version of the document. Proposed change based on passed Motions and CIDs are highlighted in blue.
* Rev 1: Modify the document based on comments from Wook Bong and .

**Notes:**

* Frequency correction related CIDs are highlighted in red (9CIDs). Move the related text to PHY section. However, some commenters request to defer the draft writing. If no consensus, I can remove them and leave them unresolved.
* TXOP, ICF/ICR, error handling related CIDs are highlighted in green (22CIDs). Discussed with commenters, gain some support but not all. If no consensus, I can remove them and leave them unresolved.

**The submission provides resolutions to the following CIDs:**

73 74 75 76 77 78 79 133 134 135 146 167 168 196 197 198 215 216 285 286 287 412 413 414 773 774 862 863 906 917 918 919 920 921 922 923 961 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 1031 1205 1382 1403 1404 1495 1525 1572 1573 1574 1575 1576 1577 1752 1920 1921 1935 1936 1944 1951 1952 1953 1957 2112 2113 2114 2219 2220 2221 2222 2223 2224 2225 2467 2546 2803 2804 2809 2980 2981 2982 2983 2984 2985 2986 2987 2988 2989 2990 2991 2992 3166 3167 3168 3280 3281 3282 3283 3284 3288 3289 3290 3527 3528 3549 3550 3576 3608 3674 3675 3676 3677 3727 3732 3901 3969 3970

**The proposed changes within this document are also based on the following motions adopted by the TGbn task group:**

[Motion #262, [1]]

* When the initiating AP requests the responding AP to join the CoBF sounding, the red subfields in the first and second User Info fields of the NDPA shall be set as follows.
	+ NDPA Version Identifier is set to 0 for CoBF sounding in UHR.
	+ Number of LTF symbols is set to 0 and 1 for 4 and 8 symbols, respectively.
	+ Starting Spatial Stream is set to 0 and 1 for the 1st and 5th streams, respectively.
	+ Number of spatial streams is set to 0 and 1 for the 4 and 8 streams, respectively.
	+ LTF+GI is set to 0 and 1 for 2x LTF+0.8us GI and 2x LTF+1.6us GI, respectively.
	+ B20-26, which are shown as Reserved in the second User Info field, can be used in the future.



[Motion #298, [1]]

* 802.11bn defines the concept of a sync-reference AP and a sync-follower AP for CFO correction in COBF
	+ Sync-follower AP pre-corrections needed.
	+ For sequential sounding:
		- All the NDPs sent by it during sounding phase that are sent for the purpose of sounding the STAs in the other BSS (Mandatory)
		- For the NDPs sent by it for sounding the STAs in its own BSS, it is recommended but not mandatory that the sync follower AP pre-correct those NDPs.
	+ For joint sounding
		- All the NDPs sent by it during the sounding phase (Mandatory)
		- The COBF sync and COBF PPDU during transmission phase using the same frequency pre-correction value as the sounding phase, when it is the sharing AP.
	+ Sync-reference AP does not pre-correct during transmission phase when it is the sharing AP.

[Motion #299, [1]]

* The sync-follower AP shall use the NDPA frame sent by the sync-reference AP to pre-correct the NDP frequency to be within a TBD range (e.g., 350Hz) of the sync-reference AP’s frequency.
	+ Applies to sequential and joint sounding.
	+ The pre-correction of cross-BSS NDP and joint NDP is mandatory.
	+ The pre-correction of in-BSS NDPs is recommended but not a mandatory requirement.

[Motion #306, [1]]

* There shall be a frame-exchange before the COBF sounding between the two APs which will at-least serve the following goals:
	+ Unavailability/decline indication from the responding AP
		- Used by responding AP to refuse participation in a COBF sounding process.
	+ Exchange of sounding Nss capability of the STAs being sounded in the two BSSs.
		- The minimum sounding Nss capability of the participating STAs in each BSS will be exchanged.
	+ Note: Design of the frames is TBD by MAC group

[Motion #309, [1]]

* Joint/cross-BSS sounding feedback is limited to UL OFDMA if >1 STA is sounded.

[Motion #372, [1]]

* UHR Co-BF sounding reuses EHT Compressed Beamforming/CQI report.

[Motion #373, [1]]

* EHT Compressed Beamforming/CQI report containing UHR Co-BF sounding feedback shall be carried in EHT TB PPDU

[Motion #374, [1]]

* UHR Co-BF sounding reuses the EHT sounding segmentation and retransmission of 11be feedback segments rules.

[Motion #375, [1]]

* UHR Co-BF sounding uses EHT MU full bandwidth feedback.

**Editorial:**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 73 | Jialing Li | 69.43 | Change the color of "TBD" to red. Same comment to P69L56, P70L6 and P70L33. | Refer to the comment. | **Rejected**TBD color will be changed by editor.  |
| 74 | Jialing Li | 69.48 | The first sentence reads like the responding AP may send multiple NDPs. Suggest to change the sentence structure to "by an EHT sounding NDP transmitted from the responding AP ..., or EHT sounding NDPs simultaneously from the initiating AP and the responding AP ...". | Refer to the comment. | **Revised**Agree with commenter.11bn Editor: please make the changes marked as [CID#74] in document 25/681r0. |
| 75 | Jialing Li | 69.62 | Change "Figure 37-x" to "Figure 37-1". | Refer to the comment. | **Accepted**11bn Editor: please make the changes marked as [CID#75] in document 25/681r0. |
| 906 | Anand Jee | 69.62 | Figure 37-1 instead of Figure 37-x | As in comment | **Revised**Same changes as CID#75  |
| 973 | Arik Klein | 69.62 | Replace "Figure 37-x" with "Figure 37-2" | As in comment | **Revised**Same changes as CID#75  |
| 1957 | Insik Jung | 69.62 | Figure 37-x need to be changed to Figure 37-1 | As the comment | **Revised**Same changes as CID#75  |
| 3166 | Yunbo Li | 69.62 | Change "Figure 37-x" to "Figure 37-1" to match with the Figure | as in comment | **Revised**Same changes as CID#75  |
| 3550 | ron porat | 69.62 | Figure number not correct | NDP sounding sequence initiated from AP1 is shown in Figure 37-xShould be Figure 37-1 | **Revised**Same changes as CID#75 |
| 76 | Jialing Li | 70.02 | Change "STA" to "STAs". | Refer to the comment. | **Revised**Agree with commenter. Change to STA (s) if there is only one non-AP STA.11bn Editor: please make the changes marked as [CID#76] in document 25/681r0. |
| 413 | Shuang Fan | 70.02 | The UHR Co-BF NDPA frame may address to one or more non-AP UHR STA,so it would be more appropriate to replace ' non-AP UHR STA' with ' non-AP UHR STA(s)'. | replace ' non-AP UHR STA' with ' non-AP UHR STA(s)'. | **Revised**Same changes as CID#76  |
| 773 | Seongho Byeon | 70.02 | As noted in the first paragraph of 37.7.2 Rules for UHR sounding protocol sequences, the UHR Co-BF NDP Announcement frame shall only address to the responding AP and the non-AP UHR STA associated wi the initiating AP. Suggest writing the UHR STA above in plural form above: UHR STAs | As in comment. | **Revised**Same changes as CID#76  |
| 285 | Sigurd Schelstraete | 69.32 | The sentence ending in "for DL Co-BF" would be clearer if "for DL Co-BF" was put at the beginning | Change to "For DL Co-BF, the UHR sounding protocol provides an explicit feedback mechanism, defined as UHR trigger-based (TB) sounding sequences that include UHR TB sequential NDP sounding sequence and UHR TB joint NDP sounding sequence." | **Accepted**11bn Editor: please make the changes marked as [CID#285] in document 25/681r0. |
| 968 | Arik Klein | 69.43 | Revise the following sentence for better clarity, as proposed: "STA Info fields shall only \*address to\* the responding AP and the non-AP UHR STAs associated with the initiating AP" | Replace "address to" with "correspond to" as follows:" STA Info fields shall only \*correspond to\* the responding AP and the non-AP UHR STAs associated with the initiating AP" | **Revised**Change “address” to “correspond”11bn Editor: please make the changes marked as [CID#968] in document 25/681r0. |
| 286 | Sigurd Schelstraete | 69.44 | Typo "shall only address to the responding AP" | Change to "shall only address the responding AP" | **Revised**Same changes as CID#968 |
| 3282 | Hanqing Lou | 70.01 | Using "address" may confuse people with the Address field in MAC header. | Change to "The UHR NDP Announcement frame shall have three User Info fields..." . | **Revised**Change “address” to “be sent”11bn Editor: please make the changes marked as [CID#3282] in document 25/681r0. |
| 287 | Sigurd Schelstraete | 70.01 | Typo "shall only address to the responding AP" | Change to "shall only address the responding AP" | **Revised**Same changes as CID#3282  |
| 975 | Arik Klein | 70.01 | Need to revise the following sentence for better clarity (the term "..frame shall only address to the" is not clear), as proposed: "The UHR Co-BF NDP Announcement frame shall only address to the responding AP and the non-AP UHR STA associated with the initiating AP. " | Please revise the sentence as follows: " The UHR Co-BF NDP Announcement frame shall \*contain STA Info fields that\* only \*correspond\* to the responding AP and the non-AP UHR STA associated with the initiating AP." | **Revised**Same changes as CID#3282 |
| 2987 | Mark RISON | 70.01 | "shall only address to the responding AP and the non-AP UHR STA associated with the initiating AP" is grammatically poor. Similarly at line 28 | Change to "shall only be addressed to" | **Revised**Same changes as CID#3282 |
| 3283 | Hanqing Lou | 70.28 | Using "address" may confuse people with the Address field in MAC header. | Change to "The UHR NDP Announcement frame shall have three User Info fields..." . | **Revised**Change “address” to “be sent”11bn Editor: please make the changes marked as [CID#3283] in document 25/681r0. |
| 980 | Arik Klein | 70.28 | Need to revise the following sentence for better clarity (the term "..frame shall only address to the" is not clear), as proposed: "The UHR Co-BF NDP Announcement frame shall only address to the responding AP and the non-AP UHR STA associated with the initiating AP. " | Please revise the sentence as follows: " The UHR Co-BF NDP Announcement frame shall \*contain STA Info fields that\* only \*correspond\* to the responding AP and the non-AP UHR STA associated with the initiating AP." | **Revised**Same changes as CID#3283 |
| 2112 | Vishnu Ratnam | 70.29 | The current text reads: "The UHR Co-BF NDP Announcement frame shall only address to the responding AP and ..." Replace with "The UHR Co-BF NDP Announcement frame shall only be addressed to the responding AP and" | As in comment. | **Revised**Same changes as CID#3283 |
| 412 | Shuang Fan | 69.60 | AP may collect CSI from one or more its associated STA in the EHT TB sounding procedure, so it would be more appropriate to replace ' STAs' with ' STA(s)'. | replace ' STAs' with ' STA(s)' in this sentence | **Accepted**11bn Editor: please make the changes marked as [CID#412] in document 25/681r0. |
| 2803 | RUI YANG | 69.30 | Change "transmitting DL Co-BF" to "DL Co-BF transmission" | As in Comment | **Revised**Modified as the suggested change. 11bn Editor: please make the changes marked as [CID#2803] in document 25/681r0. |
| 1921 | Yingqiao Quan | 69.30 | Incorrect description. | Change " ...for transmitting DL Co-BF." to "... for DL co-BF" or "... for transmission by (using) DL Co-BF.". | **Revised**Same change as CID#2803. |
| 2985 | Mark RISON | 69.50 | "The EHT sounding NDP(s) shall be followed after a SIFS by the BFRP Trigger frame from the initiating AP." should be "... by a BFRP ..." | As it says in the comment | **Accepted**11bn Editor: please make the changes marked as [CID#2985] in document 25/681r0. |

