IEEE P802.11  
Wireless LANs

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| IEEE 802.11 TGax  November 2015 Bangkok PHY Ad Hoc Meeting Minutes | | | | |
| Date: 2015-09-13 | | | | |
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Abstract

TGax meeting minutes from the IEEE 802.11 Dallas PHY Ad hoc session, November, 2015.

**IEEE 802.11 Task Group ax PHY Ad Hoc**

**Nov 2015 Dallas Meeting**

**Tuesday, Nov 10th, 2015, AM2 TGax Session (10:30-12:30)**

1. **Meeting called to order by Yakun Sun (Marvell) at 10:30.**
   1. The agenda is contained in 11-15/1385r0 which is on the server.
2. **Administrative Items**
   1. Chair reminded the IEEE 802 and IEEE 802.11 Policy and Procedure.
   2. Chair also reminded to do attendance.
3. **Set and approve agenda**
   1. Proposed agenda for Monday PM1
      1. Presentations follow the order of DCN.
      2. Recess
   2. Chair asked for approval of the proposed agenda. – Agenda approved.
4. **Presentations** 
   1. **11-15-1309-01-00ax-extended-range-support-for-11ax**

**Sameer Vermani** (Qualcomm) presented.

**Discussions:**

Sigurd: The proposal is not mainly about range extension.

Sameer: it assists to achieve real low MCS performance thus to guarantee extended range.

Daewon: in slide 13, the gain is not in term of data payload. What’s the real data gain performance?

Sameer: Beacon can also be sent in data rate sometimes. It’s not intend to achieve data rate performance but extended range.

**SP #1:**

* **Do you support adding the following to the spec framework**
  + **“L-STF power is boosted by 3 dB in the extended range preamble”**

**SP Result: Y50 N4 A18; SP passed.**

**SP #2:**

* **Do you support adding the following to the spec framework**
  + **“L-LTF power is boosted by 3 dB in the extended range preamble”**

**SP Result: 51Y/0N/22A; SP passed.**

* 1. **11-15-1353-00-00ax-preamble-formats**

Ron Porat (BroadCom) Presented

**Discussions:**

There’s some clarification of the proposal.

**SP #1:**

* **Do you support that there are only three pre-HE-STF preamble formats defined as:** 
  + SU format (mandatory) / Trigger based UL
  + MU format (mandatory)
  + Extended range SU format

**SP Result: 51Y/2N/21A; SP passed**

**SP #2:**

* **Do you support the signaling of the three preamble formats as shown on slide 15**

**SP Result: 55Y/0N/21A; SP passed**

**SP #3**

* **Do you support that the following are the only mandatory combinations of LTF size and CP size**
  + **2x LTF+ 0.8uS**
  + **2x LTF+ 1.6uS**
  + **4x LTF+ 3.2uS**

**with HE-LTF and payload using the same CP size.**

**and that LTF size and CP size are jointly signaled using 3 bits.**

**SP Result: 57Y/0N/15A; SP passed**

**SP #4**

* **Do you support that SIGB only has one CP size equal to 0.8uS.**

**SP Result: 61Y/0N/14A; SP passed**

* 1. **11-15-1357-01-00ax-extra-tones-in-the-preamble**

Xiaogang Chen (Intel) Presented

**Discussions:**

No discussion

**SP #1:**

* **Do you support to:**
  + Allocate 4 extra subcarriers, two at each edge of each 20MHz sub-channel, for L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields in 11ax PPDUs.
    - The 4 subcarriers added to the L-SIG and RL-SIG fields are transmitted with known TBD BPSK constellations (+-1).
    - The number of data subcarriers in HE-SIG-A and HE-SIG-B fields are increased by 4 in each 20MHz sub-channel.
    - L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields are always transmitted with the same total power as L-LTF field (in cases when L-LTF is not being boosted?

**SP Result: 46Y/0N/13A; SP passed**

* 1. **11-15-1372-00-00ax-l-length-equation-updates**

Hongyuan Zhang (Marvell) Presented

**Discussions:**

Sigurd: correct the typo of “L\_LEGNTH” in the last formula for motion text.

