IEEE P802.11
Wireless LANs

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| Proposed Draft Text (PDT-Joint): MAP-Sounding |
| Date: 2020-08-28 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Junghoon Suh | Huawei |  |  | junghoon.suh@huawei.com |
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Abstract

This submission proposed the draft text on Multi-AP Sounding for TGbe D0.1

X.Y EHT Sounding

X.Y.1 General

Sounding protocol provides the interaction procedure between the beamformer and the beamformee where the knowledge of the channel state is measured and collected with which the beam steering information is calculated for the transmit beamforming and the MU MIMO scheduling. The EHT sounding requires the additional procedure due to the multiple AP coordination for beamforming such as coordinated beamforming or joint transmission. A sequential sounding and a joint sounding are introduced to the EHT sounding among the coordinated access points and their associated STAs. The beamformers may choose the sequential or joint sounding depending on how beamforming steering matrices may be computed.

X.Y.2 EHT Sounding Sequences and Support

Since the multiple AP based sounding is not limited to the associated STAs, the OBSS STA information needs to be listed in the STA info field of NDPA for the sounding of multiple AP coordination, which is always true regardless of a sequential sounding or joint sounding.

The NDP is transmitted concurrently from the coordinated APs in joint sounding. The PHY headers of NDPs transmitted from the coordinated APs in joint sounding may carry the same information, in which the global number of TX antennas across the coordinated APs is indicated. The number of LTFs depends on this parameter, the global number of TX antennas which was indicated in each NDP transmitted from each coordinated AP. However, only the subset of P-matrix will be applied in each AP for the transmission of its respective NDP, that is, the subset of rows in P-matrix corresponding to its respective number of TX will be applied in each individual AP. For example, in case of 2 AP coordination and each AP with 4 TX, and thus 8 global TX, the LTFs on the *k* th subcarrier of each NDP from the respective AP in coordination is constructed as following, 

where *LTF*n represents the nth LTF symbol, *DCDD*is a diagonal cyclic delay diversity (CDD) mapping matrix, and *sk*is the long training sequence (LTS) in subcarrier *k*. The *P4x8* is constructed slightly differently in each AP, and *P4X8 = [P4X4 P4X4]* for Coordinating AP, *P4X8 = [P4X4 -P4X4]* for Coordinated AP.

X.Y.3 Rules for EHT Sounding Protocol Sequences

The sequential sounding is a natural extension from the single AP based sounding in an incumbent 802.11, except for the OBSS STAs being listed in an NDPA frame.

Figure 1 shows the sequential sounding for 2 AP coordination case, where the STA1n represents the nth STA associated with AP 1, and the STA2m represents the mth STA associated with AP 2. The NDPA, NDP, BFRP Trigger and CSI Report frames are exchanged in series between each AP in coordination and STAs including the OBSS STAs associated with the coordinated AP. Once the exchanges of NDPA, NDP, BFRP Trigger and CSI Report frames are finished for the first coordinating AP, the first coordinating AP transmits Sounding Request frame to the coordinated AP, so that it may begin transmitting the series of NDPA, NDP and BFRP Trigger frame. Once the coordinated AP receives the CSI report from all the STAs listed in the NDPA STA Info field, it transmits the Sounding End frame so that the Coordinating AP may trigger the data transmission from the APs in coordination.

Figure 1. Sequential sounding for 2 AP coordination