**Motion 262: NDPA**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 79 | Jialing Li | 70.58 | In the first sentence of the paragraph, need to clarify where is the AID11 subfield. Suggest to revise the sentence for clarity. | Refer to the comment. | **Revised**Motion# 262 passed. Will modify based on the passed motions.11bn Editor: please make the changes marked as [CID#79] in document 25/681r0 |
| 216 | Pei Zhou | 70.58 | In UHR Co-BF NDP Announcement frame, STAInfo fields address to the responding AP and the non-AP UHR STAs associated with the initiating AP. However, this paragraph only mentions how to set the AID11 of beamformees, it doesn't describe how responding AP is indicated. | Add relevant content to describe UHR Co-BF NDP Announcement frame is also address responding AP, not just beamformees. | **Revised**Same changes as CID#79  |
| 414 | Shuang Fan | 70.57 | Please clarify how a UHR Co-BF beamformer address to a responding AP in the UHR Co-BF NDPA frame. | replace the AID11 with APID11 in the STA info field in the NDPA frame. | **Revised**Same changes as CID#79  |
| 774 | Seongho Byeon | 70.58 | The description of the user info field starting with the AID11 field being allocated for each beamformee is ambiguous. Please change it as suggested: "A UHR Co-BF beamformer that transmits a UHR Co-BF NDP Announcement frame to one or more UHR Co-BF beamformees shall set the AID11 subfield in STA Info field of each UHR Co-BF beamformee to the 11 LSBs of the corresponding beamformee." | As in comment. | **Revised**Same changes as CID#79 The similar text used in 11be, and different is the per user info starting from the third STA Info field. |
| 2114 | Vishnu Ratnam | 70.58 | The current text reads: " UHR Co-BF beamformer that transmits a UHR Co-BF NDP Announcement frame to one or more UHR Co-BF beamformees shall set the AID11 subfield to the 11 LSBs of the AID of each UHR Co-BF beamformee." One AID11 subfield can't be set to the AID LSBs of multiple beamformees. Please rephrase the statement to indicate that these are the AID11 subfields of multiple STA Info fields, each addressed to one beamformee. | As in comment. | **Revised**Same changes as CID#79  |
| 1944 | Insik Jung | 69.43 | Since motion 262 is passed, we'd better write "four or more STA Info fields" | Replace "TBD or more STA Info fields" to "four or more STA Info fields" | **Revised**Same changes as marked as M#262. Instead of 4, it modified as three or more.  |
| 2219 | Dana Ciochina | 69.42 | "shall transmit a UHR CoBF NDP Announcement frame with TBD or more STA Info Fields". | Define the number of STA Info Fields: There should be the STA Info fields for the coordinated AP and the STA Info fields of the STA | **Revised**Same changes as M#262  |
| 2983 | Mark RISON | 69.42 | "A UHR Co-BF beamformer that initiates a UHR TB sounding sequence shall transmit a UHR Co-BF NDP Announcement frame" -- no such frame | As it says in the comment | **Revised**Motion #376 passed, will align the naming as “UHR NDP Announcement”.11bn Editor: please make the changes marked as [CID#2983] in document 25/681r0. |
| 974 | Arik Klein | 69.64 | Figure 3-72 includes "UHR NDP Announcement frame" while the text requires that "AP1, the UHR Co-BF beamformer that initiates a cross-BSS UHR TB sounding, shall transmit the UHR Co-BF NDP Announcement frame...." - please align the definitions (of the required frame) between the text and the figures | As in comment | **Revised**Same change as CID#2983 |
| 979 | Arik Klein | 70.25 | Figure 3-73 includes "UHR NDP Announcement frame" while the text requires that "A UHR Co-BF beamformer that initiates a UHR TB joint NDP sounding shall transmit the UHR Co-BF NDP Announcement frame ...." - please align the definitions (of the required frame) between the text and the figures | As in comment | **Revised**Same change as CID#2983 |
| 3167 | Yunbo Li | 69.65 | "UHR Co-BF NDP Announce frame" is used in the text, while "UHR NDP Announcement" is used in Figure 37-1. | Use the same naming in text and figure. | **Revised**Motion #376 passed, will align the naming as “UHR NDP Announcement”.11bn Editor: please make the changes marked as [CID#2983] in document 25/681r0. |
| 3168 | Yunbo Li | 70.26 | "UHR Co-BF NDP Announce frame" is used in the text, while "UHR NDP Announcement" is used in Figure 37-2. | Use the same naming in text and figure. | **Revised**Same changes as CID#2983 |
| 3280 | Hanqing Lou | 69.48 | UHR NDP Announcement frame is defined for Co-BF. Thus no need to have a term "UHR Co-BF NDPA" unless we want to define it explicitly. Also Figure 37-1 uses UHR NDP Announcement. I suggest to remove "Co-BF". | Change "UHR Co-BF NDP Announcement frame" to "UHR NDP Announcement frame". Please correct the term "UHR Co-BF NDP Announcement frame" in other places too. | **Revised**Same changes as CID#2983 |

**Motion 372-375: re-use EHT**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 133 | You-Wei Chen | 69.19 | some placeholder in PDT were removed.For example, 37.6.2 UHR sounding protocol and 37.6.4 Rules for generating segmented feedback. | will make a contribution for those sections. | **Revised**Modified based on the passed motions.11bn Editor: please make the changes marked as [M#372-375] in document 25/681r0 |
| 134 | You-Wei Chen | 71.01 | Motion 262 (JOINT) passed, please add content in 27.7.3 | please add content | **Revised**Modified based on the passed motions.Same changes as CID#134 |
| 135 | You-Wei Chen | 70.55 | There are questions and comments about UHR TB PPDU after BFRP during PDT drafting. we are not decide this is a UHR or EHT TB PPDU. | will have a contribution for this | **Revised**Modified based on the passed motions.Same changes as CID#134 |
| 918 | Wookbong Lee | 69.54 | For UHR sounding, EHT variant should be used in NDP-A and EHT-NDP is used. In this case, should UHR TB PPDU be used or should EHT TB PPDU be used to carry feedback? It seems natural to use EHT TB PPDU. | Update UHR TB PPDU to EHT TB PPDU in section 37.7 | **Revised**Same changes as marked as M#373  |
| 921 | Wookbong Lee | 70.15 | Use EHT Compressed Beamforming/CQI report in UHR sounding. | Change "TBD Compressed Beamforming/CQI" to "EHT Compressed Beamforming/CQI" in Figure 37-1 and Figure 37-2 | **Revised**Figure 37-1 and Figure 37-2 made the same changes as marked as M#372  |
| 961 | Wookbong Lee | 70.44 | Remove "1" after "Compressed Beamforming/CQI" in figure 37-2 | As in comment | **Revised**Figure 37-2 made the same changes as marked as M#372  |
| 981 | Arik Klein | 70.52 | The reference (in P70L54) corresponding to the sentence "An UHR Co-BF beamformer shall not initiate an UHR TB sounding sequence if the feedback would be computed based on parameters not supported by the UHR CoBF beamformee " points to the same subclause 37.7.2 - which seems erroneous. | Please indicate the correct reference to the list of "parameters not supported by the UHR CoBF beamformee" | **Revised**37.7.2 was removed by editor and add it back with the passed motions. |
| 3901 | Dong Wei | 70.53 | Circular reference. This paragraph is in clause 37.7.2. | Delete "(see 37.7.2 (UHR sounding protocol))" | **Revised**37.7.2 was removed by editor and add it back with the passed motions. |
| 1935 | Okan Mutgan | 69.19 | UHR TB joint NDP sounding utilizes TBD Compressed Beamforming/CQI. This frame is intended to be sent by the STA and be received by two APs. | Define the frame format of TBD Compressed Beamforming/CQI so that it can be received by two APs. | **Revised**Same changes as marked as M#372  |
| 2220 | Dana Ciochina | 69.55 | "shall repond after SIFS with a UHR TB PPDU containing one or more TBD Compressed BF/CQI". There's no reason to transmit a UHR TB PPDU for the feedback. Legacy is enough. | Change UHR TB PPDU to EHT TB PPDU | **Revised**Same changes as M#373 |