**SP #1:**

* **Do you agree to make the following changes in red, on the equations in Section 3.3.5 of TGax SFD?**

**SP Result: 71Y/0N/2A; SP passed**

* 1. **11-15-1289-01-00ax-non-uniform-constellations-for-1024-qam**

Dana Ciochina (Sony) Presented

**Discussions:**

Jianhan: any explanation why using non-uniform constellations is better? Different code rate has different modulation?

Dana: the reliability of uniform constellations is not evenly distributed.

MARVELL: how to handle non-integer in slide 17?

Dana: Both floating and quantified methods could be used.

Someone: this should be defined with new MCS, and the non-uniform constellation is considered for optional MCS modes.

Someone: is PAPR performance considered?

Dana: not considered this time.

**SP #1:**

* **Do you agree that is desirable to achieve the maximum possible gain for 1024-QAM (e.g. make also use of non-uniform constellations)?**

**SP Result: 10Y/5N/Many A; Informative**

**SP #2:**

* **Do you agree that non-uniform constellations shall be used for 1024-QAM?**

**SP Result: Many Abstain; Informative**

* 1. **11-15-1310-00-00ax-11ax-ldpc-tone-mapper-for-160mhz**

Bin Tian (Qualcomm) Presented

**Discussions:**

Daewon: Segment in 11ac needs special operation, any consideration on the impact of procedure on the proposed design?

Bin: will consider later.

**SP #1:**

* **Do you support to add the following text to 11ax SFD?**
  + **2x996RU employs a segment parser (as in 11ac) between two 996 tones (frequency segments) and the LDPC tone mapper in each 996 tone segment uses DTM=20**

**SP Result: 57Y/0N/3A; SP passed.**

----------------------------------END OF AM2 TUESDAY--------------------------------------------------------

**Tuesday, Nov 10th, 2015, EV1 TGax Session (19:30-21:30)**

1. **Meeting called to order by Yakun Sun (Marvell) at 19:30.**
   1. The agenda is contained in 11-15/1385r1 which is on the server.
2. **Administrative Items**
   1. Chair reminded the IEEE 802 and IEEE 802.11 Policy and Procedure.
   2. Chair also reminded to do attendance.
3. **Presentations** 
   1. **11-15-1305-00-00ax-stbc-and-padding-discussions**

Hongyuan Zhang (Marvell) Presented

**Discussions:**

Daewon: Agree generally with the conclusion. Wonder if SFBC can be used to replace STBC totally.

Hongyuan: will discuss it once the SFBC proposal is available.

**SP #1:**

* **Do you agree to add the following text in 11ax SFD?**
  + ***STBC is an optional feature in 11ax and it is ONLY defined for single spatial stream (Nss=1 and Nsts=2)***
  + ***In a MU PPDU all RUs are either STBC or not STBC.***

**SP Result: 46Y/0N/12A; SP passed**

* 1. **11-15-1311-00-00ax-11ax-sppectral-masks**

Bin Tian (Qualcomm) Presented

**Discussions:**

Daewon: The spectrum mask used for PPDU transmission is based on PPDU bandwidth, it’s different from 11ac.

Bin: Yes. We believe it’s better to use a 20MHz mask for a20MHz PPDU.

**SP #1:**

**Do you support to add the following to 11ax SFD?**

* **The spectral masks for 11ax non-OFDMA 20/40/80/160/80+80 MHz PPDU are defined as in slides 13-15?** 
  + **The bandwidth of the applied spectrum mask for a (non-OFDMA) PPDU shall be determined by the bandwidth occupied by the pre HE-STF portion of the preamble in this PPDU, regardless of the BSS bandwidth**
  + **The spectral mask requirements do not apply to LO leakage**

**SP Result: 49Y/2N/8A; SP passed**

* 1. **11-15-1327-00-00ax-diversity-mode-in-ofdma**

Yujin Noh (Newracom) Presented

**Discussions:**

Bin: typically, 11ax will have more antennas which will cause lots of gain. How this transmission diversity behavior in this case?

Yujin: the proposal doesn’t address the antenna gain.