**Definition and Clarification**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 196 | Chunyu Hu | 69.40 | Lack of a clear definition of UHR TB sequential NDP sounding despite an example is provided. | Please provide a clear definition of UHR TB sequential NDP sounding procedure. | **Revised**clarify the definition for UHR TB sequential NDP.11bn Editor: please make the changes marked as [CID#196] in document 25/681r0. |
| 2986 | Mark RISON | 69.60 | "a cross-BSS UHR TB sounding sequence" is a new term that has not been defined or describe above (above it's "UHR trigger-based (TB) sounding sequences that include UHR TB sequential NDP sounding sequence and UHR TB joint NDP sounding sequence") | As it says in the comment | **Revised** Same change as CID#196 |
| 197 | Chunyu Hu | 69.40 | Lack of a clear definition of UHR TB joint NDP sounding despite an example is provided. | Please provide a clear definition of UHR TB joint NDP sounding procedure. | **Revised**clarify the definition for UHR TB sequential NDP.11bn Editor: please make the changes marked as [CID#197] in document 25/681r0. |
| 863 | Tomoko Adachi | 69.40 | All the description under 37.7.2 seems to be for Co-BF, not general for UHR sounding protocol sequences. | Clarify that in the subclause title. | **Revised**Discussed with the commenter. Suggest highlighting the “Co-BF”.11bn Editor: please make the changes marked as [CID#863] in document 25/681r0. |
| 3727 | Youhan Kim | 69.19 | This section applies only to UHR COBF. | Change "UHR sounding operation" to "UHR Co-BF sounding operation" | **Accepted** |
| 2546 | Youhan Kim | 69.19 | EHT sounding is used for UHR SU beamforming and DL MU-MIMO. | Change "UHR sounding operation" to "UHR COBF sounding operation". | **Revised**Same changes as CID#3727. |
| 2804 | RUI YANG | 69.40 | Change the title of this subclause to make it specifically for Co-BF | Change it to "UHR Sounding Protocol for Co-BF" | **Revised**Same changes as CID#3727. |
| 917 | Wookbong Lee | 69.44 | What is "responding AP" and "initiating AP"? | Define "responding AP" and "initiating AP" | **Revised**Add definitions of “initiating AP” and “responding AP”.11bn Editor: please make the changes marked as [CID#917] in document 25/681r0. |
| 1525 | Xiandong Dong | 69.45 | clarify that the responding AP established MAPC agreement with the initiating AP. | as in comment | **Revised**Same changes as CID#917. |
| 1573 | Jinsoo Choi | 69.45 | responding AP and initiating AP is mostly used only in this subclause without a specific definition. Suggest to define Co-BF responding AP and Co-BF initiating AP in either this subclause or 3.2 definition subclause. | See the comment. | **Revised**Same changes as CID#917. |
| 970 | Arik Klein | 69.51 | The terms "initiating AP" , "responding AP" in the UHR sounding procedure are confusing and do not align with the definition of "UHR Co-BF beamformer" that is mentioned in P69L42 | Please clarify the distinction between "initiating AP", "responding AP" and "UHR Co-BF beamformer" in detail. | **Revised**Same changes as CID#917 |
| 3527 | ron porat | 69.45 | Concepts of responding AP and initiating AP mentioned but not explained/referenced. | Include a reference to the definition of 'responding AP' and 'initiating AP' | **Revised**Same changes as CID#917 |
| 2984 | Mark RISON | 69.43 | "STA Info fields shall only address to the responding AP and the non-AP UHR STAs associated with the initiating AP. " grammar wonky and "the responding AP" is unclear (first time this term is used in this clause) | As it says in the comment | **Revised**Same modifications as CID#917 and 968 |
| 920 | Wookbong Lee | 69.30 | For the non-AP STA point of view, UHR sounding protocol (Co-BF) is same as EHT TB sounding. It is better to inherit EHT sounding protocol and rules other than specified in the section 37.7. | Modify following sentence "UHR STAs use the UHR sounding protocol as defined in 37.7 (UHR sounding operation) to determine the channel state information for transmitting DL Co-BF." with "UHR STAs use the UHR sounding protocol which is the same as the EHT TB sounding protocol defined in 35.7 (EHT sounding operation) except specified in this section to determine the channel state information for transmitting DL Co-BF." | **Revised**Agree and make the changes.11bn Editor: please make the changes marked as [CID#920] in document 25/681r0. |
| 923 | Wookbong Lee | 70.33 | There should be a timing requirement between two NDPs for joint NDP case. Please add it. | As in comment | **Revised**Agree and make the changes.11bn Editor: please make the changes marked as [CID#923] in document 25/681r0. |
| 966 | Arik Klein | 69.35 | Need to clarify whether the UHR Co-BF beamformer can be a only a UHR AP or a UHR non-AP or both... | According to Figures 37-2, 37-3 it can only be UHR AP, so please clarify this point explicitly in the text accordingly. | **Revised**Add the corresponding text to clarify this.11bn Editor: please make the changes marked as [CID#966] in document 25/681r0. |
| 969 | Arik Klein | 69.43 | Add clarification that the non-AP UHR STAs that are included in the STA Info fields of the UHR Co-BF NDP Announcement frame are those that require nulling from the OBSS AP during the Co-BF PPDU transmission | As in comment | **Rejected**Sounding and transmission phases should be decoupled. |
| 971 | Arik Klein | 69.59 | The AP uses the feedback from the associated non-AP STAs for the Sounding NDP as a mean to collect the information of the channel states, but not to collect the channel states (which is uncollectable). Revise the following sentence, as proposed: "A UHR TB sequential NDP sounding sequence initiated from one AP comprises an EHT TB sounding sequence to collect channel states from its associated STAs, and a cross-BSS UHR TB sounding sequence for the responding AP to collect channel states from the same STAs." | The sentence should be revised as follows:" A UHR TB sequential NDP sounding sequence initiated from one AP comprises an EHT TB sounding sequence to collect \*the information corresponding to\* channel state\*s\* from its associated \*non-AP\* STAs, and a cross-BSS UHR TB sounding sequence for the responding AP to collect \*the information corresponding to \*channel states from the same STAs. " | **Revised**Change “channel states’ to ‘channel state information'.Change ‘ STA’ to ‘non-AP STA’11bn Editor: please make the changes marked as [CID#971] in document 25/681r0. |
| 3281 | Hanqing Lou | 69.60 | Channel state is different from channel state information. Change "channel states" to "channel state information" | See Comment. "chanel state(s)" is used in other places too. Please correct them. | **Revised**Same changes as CID#971 |
| 976 | Arik Klein | 70.01 | Add clarification that the non-AP UHR STAs that are included in the STA Info fields of the UHR Co-BF NDP Announcement frame are those that require nulling from the OBSS AP during the Co-BF PPDU transmission | As in comment | **Rejected**Sounding and transmission phases should be decoupled. |
| 1382 | Renlong Zhou | 70.24 | For an AP that supports Co-BF, it is unclear whether Joint NDP Sounding is an optional or a mandatory function? | It is recommended as an optional function, Joint NDP Sounding have very high synchronization requirements. | **Revised**Based on the motion#116 and CID#1382, add the conditional mandatory and optional sentences. 11bn Editor: please make the changes marked as [CID#1382] in document 25/681r0. |
| 1572 | Jinsoo Choi | 69.42 | A UHR Co-BF NDP Announcement frame shall be transmitted by not only the UHR Co-BF beamformer who initiates a UHR TB sounding sequence (i.e. Co-BF initiating AP) but also the UHR Co-BF beamformer who responds to this UHR TB sounding sequence (i.e. Co-BF responding AP). Need to improve the text to cover both cases. | Modify the text as in comment. | **Revised**Change ‘UHR Co-BF beamformer…’ as initialing AP. 11bn Editor: please make the changes marked as [CID#1572] in document 25/681r0. |
| 1574 | Jinsoo Choi | 69.49 | "The UHR Co-BF NDP Announcement frame shall be followed after a SIFS by EHT sounding NDP(s) transmitted from the responding AP in a UHR TB sequential NDP sounding sequence" this also happens when Co-BF responding AP transmits UHR Co-BF NDP Announcement frame. (in this case EHT sounding NDP(s) is transmitted from the Co-BF initiating AP) | Improve the text to cover both cases. | **Revised**Same change as CID #917 and 1572.In CID#917, the initialing and responding AP are defined before this paragraph. In CID#1572, replace the CO-BF beamformer as initialing AP. |
| 1752 | Yapu Li | 70.19 | It's better to clarfy which is beamformer and beamformee. In each phase, which AP need to receive the CSI feedback from STA1? In both figure 37-1 and figure 37-2. | As in comment | **Revised** Same change as CID#966 |
| 2222 | Dana Ciochina | 0.00 | "A UHR COBF beamformer intiates a UHR TB soudnign sequence to solicit feedback only if the feedback is computed based on parameters supported by the COBF Beamformee" . It is not very clear to which COBF Beamformee this refers to | change to supported by all the COBF Beamformees, participating in the COBF sounding (and associated with the COBF initiator). | **Revised** Add “beamformee(s) associated with the initiating AP.”11bn Editor: please make the changes marked as [CID#2222] in document 25/681r0. |
| 2980 | Mark RISON | 69.27 | "UHR STAs use the UHR sounding protocol as defined in 37.7 (UHR sounding operation) to determine the channel state information for transmitting DL Co-BF." is confusing because only APs do this | Change "STAs" to "APs" | **Rejected**Since we also have descriptions for UHR Co-BF beamformee, using ‘STAs’ should be more suitable. |
| 2981 | Mark RISON | 69.30 | "The UHR sounding protocol provides explicit feedback mechanism, defined as UHR trigger-based (TB) sounding sequences that include UHR TB sequential NDP sounding sequence and UHR TB joint NDP sounding sequence for DL Co-BF." -- missing articles and more generally I don't understand what this is trying to say | As it says in the comment | **Rejected**The comment is asking a question but not proposing a change.  |
| 2982 | Mark RISON | 69.32 | "In the UHR TB sounding sequences, the UHR beamformee measures the channel using a training signal as defined in 38.3.22 (EHT sounding NDP for UHR TB sounding sequence) transmitted by one or two UHR beamformers and sends back a transformed estimate of the channel state (see 37.7.2 (Rules for UHR sounding protocol sequences))." -- sends back to whom, in the two beamformers case? | As it says in the comment | **Rejected**The detailed sequential is described in 37.7.3. |
| 3284 | Hanqing Lou | 71.04 | The subclause if for UHR, however, the text is all abound EHT. It is confusing | Please add a paragraph to clerity that the sounding NDP in a UHR TB sounding sequence is always with EHT format. | **Revised**Based on the motion#180 and CID#3284. Add the corresponding text to clarify this.11bn Editor: please make the changes marked as [CID#3284] in document 25/681r0. |
| 3289 | Tianyu Wu | 70.10 | Figure 37-1 is not complete sounding sequence. Missing the sounding for the STA2 associated with AP2. | Add sounding sequence for STA2 from AP2. | **Revised**Modify the figure and text.11bn Editor: please make the changes marked as [CID#3289] in document 25/681r0. |
| 978 | Arik Klein | 70.04 | Please replace the following vague sentence that "..both APs need to initiate an EHT TB sounding sequence and a cross-BSS UHR TB sounding sequence sequentially, ... " with a clear requirement how the sequences need to be used and when the UHR TB sequential NDP sounding sequence is required to be operated. | A defined sequence needs to be executed completely with a SIFS separating between each adjacent frames within the sequence. If 2 separate sequences are required to be executed one after the other need to define a new sequence that will include the required components and apply the requirement to this sequence only. | **Revised**.Same change as CID#3289 |
| 1575 | Jinsoo Choi | 70.02 | Suggest to add a decription (and related figure) from Co-BF responding AP(i.e. AP2) point of view in order to show that Co-BF responding AP also only address the non-AP UHR STA associated with the Co-BF responding AP in UHR TB sequential NDP sounding. | See the comment. | **Revised**.Same change as CID#3289 |
| 3290 | Tianyu Wu | 70.40 | Figure 37-2 is not complete. Missing the sounding for the STA2 associated with AP2. | Add sounding sequence for STA2 from AP2. | **Revised**Modify the figure and text.11bn Editor: please make the changes marked as [CID#3289] in document 25/681r0. |
| 1577 | Jinsoo Choi | 70.29 | Suggest to add a decription (and related figure) from Co-BF responding AP(i.e. AP2) point of view in order to show that Co-BF responding AP also only address the non-AP UHR STA associated with the Co-BF responding AP in UHR TB joint NDP sounding. | See the comment. | Revised.Same change as CID#3290 |
| 3549 | ron porat | 69.25 | Beamforming for DL OFDMA is ambiguous in the statement | "UHR STAs use the EHT sounding protocol as defined in 35.7 (EHT sounding operation) to determine the channel state information for transmitting SU beamforming and DL MU-MIMO."Does this statement exclude DL OFDMA? | **Revised**Modify the text.11bn Editor: please make the changes marked as [CID#3549] in document 25/681r0. |
| 1920 | Yingqiao Quan | 69.28 | Incorrect description. | Change " ... for transmitting SU beamforming and DL MU-MIMO." to "... for transmit beamforming and DL MU-MIMO beamforming" or "... for transmission by (using) beamforming other than DL Co-BF.". | **Revised**Same change as CID#3549‘SU beamforming’ and ‘DL MU-MIM’ used in 11be without ‘transmission. |

**Others**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 967 | Arik Klein | 69.42 | Need to add the following details for the UHR Co-BF NDP Announcement frame in clause 9 (Frame formats): Is it a new subtype of control frame or a new variant of "VHT/HE/Ranging/EHT NDP Announcement frame format"? | Need to add definitions in clause 9 for the UHR Co-BF NDP Announcement frame to include: type, subtype and format | **Rejected**Motion 376 passed PDT draft for UHR Co-BF NDPA, which will be described in 9.3.1.19 |
| 2225 | Dana Ciochina | 71.12 | It is not clear how the BSS Color should be set in the NDP sent in response to a UHR NDP-A. If set to the Color of the responder AP, the STA should be explicitly notified as it is not standard behaviour. | indicate how to set the BSS Color | **Revised**Same changes as marked as M#262. add a refernce of 9.3.1.19.6 (UHR NDP Announcement frame format) |
| 2991 | Mark RISON | 70.56 | "A UHR Co-BF beamformer that transmits a UHR Co-BF NDP Announcement frame to one or more UHR Co-BF beamformees shall set the AID11 subfield to the 11 LSBs of the AID of each UHR Co-BF beamformee. " -- the NDPA can't be transmitted to 0 UHR Co-BF beamformees | Delete "to one or more UHR Co-BF beamformees" | **Rejected**Similar description in 35.7.3. this means larger or equal to one. |
| 146 | Jay Yang | 69.52 | why "shall be followed" here, BFRP may not follow NDP in SIFS interval in the baseline | change "shall" to "may" to allow another approach defined in baseline. | **Rejected**Discussed with the commenter, and commenter would like to withdraw. |
| 862 | Tomoko Adachi | 0.00 | DL Co-BF should be one of the Multi-AP Coordination schemes described as Co-BF in 37.8.2.1. Unify the term. | As in comment. | **Revised**Discussed with the commenter. To align with other section, remove “DL”11bn Editor: please make the changes marked as [CID#862] in document 25/681r0. |
| 919 | Wookbong Lee | 69.55 | Why there is a one or more Compressed Beamforming/CQI frames? | Replace "with a UHR TB PPDUcontaining one or more TBD Compressed Beamforming/CQI frames" to "with an EHT TB PPDU" | **Accepted.**  |
| 215 | Pei Zhou | 70.53 | It is not clear how does the UHR Co-BF beamformee indicates it supports the feedback computed based on parameters or not. | As in comment. Please give more detailed explaination. | **Rejected**Discussed with commenter, and the commenter is fine with the text in D0.1 |
| 1205 | Oded Redlich | 0.00 | Sounding NDP for OFDMA transmission is missing / not supported | Will prepare a proposal | **Rejected**Co-BF transmissions in UHR are applicable only to non-OFDMA DL transmissions. |
| 2113 | Vishnu Ratnam | 70.52 | The sentence "A UHR Co-BF beamformer shall not initiate a UHR TB sounding sequence if the feedback would be computed based on parameters not supported by the UHR Co-BF beamformee (see 37.7.2 (UHR sounding protocol))" seems to have the same meaning as the previous sentence. Is this sentence redundant. | Remove sentence if redundant. | **Revised**Discussed with commenter, and modify the text.11bn Editor: please make the changes marked as [CID#2113] in document 25/681r0. |
| 2990 | Mark RISON | 70.49 | "A UHR Co-BF beamformer initiates a UHR TB sounding sequence to solicit feedback only if the feedback is computed based on parameters (see 9.4.2.aa2.3 (UHR PHY Capabilities Information field)) supported by the UHR Co-BF beamformee." ambiguous: "initiates to solicit only feedback (if ...)" or "initiates to solicit feedback (but only if...)". Also should be normative ("shall"). But doesn't the following sentence say the same thing? | As it says in the comment | **Revised** Same changes as CID2113 |
| 2809 | Mrugen Deshmukh | 0.00 | The current draft does not include specification for MIMO and beamforming in uplink for RRU or DRU transmissions. Support for beamforming in uplink is essential since it enhances the reliability of the uplink transmissions. By not including support for beamforming transmissions in uplink, optimal reliability and link performance may not be realized. | Add a subclause in the draft to describe beamforming support for uplink transmissions. | **Rejected**UHR sounding is for Co-BF. |
| 2988 | Mark RISON | 0.00 | "need to" should be "shall" (2x) | As it says in the comment | **Revised**Modify as suggested.11bn Editor: please make the changes marked as [CID#2988] in document 25/681r0. |
| 2992 | Mark RISON | 71.14 | "The intended recipient(s) of an EHT sounding NDP is the STA(s) addressed by the STA Info field(s) in theimmediately preceding UHR Co-BF NDP Announcement frame. " -- the grammar is broken (should be "is/are" at least) but this has nothing to do with Sounding NDP transmission anyway | Delete the cited text | **Revised**Discussed with commenter, and modify the text.11bn Editor: please make the changes marked as [CID#2992] in document 25/681r0. |
| 3288 | Tianyu Wu | 69.40 | Add a new sub clause under 37.7.2 for the UHR sounding sequence for Co-BF. | as in comment | **Rejected**The 37.7.2 is used for UHR Co-BF sounding protocol. |
| 3732 | Jiayi Zhang | 70.12 | The initiating AP and the responding AP may individually apply its own orthogonal spatial mapping matrix Q for the tranmsission of its own EHT sounding NDP during the UHR TB joint sounding. However, using different orthogonal spatial mapping matrix Q or the same orthogonal spatial mapping matrix Q as used by the initiating AP locally between two EHT sounding NDPs concurrently transmitted by the initiating AP and the responding AP may result inaccuracy of channel estimation after collecting channel feedback. | Define a mechanism for UHR TB joint sounding to pre-negotiation of a common orthogonal spatial mapping matrix that is satisfied between two initiating AP and responding AP. | **Rejected**This topic has been described in 9.3.1.19.6 UHR NDP Announcement frame format |