Le: understanding the intention is to find a new RU. While in previous discussion of RU, it’s evaluated against system level gain instead of link level gain.

Le: the new RU is only for multicast frame, e.g. trigger frame?

Daewon: It’s likely. Though not limit it to trigger frame directly, but AP will not be so stupid to assign such a RU to a big data frame.

Brian: Multicast is not a big issue, and low rate of multicast will take longer time.

**SP #1:**

**Do you agree to add the following to the SFD?**

* **Transmission diversity mode (i.e. non-continuous transmission) shall be supported in 11ax.** 
  + **Transmission diversity mode divides a single encoded packet in half and maps to 13 + 13 (26 RU) or 26 + 26 (52 RU) tones, that are spaced apart in frequency.**
  + **TBD whether only 26 RU, only 52 RU, or both 26 and 52 RU support transmit diversity mode.**

**SP Result: 12Y/23N/21A; SP failed**

* 1. **11-15-1329-00-00ax-link-adaptation-for-he-wlan**

Yujin Noh (Newracom) Presented

**Discussions:**

Jianhan: The proposal could be one solution, there could be another solution.

Daewon: We offer this solution and want group’s feedback.

Bin: Some of the SP2 content may relate to other group. Suggest to move the SP2 to TG meeting.

Ron: suggest to replace “is composed of “ with “contains of” in SP2.

**SP #1:**

**Do you agree to include the following text to TGax SFD:**

* **HE link adaptation shall define reference payload size for the reported MCS in MFB.**
  + **Reference payload size may be dependent on the frames involved in link adaptation or fixed in specification. Details TBD.**

**SP Result: 12Y/1N/Many A; SP passed**

**SP #2:**

**Do you agree to include the following text to TGax SFD:**

* **HE link adaptation field, which is part of HE variant of HT control field, consists of MFB and TBD subfields. The MFB subfield consists of NSS and MCS subfield. The MFB subfield includes NSS and MCS subfield.**

**SP Result: 17Y/0N/37A; SP passed**

* 1. **11-15-1331-00-00ax-phy-padding-capability-signaling**

Daewon Lee (Newracom) Presented

**Discussions:**

Hongyuan: it’s too complex with consideration of STBC.

Daewon: Agree that’s a challenge. But from our aspect, we prefer this proposal.

Someone: the processing time depends on the devices’ capability to decode earlier or longer, not sure if AP can actually capture that information.

**SP #1:**

**To you agree to added the following text in SFD:**

* **HE padding and packet extension capability field shall be defined separately for STBC and non-STBC transmissions.**
* **HE padding and packet extension capability field content for STBC transmission is limited to Nss = 1.**

**SP Result: 12Y/28N/16A; SP failed**

**SP #2:**

**Do you agree to the following concept:**

* **Maximum TPE of 0us, 8us, or 16us is determined by number of codewords in the last two OFDM symbols (denoted as NCW,left) containing information payload.**
* **Maximum TPE capability can be signaled using two threshold values threshold8 and threshold16, which determine the NCW,left threshold for using max TPE of 8us or 16us, respectively. The threshold value will be common for all BW and NSS.**

**SP Result: 12Y/26N/13A; (For information)**

----------------------------------END OF EV1 TUESDAY--------------------------------------------------------

**Wednesdday, Nov 12th, 2015, EV1 TGax Session (13:30-15:30)**

1. **Meeting called to order by Yakun Sun (Marvell) at 13:30.**
   1. The agenda is contained in 11-15/1385r2 which is on the server.
2. **Administrative Items**
   1. Chair reminded the IEEE 802 and IEEE 802.11 Policy and Procedure.
   2. Chair also reminded to do attendance.
3. **Presentations** 
   1. **11-15-1323-01-00ax-he-stf-sequences**