**Motion 298-299: frequency correction (commenters request to defer the draft writing)**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 77 | Jialing Li | 70.06 | The last sentence in the paragraph reads like if an AP is a reference AP, it also conducts frequency correction to itself. Suggest to revise the sentence for clarity. | Refer to the comment. | **Revised**Motion# 298 and 299 passed. Modified based on the passed motions.11bn Editor: please make the changes marked as [M#298-299] in document 25/681r0 |
| 78 | Jialing Li | 70.32 | The last sentence in the paragraph reads like if an AP is a reference AP, it also conducts frequency correction to itself. Suggest to revise the sentence for clarity. | Refer to the comment. | **Revised**Same changes as marked as M#298-299. |
| 1951 | Insik Jung | 70.33 | Instead of the term "one AP" and "reference AP", "sync-follower AP" and "sync-reference AP" seems more clear. | As the comment | **Revised**Same changes as marked as M#298-299.  |
| 1952 | Insik Jung | 70.07 | Instead of the term "one AP" and "reference AP", "sync-follower AP" and "sync-reference AP" seems more clear. | As the comment | **Revised**Same changes as marked as M#298-299. |
| 1495 | Kotaro NAGANO | 70.33 | Unknown frequency correction method or requirement. | The requirements for implementing Co-BF should be clarified. | **Revised**Same changes as marked as M#298-299. |
| 3528 | ron porat | 70.06 | "one AP conducts the frequency correction on ..." is introducing the concept of frequency correction, where as it is unclear what this frequency correction actually is. | Add a description of, or reference to, the concept of 'frequency correction'. | **Revised**Same changes as marked as M#298-299. |
| 3969 | Bilal Sadiq | 70.06 | "For all the sounding sequences, one AP conducts the frequency correction on its EHT sounding NDPs to a TBD range of the reference AP, which may be either AP1 or AP2." Procedure to determine which AP is the reference is unspecified. Moreover, how the follower AP obtains a frequency correction value/CFO w.r.t to the reference AP is not specified. | Define the rules for determining when does an AP serve as reference. Define the procedure followed by the non-reference AP to obtain frequency correction term/CFO w.r.t the reference AP. | **Revised**Same changes as marked as M#298-299. |
| 3970 | Bilal Sadiq | 70.32 | "For both UHR TB joint NDP sounding sequences, one AP conducts the frequency correction on its EHT sounding NDPs to a TBD range of the reference AP, whichmay be either AP1 or AP2." Procedure to determine which AP is the reference is unspecified. Moreover, how the follower AP obtains a frequency correction value/CFO w.r.t to the reference AP is not specified. | Define the rules for determining when does an AP serve as reference. Define the procedure followed by the non-reference AP to obtain frequency correction term/CFO w.r.t the reference AP. | **Revised**Same changes as marked as M#298-299. |
| 2989 | Mark RISON | 70.05 | "one AP conducts the frequency correction on its EHT sounding NDPs to a TBD range of the reference AP" -- I have no idea what it means, and it sounds PHYy not MACy so maybe should be in the next clause. Similarly line 32 | As it says in the comment | **Revised**Agree with the commenter and also checked with other commenters within this table.11bn Editor: please make the changes marked as [CID#2989] in document 25/681r0 |

**ICF/ICR exchange**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 167 | Jay Yang | 69.49 | We need consider the responding AP may not transmit NDP due to the inference issue, such issue could be mitigated if the channel can be protected via the ICF/ICR exchange before sounding procedure,see the details in (25/0006) | the commenter will provide a solution on this. | **Revised** Same change as marked as M#306 |
| 1403 | Renlong Zhou | 69.49 | Responding APs might withhold NDP transmission due to interference concerns. This issue could be mitigated by implementing channel protection through ICF/ICR exchange before sounding procedures. | As it says in the comment | **Revised** Same change as marked as M#306 |
| 1953 | Insik Jung | 69.41 | Before initiating UHR sounding procedure described in 37.7 clause, some AP-to-AP frame exchange would be needed. We'd better include some description about the procedure in this section if a related consensus is reached. | As the comment | **Revised** Same change as marked as M#306 |
| 3674 | Sherief Helwa | 69.60 | For any Cross-BSS sounding, there should be an initial handshake between the two APs involved in the sounding sequence to make sure of the availability of the AP intended to collect the CSI and to agree on the sounding configuration details. | Explained in the comment | **Revised** Same change as marked as M#306 |
| 3675 | Sherief Helwa | 69.63 | The sounding sequence may need to include an ICF/ICR frame exchange between an AP and its associated non-AP STA before the initiation of the sounding sequence. This assures the readiness of the non-AP STAs if they operate in a mode/state that does not enable them to engage immediately in frame exchanges with the AP. | Explained in the comment | **Revised** Same change as marked as M#306 |
| 3677 | Sherief Helwa | 70.46 | My comments regarding the initial handshake between the two APs before Cross-BSS sounding, ICF/ICR exchange, and the multi-TXOP sounding sequence for the sequential sounding variant are also applicable to the joint sounding variant. | Explained in the comment | **Revised** Same change as marked as M#306 |

**Error handling**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 2467 | Yanjun Sun | 70.50 | The sounding sequence is missing a few technical details: how would AP1 know that AP2 is available and has transmitted its NDP? How to protect the sequence agaist interference from hidden node? How will the sequence work if the STA1 in Figure 37-2 is an eMLSR STA handled? Please address these open issues. Some discussion on additional ICFs/ICRs between the devices in Figure 37-2 may help help to clarify. | as in comment | **Revised**Discussed with the commenter and also checked with other commenters within this table.11bn Editor: please make the changes marked as [CID#2467] in document 25/681r0 |
| 168 | Jay Yang | 69.49 | In sequential sounding, the responding AP may not transmit NDP if it doesn't decode the NDPA from initiating AP, we need to consider the intiating AP may retransmit the NDPA(see the details in 25/0006). | the commenter will provide a solution on this. | **Rejected**Discussed with commenters via email thread. We will not define a specific retransmission method. |
| 922 | Wookbong Lee | 70.21 | There are multiple feedback by multiple STAs in Co-BF sounding. What will happen if one of feedback is missing. APs will perform sounding for only failed one or it repeats entire sequence (EHT behavior) or will drop the STA whose report is missing? If we only allow all (four) sounding sequence in a single TXOP, then how will this work for this case? | Please clarify. | **Rejected**Discussed with commenters via email thread. We will not define a specific retransmission method. |
| 977 | Arik Klein | 70.01 | According to the sentence "The UHR Co-BF NDP Announcement frame shall only address to the responding AP and... " it is assumed that the parameters corresponding the EHT Sounding NDP are contained within the STA Info field that corresponds to the responding AP. If so, what is the expected behavior of the Cross-BSS UHR TB Sounding sequence, if the responding AP fails to correctly parse the STA Info field (FCS error)? | Please add the relevant rules for the expected behavior of the sharing AP in this case. | **Rejected**Discussed with commenters via email thread. We will not define a specific retransmission method. |
| 1404 | Renlong Zhou | 69.49 | In sequential sounding implementations, failure of a responding AP to decode NDPA from the initiating AP may prevent NDP transmission. The specification should address potential NDPA retransmission mechanisms by initiating APs | As it says in the comment | **Rejected**Discussed with commenters via email thread. We will not define a specific retransmission method. |
| 1936 | Okan Mutgan | 69.19 | All the frames In CBF sounding need to be transmitted/received succesfully so that CBF works properly. | Make sure that the frame exchanges in CBF sounding are successfull. | **Rejected**Discussed with commenters via email thread. We will not define a specific retransmission method. |