Eunsung Park (LGE) Presented

**Discussions:**

No discussion

**SP #1:**

* **Do you agree to add the following HE-STF sequences for 0.8us and 1.6us periodicity to the 11ax SFD:**
  + ***M* = {-1 -1 -1 +1 +1 +1 -1 +1 +1 +1 -1 +1 +1 -1 +1}**
  + **1x HE-STF sequences** 
    - **20MHz**
      * **HES-112,112(-112:16:112) = *M* \*(1+*j*)\*sqrt(1/2)**
      * **HES-112,112(0) = 0**
    - **40MHz**
      * **HES-240,240(-240:16:240) = {*M*, 0, -*M*} \*(1+*j*)\*sqrt(1/2)**
    - **80MHz**
      * **HES-496,496(-496:16:496) = {*M*, 1, -*M*, 0, -*M*, 1, -*M*} \*(1+*j*)\*sqrt(1/2)**
  + **2x HE-STF sequences** 
    - **20MHz**
      * **HES-120,120(-120:8:120) = {*M*, 0, *-M*} \*(1+*j*)\*sqrt(1/2)**
    - **40MHz**
      * **HES-248,248(-248:8:248) = {*M*, -1, -*M*, 0, *M*, -1, *M*} \*(1+*j*)\*sqrt(1/2)**
      * **HES-248,248(±248) = 0**
    - **80MHz**
      * **HES-504,504 (-504:8:504) = {*M*, -1, *M*, -1, -*M*, -1, *M*, 0, -*M*, 1, *M*, 1, -*M*, 1, -*M*} \*(1+*j*)\*sqrt(1/2)**
      * **HES-504,504(±504) = 0**

**SP Result: 48Y/0N/14A; SP passed**

* 1. **11-15-1303-00-00ax-ltf-sequence-designs**

Sungho Moon (Newracom) Presented

**Discussions:**

Le: slide 6, pilot position is different from what we agreed in SFD. Maybe the PAPR performance re-check is needed. So your proposal is trying to reuse LTF long sequence?

Sungho: Yes.

Someone: the full-band PAPR design is possible.

Sungho: How long to run the sim depends on how many position to search. And our design is based on reuse existing LTF sequence the most as possible.

SPs withdrawn.

* 1. **11-15-1334-01-00ax-he-ltf-sequence-design**

Le Liu (Huawei) Presented

**Discussions:**

Sungho: slide22, 40MHz should be more popular than 20MHz and the PAPR performance of 40MHz is not very good.

Le: not sure whether 40MHz is more popular. And the simulation result is for different cases.

Sungho: the proposed new sequence should have better performance over existing VHT sequence. But the performance over 26 tone RU is not good.

Le: we prioritize overall performance.

**SP #1:**

**Do you support to add to SFD**

* + **4x/2x HE-LTF sequences for 80MHz in slide 13-15**
  + **4x/2x HE-LTF sequences for 40MHz in slide 20-21**
  + **4x/2x HE-LTF sequences for 20MHz in slide 26**

**SP Result: 63Y/2N/16A; SP passed**

**SP #2:**

**Do you support to add to SFD**

* **In all transmission modes, HE-STF and HE-LTF only populate RUs that are populated in the data field.**

**SP Result: 74Y/0N/15A; SP passed**

**SP #3:**

**Do you support to add to SFD**

* **Gamma (tone rotation as defined in 22.3.7.5) is not applied on HE-STF and beyond.**
  + **TBD in case of a duplicated HE PPDU (if ever defined)**

**SP Result: 60Y/0N/13A; SP passed**

* 1. **11-15-1322-00-00ax-channel-estimation-enhancement-and-transmission-efficiency-improvement-using-beam-change-indication-and-1x-he-ltf**

Yakun Sun (Marvell) Presented

**Discussions:**

Sigurd: How the two streams for preamble is transmitted?

Jianhan: same as HE-LTF1

Someone: How to evaluate the bit left in HE-SIG-A?

Jianhan: most critical to PHY and performance enhancement features are prioritized to use HE-SIG-A.

Daewon: Is it necessary to use HE-STF with this design?

Jianhan: in some cases, the proposed bit is used to inform AGC update.

Daewon: in some cases, e.g. short package cases, the performance of proposal is not so good.

Yakun: the feature has promising performance and all implementation will support it. But it’s not a right time to decide it’s a mandatory IEEE feature or not.

**SP #1:**

**Do you agree to add 1-bit beam-change indication into HE-SIGA?**

* **Value “1” indicates that spatial mapping is changed**
* **Value “0” indicates that spatial mapping is unchanged**

**SP Result: 63Y/0N/14A; SP passed**

**SP #2:**

**Do you agree that when beam-change indication is “0”, the pre-HE-STF portion preamble shall be spatially mapped in the same way as HE-LTF1 on each tone?**

**SP Result: 62Y/0N/8A; SP passed**

**SP #3:**

**Do you agree to add 1x HE-LTF as an optional mode in 11ax for SU PPDU (TBD for MU-MIMO)?**

* **1xLTF + 0.8us GI is one optional combination as indicated by the “GI and LTF size” sub-field in HE-SIG-A.**

**SP Result: 60Y/1N/14A; SP passed**

* 1. **11-15-1315-01-00ax-he-sig-b-mapping-and-compression**

Kaushik (Samsung) Presented

**Discussions:**

Sigurd: slide 11, how does the receiver know the position of SIG-B.

Kaushik: the receiver has to decode two 20MHz channels to get complete SIG-B anyway.

**SP #1:**

**Do you agree to add the following text to the 11ax SFD:**

* **The resource allocation signaling in the common control field and user specific subfields for an STA carried in the HE-SIG-B are transmitted in the same 20MHz sub-channel as the data for 20MHz and 40MHz PPDU.**
* **For an 80MHz PPDU, the default mapping per 20MHz as shown in the figure below.**

****

* **For a 160MHz PPDU , the default mapping per 20MHz is as shown in the figure below**

****

**SP Result: SP passed without objection**

**SP #2:**

**Do you agree to add the following text to the 11ax SFD:**

* **A compression bit is carried in the HE-SIG-A MU format to differentiate full BW MU-MIMO from OFDMA MU PPDU.**
* **In case of full BW MU-MIMO, the following conditions hold:**
  + **Only applicable for RU sizes 242,484,996,2\*996**
  + **The RU information in HE-SIGB common is not signaled**
  + **For bandwidths > 20MHz, the user specific sub-fields are split equitably between the two HE-SIG-B Channels**

**SP Result: SP passed without objection**

* 1. **11-15-1324-00-00ax-mcs-for-he-sig-b**

Dongguk (LG Electronic) Presented

**Discussions:**

No discussion

**SP #1:**

**SP Result: 34Y/0N/9A; SP passed (performed at the beginning of PM2, WEDNESDAY)**

----------------------------------END OF PM1 WEDNESDAY--------------------------------------------------------

**Wednesdday, Nov 12th, 2015, EV1 TGax Session (16:03-18:00)**

1. **Meeting called to order by Yakun Sun (Marvell) at 16:03.**
   1. The agenda is contained in 11-15/1385r2 which is on the server.
2. **Administrative Items**
   1. Chair reminded the IEEE 802 and IEEE 802.11 Policy and Procedure.
   2. Chair also reminded to do attendance.
3. **Presentations** 
   1. **11-15-1335-02-00ax-he-sig-b-contents**

Le Liu (Huawei) Presented

**Discussions:**

Sungho: slide 13, the supported user number cannot meet 9 per 20MHz.

Le: the supported user number should be limited by SIG-B length.