**TXOPs**

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 1576 | Jinsoo Choi | 70.22 | It should be allowed EHT TB sounding sequence and Cross-BSS UHR TB sounding sequence in a UHR TB sequential NDP sounding sequence can be completed in different TXOPs, since totally four sounding sequences are required for getting full channel state information across BSSs which wouldn't be always available in a TXOP. | Suggest not to restrict the whole sounding sequences should be done in the same TXOP. | **Revised**Change the figure and text for sequential and joint sounding.11bn Editor: please make the changes marked as [CID#1576] in document 25/681r0. |
| 972 | Arik Klein | 69.59 | There is a conflict between the illustration in Figure 37-2 (which shows 2 independent sequences: EHT TB sounding sequence and cross-BSS UHR TB sounding sequence) and the following sentence: "A UHR TB sequential NDP sounding sequence initiated from one AP comprises an EHT TB sounding sequence to collect channel states from its associated STAs, and a cross-BSS UHR TB sounding sequence for the responding AP to collect channel states from the same STAs." - Please resolve this conflict. | If the UHR TB sequential NDP sounding sequence is one single sequence, it should be separated with SIFS between any frames exchanged within this sequence.Please revise either the definition or Figure 37-2. | **Revised** Same change as CID#1576EHT TB sounding sequence and Cross-BSS UHR TB sounding sequence in a UHR TB sequential NDP sounding sequence are allowed to be in different TXOPs  |
| 1031 | Shuling feng | 70.22 | There is no merit to limit the EHT TB sounding sequence and Cross-BSS UHR TB sounding sequence in a UHR TB sequential NDP sounding sequence in a single TXOP. They can be in separate TXOP or in the same TXOP. | Please change the Note to "NOTE -- the EHT TB sounding sequence and Cross-BSS UHR TB sounding sequence in a UHR TB sequential NDP sounding sequence are allowed to be in different TXOPs or in the same TXOP." | **Revised** Same change as CID#1576 |
| 3576 | Leonardo Lanante | 69.40 | UHR TB sounding procotol sequences are quite long and may even need multiple TXOPs. A procedure for truncating the procedure is needed. | As in comment | **Revised** Same change as CID#1576 |
| 3608 | kaiying Lu | 70.22 | EHT TB sounding sequence and Cross-BSS UHR TB sounding sequence in a UHR TB sequential NDP sounding sequence should be allowed to be in different or the same TXOP. | Clarify the rule as the comment. | **Revised** Same change as CID#1576 |
| 3676 | Sherief Helwa | 70.21 | The default mode should be single-TXOP sounding. Strong reasoning must be provided for the multi-TXOP sounding approach as it is much less efficient and in any case it will need careful design.. My suggestion is to proceed with the single-TXOP design and reconsider the mutli-TXOP sounding after careful design and analysis if needed. | Explained in the comment | **Revised** Same change as CID#1576 |
| 2221 | Dana Ciochina | 70.21 | "It is TBD whether EHT TB sounding sequence and Cross BSS UHR TB Sounding should be in different or in the same TXOP" It would be useful to define an ICF/ICR exchange which defines which sequences can be performed to gether | as in comment. Commentor can help with resolution. | **Revised**Same change as marked M#306 |
| 2223 | Dana Ciochina | 0.00 | "A UHR COBF Beamformer shall not initiate a UHR TB sounding if the feedback would be computed based on parameters not supported... " I wonder if this part should be here or rather in an initial negotiation or ICF/ICR in which it is decided if the APs can be COBF Beamformers. Because it should be both APs being COBF Beamformers that should establish before initiating any of the 4 sequences that the capabilities of the STAs can be respected. | write the text to include both CoBF Bfers and have an initial phase in which the necessary capabilities and parameters for the CoBF are exchanged. | **Revised**Same change as marked M#306 |
| 2224 | Dana Ciochina | 70.49 | When one AP sends the NDPA and the other sends the NDP, it is the latter that processes the feedback, therefore the format should also consider the needs and capabilities of this AP (together with the capabilities of the bfees). | include a mechansim that enables the APs to indicate the format they expect | **Revised**Same change as marked M#306For grouping or negotiation protocol, that should be covered by other section. |
| 198 | Chunyu Hu | 69.19 | Different STA have different capability for sounding support. How an AP knows this and initiate a sounding procedure that involves a STA associated with other BSS is missing and needs to be addressed. | Provide a mechanism for an AP to acquire the necessary sounding parameter info of a non-AP STA associated with a different AP (MLD). | **Revised**Same change as marked M#306For grouping or negotiation protocol, that should be covered by other section. |

**37.7 UHR [CID#3727] Co-BF sounding operation**

**37.7.1 General**

Transmit beamforming, DL MU-MIMO and [CID#862] ~~DL~~ Co-BF require knowledge of the channel state to compute a steering matrix that is applied to the transmit signal to optimize reception at one or more receivers. UHR STAs use the EHT sounding protocol as defined in 35.7 (EHT sounding operation) to determine the channel state information for [CID#3549] non-Co-BF transmission.

[CID#920, also separate to different paragraph] UHR STAs use the UHR sounding protocol [CID#920] which is the same as the EHT TB sounding protocol defined in 35.7 (EHT sounding operation) except specified in this section ~~as defined in 37.7 (UHR sounding operation)~~ to determine the channel state information for [CID#862, 2803] ~~transmitting~~ ~~DL~~ Co-BF transmission. [CID#285, 862] For Co-BF, the UHR sounding protocol provides explicit feedback mechanism, defined as UHR [CID#920] Co-BF ~~trigger-based (TB)~~ sounding sequences that include UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence and UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence [CID#285] ~~for DL Co-BF~~. In the UHR [CID#920] Co-BF ~~TB~~ sounding sequences, the UHR Co-BF beamformee measures the channel using a training signal as defined in 38.3.22 (EHT sounding NDP for UHR [CID#920] Co-BF ~~TB~~ sounding sequence) transmitted by one or two UHR beamformers and sends back a transformed estimate of the channel state (see 37.7.3 (Rules for UHR sounding protocol sequences)). The UHR beamformer uses this estimate to derive the steering matrix.

[CID#966] A UHR Co-BF beamformer is a UHR AP. A UHR Co-BF beamformee is a UHR non-AP STA.

[M#372-375] A UHR Co-BF beamformee returns an estimate of the channel state via an EHT compressed beamforming/CQI report (see 35.7.1 (General)) in MU feedback. A UHR Co-BF beamformee transmits EHT Compressed Beamforming/CQI Report follows the segmentation rules defined in 37.7.4 (Rules for generating segmented feedback)).

[M#372-375] A UHR Co-BF beamformer shall support a maximum MPDU length for the EHT Compressed Beamforming/CQI Report frame that is the minimum of 11 454 octets and the maximum length of the EHT Compressed Beamforming/CQI Report frame that the UHR Co-BF beamformer intends to solicit from its UHR Co-BF beamformee(s).

**37.7.2 UHR Co-BF sounding protocol**

[M#375] The term UHR Co-BF beamformer refers to a MU beamformer. The term UHR Co-BF beamformee refers to a MU beamformee. A UHR Co-BF beamformee only supports full bandwidth MU feedback.

[M#375] The type of feedback solicited by a UHR Co-BF beamformer from a UHR Co-BF beamformee is indicated in the Feedback Type And Ng and Codebook Size subfields in the STA Info field identifying the UHR Co-BF beamformee in the UHR NDP Announcement frame as defined in Table 9-42d (Feedback Type And Ng subfield and Codebook Size subfield encoding for HE TB sounding).

[M#375] The bandwidth of the feedback solicited by a UHR Co-BF beamformer from a UHR Co-BF beamformee depends on the Partial BW Info subfield in the STA Info field identifying the UHR Co-BF beamformee in the UHR NDP Announcement frame, the bandwidth of the PPDU carrying the UHR NDP Announcement frame, and the operating bandwidth of the UHR Co-BF beamformee. The bandwidth of the PPDU carrying the UHR NDP Announcement frame and the subsequent EHT sounding NDP shall be the same.

[M#375] Full bandwidth MU feedback refers to the feedback mode where the feedback RU or MRU size indicated in the Partial BW Info subfield of the UHR NDP Announcement frame spans all the available bandwidth within a UHR Co-BF beamformee’s operating bandwidth.

* [M#375] If the UHR Co-BF beamformee’s operating bandwidth is larger than or equal to the bandwidth of the EHT sounding NDP, the available bandwidth is the entire PPDU bandwidth of the EHT sounding NDP when preamble puncturing is not applied on the PPDU and is the entire occupied PPDU bandwidth of the EHT sounding NDP when preamble puncturing is applied on the PPDU.

[M#375] A UHR Co-BF beamformer shall set the Partial BW Info subfield in a UHR NDP Announcement frame to a value that is listed in Table 9-42f (Settings for BW, Partial Bandwidth Info subfield in the EHT NDP Announcement frame).

[M#375] A UHR NDP Announcement frame shall not request feedback on any RU that is signaled as punctured in the U-SIG field of the EHT sounding NDP that follows the UHR NDP Announcement frame.

[M#372-373] A UHR Co-BF beamformee indicates the maximum supported data rate used in the EHT TB PPDU carrying the EHT compressed beamforming/CQI report in the TB Sounding Feedback Rate Limit subfield in the UHR PHY Capabilities Information field in the UHR Capabilities element it transmits.

[M#374] A UHR Co-BF beamformer shall not solicit an EHT TB PPDU with a BFRP Trigger frame that indicates a data rate greater than the data rate indicated by the UHR Co-BF beamformee in the TB Sounding Feedback Rate Limit subfield. The data rate indicated in the BFRP Trigger frame is computed based on the RU Allocation subfield, PS160 subfield, UL EHT-MCS subfield, and SS Allocation subfield in the EHT variant User Info field of the BFRP Trigger frame. The data rate is computed based on 1.6 μs GI.

**37.7.3 Rules for UHR [CID#863] Co-BF sounding protocol sequences**

[CID#917] A UHR Co-BF beamformer that initiates a UHR [CID#920] Co-BF ~~TB~~ sounding sequence is the initiating AP. A UHR Co-BF beamformer that responses to the Co-BF invite frame from the initiating AP is the responding AP.

[CID1572] An initiating AP shall transmit a UHR Co-BF NDP Announcement frame with [M#262] three or more STA Info fields and the RA field set to the broadcast address. STA Info fields shall only [CID#968] correspond to the responding AP and the non-AP UHR STAs associated with the initiating AP.

The UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame shall be followed after a SIFS by [CID#74] an EHT sounding NDP~~(s)~~ transmitted from the responding AP in a UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence, or [CID#74] EHT sounding NDPs simultaneously [Editorial, no CID] transmitted from the initiating AP and the responding AP in a UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence. The EHT sounding NDP(s) shall be followed after a SIFS by [CID2985] a ~~the~~ BFRP Trigger frame from the initiating AP. Subsequent BFRP Trigger frames, if any, in the UHR [CID#920] Co-BF ~~TB~~ sounding sequence shall be transmitted a SIFS after the [M#373] EHT TB PPDU transmitted in response to the previous BFRP Trigger frame. Each UHR Co-BF beamformee that is addressed by a BFRP Trigger frame shall respond after a SIFS with [M#373] an EHT TB PPDU. [CID919] ~~containing one or more [M#372] EHT Compressed Beamforming/CQI frames.~~

[CID#196] A UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence comprises an EHT TB sounding sequence (see 35.7.3 (Rules for generating segmented feedback) and a cross-BSS UHR [CID#920] Co-BF ~~TB~~ sounding sequence. [CID#1382] A UHR Co-BF beamformer shall support a UHR Co-BF sequential NDP sounding sequence.

A UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from one AP comprises an EHT TB sounding sequence to collect channel [CID#971] state information from its associated [CID#971] non-AP [CID#412] STA(s), and a cross-BSS UHR [CID#920] Co-BF ~~TB~~ sounding sequence for the responding AP to collect channel [CID#971] state information from the same [CID#412] STA(s). [CID#196] The cross-BSS UHR [CID#920] Co-BF ~~TB~~ sounding sequence use the same sounding sequence as EHT TB sounding except that the initiating AP transmits the UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame to solicit the EHT sounding NDP from the responding AP. ~~An example of a UHR TB sequential NDP sounding sequence initiated from AP1 is shown in Figure [CID#75] 37-1 (UHR TB sequential NDP sounding sequence initiated from AP1)~~. ~~AP1, the UHR Co-BF beamformer that initiates a cross-BSS UHR TB sounding, shall transmit the UHR [CID#2983] Co-BF NDP Announcement frame to solicit the EHT sounding NDP from AP2, the responding AP.~~ The UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame shall only [CID#3282] ~~address~~ be sent to the responding AP and the non-AP UHR [CID#76] STA(s) associated with the initiating AP. [CID#196] An example of a UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP1 is shown in Figure [CID#75] 37-1 (UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP1)

[M#306, 372]



#### Figure 37-1—UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP1

NOTE — [CID#1576] ~~It is TBD whether~~ EHT TB sounding sequence and Cross-BSS UHR [CID#920] Co-BF ~~TB~~ sounding sequence in a UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence are allowed to be in different TXOPs or in the same TXOP.

[CID#1576] If EHT TB sounding sequence and Cross-BSS UHR Co-BF sounding sequence in a UHR Co-BF sequential NDP sounding sequence are in different TXOPs, the ordering of the EHT TB sounding sequence and the cross-BSS UHR Co-BF sounding sequence is implementation dependent. A beamformer may skip the EHT TB sounding sequence if it already has the in-BSS channel state information needed from all its associated STA(s).

[CID#1576] If EHT TB sounding sequence and Cross-BSS UHR Co-BF sounding sequence in a UHR Co-BF sequential NDP sounding sequence are in the same TXOP, the cross-BSS UHR Co-BF sounding sequence transmits first. The subsequent EHT NDP Announcement in the EHT TB sounding sequence shall be transmitted SIFS after the EHT TB PPDU.

[M#306] Before the cross-BSS UHR Co-BF sounding sequence, a Co-BF sounding invite frame and a Co-BF sounding response frame shall be exchanged between the initiating AP and responding AP. The responding AP may indicate it accepts or declines to participate the cross-BSS UHR Co-BF sounding sequence in the Co-BF sounding response frame. The information of the minimum sounding NSS capability of the participating non-AP STAs in each BSS are exchanged by the Co-BF sounding invite frame and the Co-BF sounding response frame.

[CID#2467] In a Co-BF sounding invite frame, the Duration/ID field is set to the estimated time, in microseconds, required to transmit at least the UHR NDP Announcement frame sent by the Co-BF sounding initiator, plus one Co-BF sounding response frame, plus one EHT NDP, plus applicable IFSs and any necessary ICF/ICR for STA(s).

[CID#3289] In UHR Co-BF sequential NDP sounding sequence, to collect all the required the channel state to compute a steering matrix for [CID862] ~~DL~~ Co-BF transmission, both UHR Co-BF beamformer [CID#2988] shall ~~need to~~ initiate the UHR Co-BF sequential NDP sounding sequence to solicit the channel state from their own associated non-AP STA(s)~~. an EHT TB sounding sequence and a cross-BSS UHR TB sounding sequence sequentially, i.e., total four sounding sequences~~. [CID#2989, remove to PHY] ~~For all the sounding sequences, one AP conducts the frequency correction on its EHT sounding NDPs to a TBD range of the reference AP, which may be either AP1 or AP2.~~ [CID#3289] An example of a UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP2 is shown in Figure [CID#75] 37-2 (UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP2)



#### [CID#3289] Figure 37-2—UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence initiated from AP2

[CID#3289] NOTE — [CID#1576] ~~It is TBD whether~~ EHT TB sounding sequence and Cross-BSS UHR [CID#920] Co-BF ~~TB~~ sounding sequence in a UHR [CID#920] Co-BF ~~TB~~ sequential NDP sounding sequence are allowed to be in different TXOPs or in the same TXOP.

[CID#1382] A UHR Co-BF beamformer may support UHR Co-BF joint NDP sounding sequence.

[CID#197] The UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence use the same sounding sequence as EHT TB sounding except that the initiating AP transmits the UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame followed after a SIFS by EHT sounding NDPs transmitted simultaneously from both the initiating AP and responding AP. ~~An example of a UHR TB joint NDP sounding is shown in Figure 37-2 (UHR TB joint NDP sounding). A UHR Co-BF beamformer that initiates a UHR TB joint NDP sounding shall transmit the UHR [CID#2983] Co-BF NDP Announcement frame followed after a SIFS by EHT sounding NDPs transmitted simultaneously from the initiating AP and responding AP.~~ The UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame shall only [CID#3283] ~~address~~ be sent to the responding AP and the non-AP UHR STAs associated with the initiating AP. [CID#197, 3289, shift to here] An example of a UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding initiated from AP1 is shown in Figure 37-3 (UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding initiated from AP1).

[M#307, 372] 

#### [CID#3290] Figure 37-3—UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence initiated from AP1

[M#306] Before the UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence, a Co-BF sounding invite frame and a Co-BF sounding response frame shall be exchanged between the initiating AP and responding AP. The responding AP may indicate it accepts or declines to participate the UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence in the Co-BF sounding response frame. The information of the minimum sounding NSS capability of the participating non-AP STAs in each BSS are exchanged by the Co-BF sounding invite frame and the Co-BF sounding response frame.

[CID#3290, shift to below figure 37-3] In UHR Co-BF joint NDP sounding sequence, to collect all the required the channel state to compute a steering matrix for [CID#862] ~~DL~~ Co-BF transmission, both UHR Co-BF beamformer ~~APs~~ [CID#2988] shall ~~need to~~ initiate the UHR Co-BG joint NDP sounding sequence sequentially~~, i.e., total two sequences.~~ [CID#2989, remove to PHY] ~~For both UHR TB joint NDP sounding sequences, one AP conducts the frequency correction on its EHT sounding NDPs to a TBD range of the reference AP, which may be either AP1 or AP2.~~ [CID#3290] An example of a UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence initiated from AP2 is shown in Figure [CID#75] 37-4 (UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence initiated from AP2)

 

#### [CID#3290] Figure 37-4—UHR [CID#920] Co-BF ~~TB~~ joint NDP sounding sequence initiated from AP2

[M#374] A UHR Co-BF beamformer that sends a BFRP Trigger frame shall set the Feedback Segment Retransmission Bitmap fields of the BFRP Trigger frame to all 1s.