**SP #1:**

**Do you agree to modify the text in IEEE 802.11ax SFD(r9) as follows**

* **Change “The exact mapping of the 8 bit to the arrangement and the number of MU-MIMO allocations is TBD.” to “The mapping of the 8 bits to the arrangement and the number of MU-MIMO allocations is defined in the following lookup table.”**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **8 bits indices** | **#1** | **#2** | **#3** | **#4** | **#5** | **#6** | **#7** | **#8** | **#9** | **Num of entries** |
| **000 0 0000** | **26** | **26** | **26** | **26** | **26** | **26** | **26** | **26** | **26** | **1** |
| **000 0 0001** | **26** | **26** | **26** | **26** | **26** | **26** | **26** | **52** | | **1** |
| **000 0 0010** | **26** | **26** | **26** | **26** | **26** | **52** | | **26** | **26** | **1** |
| **000 0 0011** | **26** | **26** | **26** | **26** | **26** | **52** | | **52** | | **1** |
| **000 0 0100** | **26** | **26** | **52** | | **26** | **26** | **26** | **26** | **26** | **1** |
| **000 0 0101** | **26** | **26** | **52** | | **26** | **26** | **26** | **52** | | **1** |
| **000 0 0110** | **26** | **26** | **52** | | **26** | **52** | | **26** | **26** | **1** |
| **000 0 0111** | **26** | **26** | **52** | | **26** | **52** | | **52** | | **1** |
| **000 0 1000** | **52** | | **26** | **26** | **26** | **26** | **26** | **26** | **26** | **1** |
| **000 0 1001** | **52** | | **26** | **26** | **26** | **26** | **26** | **52** | | **1** |
| **000 0 1010** | **52** | | **26** | **26** | **26** | **52** | | **26** | **26** | **1** |
| **000 0 1011** | **52** | | **26** | **26** | **26** | **52** | | **52** | | **1** |
| **000 0 1100** | **52** | | **52** | | **26** | **26** | **26** | **26** | **26** | **1** |
| **000 0 1101** | **52** | | **52** | | **26** | **26** | **26** | **52** | | **1** |
| **000 0 1110** | **52** | | **52** | | **26** | **52** | | **26** | **26** | **1** |
| **000 0 1111** | **52** | | **52** | | **26** | **52** | | **52** | | **1** |
| **000 1 xxxx** | **Definition TBD** | | | | | | | | | **16** |
| **00100 yyy** | **26** | **26** | **26** | **26** | **26** | **106** | | | | **8** |
| **00101 yyy** | **26** | **26** | **52** | | **26** | **106** | | | | **8** |
| **00110 yyy** | **52** | | **26** | **26** | **26** | **106** | | | | **8** |
| **00111 yyy** | **52** | | **52** | | **26** | **106** | | | | **8** |
| **01000 yyy** | **106** | | | | **26** | **26** | **26** | **26** | **26** | **8** |
| **01001 yyy** | **106** | | | | **26** | **26** | **26** | **52** | | **8** |
| **01010 yyy** | **106** | | | | **26** | **52** | | **26** | **26** | **8** |
| **01011 yyy** | **106** | | | | **26** | **52** | | **52** | | **8** |
| **011 xxxxx** | **Definition TBD** | | | | | | | | | **32** |
| **10 yyy yyy** | **106** | | | | **26** | **106** | | | | **64** |
| **11 0 00yyy** | **242** | | | | | | | | | **8** |
| **11 0 01yyy** | **484** | | | | | | | | | **8** |
| **11 0 10yyy** | **996** | | | | | | | | | **8** |
| **11 0 11yyy** | **2\*996** | | | | | | | | | **8** |
| **11 1 xxxxx** | **Definition TBD** | | | | | | | | | **32** |

**SP Result: 50Y4/N/18A; SP passed**

**SP #2:**

**Do you agree to add the STAID size in the user specific subfields of HE-SIGB is 11bits?**

**SP Result: 47Y/0N/14A; SP passed**

**SP #3:**

**Do you agree to add a DCM subfield (1-bit) to the user-specific subfields of HE-SIG-B in IEEE 802.11ax SFD(r9) (as shown in red) ?**

* **For single-user allocations in a RU:  NSTS (Number of Spatial Streams), TxBF (transmit beamforming ), MCS (Modulation and Coding Scheme), DCM (Dual Sub-Carrier Modulation) and Coding (Use of LDPC)**
* **For each user in a multi-user allocation in a RU:  Spatial Configuration Fields, MCS, DCM and Coding**

**SP Result: 54Y/0N/19A; SP passed**

* 1. **11-15-1304-01-00ax-supported-resource-allocations-in-sig-b**

Sungho (Newracom) Presented

**Discussions:**

Le: slide 5, any consideration of some RU arrangement pattern not supported by the proposal?

Sungho: some cases are actually not used in practical.

Yakun: the receiver has to decode two SIG-B blocks anyway.