A UHR Co-BF beamformer initiates a UHR [CID#920] Co-BF ~~TB~~ sounding sequence [CID#2113] ~~to solicit feedback only~~ if the feedback is computed based on parameters (see 9.4.2.aa2.3 (UHR PHY Capabilities Information field)) supported by the UHR Co-BF [CID#2222] beamformee(s) associated with the initiating AP. A UHR Co-BF beamformer shall not initiate a UHR [CID#920] Co-BF ~~TB~~ sounding sequence if the feedback would be computed based on parameters not supported by the UHR Co-BF [CID#2222] beamformee(s) associated with the initiating AP. (see 37.7.2 (UHR Co-BF sounding protocol)).

[CID#79] A UHR Co-BF beamformer that transmits a UHR NDP Announcement frame shall set the AID11 subfield of the first STA Info field to 2047 and the AID11 subfield of the second STA Info field to the responding AP identifier (see 9.3.1.19.6 (UHR NDP Announcement frame format)).

A UHR Co-BF beamformer that transmits a UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame to one or more UHR Co-BF beamformees shall set the AID11 subfield to the 11 LSBs of the AID of each UHR Co-BF beamformee [CID#79] starting from the third STA Info field. A UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame shall not include multiple STA Info fields that have the same value in the AID11 subfield.

[M#375] In a UHR [CID#920] Co-BF ~~TB~~ sounding sequence, a STA Info field in the UHR NDP Announcement frame that solicits MU feedback indicates the subcarrier grouping, *Ng*, codebook size and the number of columns, *Nc*, to be used by the UHR Co-BF beamformee identified by the STA Info field for the generation of the MU feedback.

[M#372] A UHR Co-BF beamformer that transmits a UHR NDP Announcement frame shall set the Partial BW Info subfield in a STA Info field to indicate the feedback subcarrier indices of the solicited EHT compressed beamforming/CQI report (see 9.3.1.19 (NDP Announcement frame format)). A UHR Co-BF beamformer shall set the Partial BW Info subfield such that the subcarrier indices *scidx(i), i=0, 1, …, Ns-1* (see 9.4.1.73 (EHT Compressed Beamforming Report field)), fall within the operating channel width of the corresponding UHR Co-BF beamformee.

[M#375] The UHR Co-BF beamformer shall set the TXVECTOR parameter CH\_BANDWIDTH or CH\_BANDWIDTH\_IN\_NON\_HT, the Partial BW Info subfield of the UHR NDP Announcement frame, depending on the operating channel width of the beamformee, the operating channel width of the beamformer, and the feedback RU or MRU size, as defined in Table 9-42f (Settings for BW, Partial Bandwidth Info subfield in the EHT NDP Announcement frame).

[M#375] A UHR Co-BF beamformee that receives a UHR NDP Announcement frame as part of a UHR [CID#920] Co-BF ~~TB~~ sounding sequence with a STA Info field identifying it soliciting MU feedback shall generate a UHR compressed beamforming/CQI report using the feedback type, *Ng*, codebook size, and *Nc* indicated in the STA Info field.

[M#373] If the UHR Co-BF beamformee receives a BFRP Trigger frame with a matching User Info field, the UHR Co-BF beamformee transmits an EHT TB PPDU containing the EHT compressed beamforming/CQI report following the rules defined in 35.5.2.3 (Non-AP STA behavior for UL MU operation).

[M#372] A UHR Co-BF beamformee that transmits an EHT Compressed Beamforming/CQI frame sets the Partial BW Info subfield of the EHT MIMO Control field to indicate the range of subcarriers for which compressed beamforming/CQI information is provided. The Partial BW Info subfield shall be set to the value of the Partial BW Info subfield of the NDP Announcement frame for the UHR Co-BF beamformee.

[M#373] An AP that sends a BFRP Trigger frame shall allocate sufficient resources for the EHT TB PPDU response for each UHR Co-BF beamformee to include all the solicited feedback, including feedback that is segmented and including an HT Control field in each frame.

**37.7.4 Rules for generating segmented feedback for Co-BF**

[M#372-374] A UHR Co-BF beamformee receiving a BFRP Trigger frame with a matching STA Info field, transmits a EHT TB PPDU containing the EHT compressed beamforming/CQI report following the segmentation rules defined in 35.7.4 (Rules for generating segmented feedback).

[M#374] A UHR Co-BF beamformer that sends a BFRP Trigger frame to retrieve an EHT compressed beamforming/CQI report from a UHR Co-BF beamformee shall solicit all possible EHT Sounding Feedback Segment fields (feedback segments) by setting all of the bits in the Feedback Segment Retransmission Bitmap subfield to 1 in the User Info field identifying the UHR Co-BF beamformee.

[M#374] A UHR Co-BF beamformer that fails to receive some or all of the feedback segments of the EHT compressed beamforming/CQI report from the UHR Co-BF beamformee shall not use a BFRP Trigger frame to request retransmission of the feedback segments.

**37.7.5 Sounding NDP transmission for UHR [CID#920] Co-BF ~~TB~~ sounding sequence**

[CID#3284] UHR Co-BF sounding uses EHT sounding NDP. the TXVECTOR parameters for an EHT sounding NDP shall be set as follows:

* FORMAT is set to EHT\_MU.
* APEP\_LENGTH is set to 0.
* [M#262] EHT\_LTF\_TYPE is set to 2×EHT-LTF.
* [M#262] GI\_TYPE is set to either 0.8 µs GI or 1.6 µs GI.
* [M#262] Number Of EHT-LTF Symbols is set to 4 or 8.
* [M#262] NSS is set to 4 or 8 spatial streams.
* [M#262] CH\_BANDWIDTH is set to the value indicated in the special STA info field (see 9.3.1.19.6 (UHR NDP Announcement frame format)).
* SPATIAL\_REUSE is set to PSR\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED (see 35.11.2 (SPATIAL\_REUSE)).
* [M#262] BSS\_COLOR is set to the value indicated in the special STA info field (see 9.3.1.19.6 (UHR NDP Announcement frame format)).
* TXOP\_DURATION set to either 127 or a value defined in Equation (35-3).
* [M#262] ~~Other parameter settings are TBD.~~

The intended recipient(s) of an EHT sounding NDP is [CID#2992] (are) the STA(s) addressed by the STA Info field(s) in the immediately preceding UHR [CID#2983] ~~Co-BF~~ NDP Announcement frame.

**[CID#920] 38.3.22 EHT sounding NDP for UHR [CID#920] Co-BF ~~TB~~ sounding sequence**

The EHT sounding NDP is a variant of the EHT MU PPDU as defined in 36.3.18 (EHT sounding NDP). An EHT sounding NDP for UHR [CID#920] Co-BF ~~TB~~ sounding sequence is indicated by setting the PHY Version Identifier to 0 (EHT), PPDU Type And Compression Mode field to 1, the EHT-SIG MCS field to 0, and the Number Of EHT-SIG Symbols field to 0 in the U-SIG field. The format of an EHT sounding NDP for UHR [CID#920] Co-BF ~~TB~~ sounding sequence is illustrated in Figure 38-25 (EHT sounding NDP format for UHR [CID#920] Co-BF ~~TB~~ sounding sequences).

**Figure 38-25—EHT sounding NDP format for UHR [CID#920] Co-BF ~~TB~~ sounding sequences**

The BSS Color in the U-SIG of the EHT sounding NDP for UHR [CID#920] Co-BF ~~TB~~ sounding is set to the BSS Color of the transmitter of the most recent UHR NDP Announcement frame.

**[CID# 2989] 38.3.23 frequency and timing requirement for UHR TB sounding sequence and CoBF transmission**

[M#298] A UHR AP acting as the frequency reference during the UHR TB sounding and UHR CoBF transmission phase is a Sync-reference AP. A UHR AP aligns its frequency with respect to the Sync-reference AP during the UHR TB sounding and UHR CoBF transmission phase is a Sync-follower AP.

[M#298-299] The Sync-follower AP shall use the UHR NDP Announcement frame sent by the Sync-reference AP to pre-correct the NDP frequency to be within 350Hz ~~a TBD range (e.g., 350Hz)~~ of the sync-reference AP’s frequency. The frequency correction on the EHT NDP shall be applied in a Cross-BSS UHR TB sounding and a UHR Co-BF joint NDP sounding. The frequency correction on the EHT NDP is recommended in an EHT TB sounding within a UHR Co-BF sequential NDP sounding sequence.

[CID#923] The UHR Co-BF beamformers that transmits EHT sounding NDPs in a UHR Co-BF joint NDP sounding sequence ensure that the transmission start time of the EHT sounding NDPs is within ±0.4 μs + 16 μs from the end, at the UHR Co-BF beamformers’ transmit antenna connectors, of the last OFDM symbol of the PPDU carrying the UHR NDP Announcement frame (if it contains no PE field) or of the PE field of the PPDU carrying the UHR NDP Announcement frame (if the PE field is present).