Lots of discussion regarding the necessity for receiver to check each of the SIG-B block.

Le: it’s too early to define how to handle special cases. We need to discuss how to prioritize these special cases.

**SP #1:**

**Do you agree to add the following text into the SFD?**

* **The 8 bits in the common field of HE SIG-B includes a state of ‘No STA Assigned’ for which no STA-specific field is transmitted**

**SP Result: 12Y/26N/16A; SP failed**

**SP #2:**

**Do you agree to add the following text into the SFD?**

* **The number of spatially multiplexed STAs for 106 RU limited to 4**
  + **For RUs larger than 106, it can be 8 STAs as maximum**

**SP Result: 5Y/34N/16A; SP failed**

**SP #3:**

**Do you agree to support the following text?**

* **The 8 bits in the common field of HE SIG-B includes explicit states for the existence of the center 26RU of 80MHz**

**SP Result: 9Y/16N/25A; Informative**

* 1. **11-15-1350-01-00ax-spatial-configuration-and-signaling-for-mu-mimo**

Yakun Sun (Marvell) Presented

**Discussions:**

No discussion

**SP #1:**

**Do you support to add the following text in Section x.x.x in current SFD:**

* **The number of spatially multiplexed user in a DL or UL MU-MIMO transmission is up to 8 (in a given RU)?**

**SP Result: 46Y/5N/8A; SP passed**

**SP #2:**

**Do you support to add the following text in Section x.x.x current SFD:**

* **The Nsts value for each user in a MU-MIMO RU is less than or equal to 4?**

**SP Result: 41Y/1N/7A; SP passed**

**SP #3:**

**Do you support to add the following text in Section x.x.x in current SFD:**

* **A MU-MIMO user block includes a “spatial config” field of 4bit indicating the number of spatial streams for each multiplexed STA. The field is constructed by using the entries corresponding to the value of Nuser of this RU in the following table?**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nuser** | **B0…B3** | **Nsts[1]** | **Nsts[2]** | **Nsts[3]** | **Nsts[4]** | **Nsts[5]** | **Nsts[6]** | **Nsts[7]** | **Nsts[8]** | **#Entries** |
| **2** | **0000~0011** | **1~4** | **1** |  |  |  |  |  |  | **10** |
| **0100~0110** | **2~4** | **2** |  |  |  |  |  |  |
| **0111~1000** | **3~4** | **3** |  |  |  |  |  |  |
| **1001** | **4** | **4** |  |  |  |  |  |  |
| **3** | **0000~0011** | **1~4** | **1** | **1** |  |  |  |  |  | **13** |
| **0100~0110** | **2~4** | **2** | **1** |  |  |  |  |  |
| **0111~1000** | **3~4** | **3** | **1** |  |  |  |  |  |
| **1001~1011** | **2~4** | **2** | **2** |  |  |  |  |  |
| **1100** | **3** | **3** | **2** |  |  |  |  |  |
| **4** | **0000~0011** | **1~4** | **1** | **1** | **1** |  |  |  |  | **11** |
| **0100~0110** | **2~4** | **2** | **1** | **1** |  |  |  |  |
| **0111** | **3** | **3** | **1** | **1** |  |  |  |  |
| **1000~1001** | **2~3** | **2** | **2** | **1** |  |  |  |  |
| **1010** | **2** | **2** | **2** | **2** |  |  |  |  |
| **5** | **0000~0011** | **1~4** | **1** | **1** | **1** | **1** |  |  |  | **6** |
| **0100~0101** | **2~3** | **2** | **1** | **1** | **1** |  |  |  |
| **6** | **0000~0010** | **1~3** | **1** | **1** | **1** | **1** | **1** |  |  | **4** |
| **0011** | **2** | **2** | **1** | **1** | **1** | **1** |  |  |
| **7** | **0000~0001** | **1~2** | **1** | **1** | **1** | **1** | **1** | **1** |  | **2** |
| **8** | **0000** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |

**SP Result: 48Y/1N/10A; SP passed**

* 1. **11-15-1059-02-00ax-sig-b-encoding-structure-part-ii**

Sriram Venkateswaran (BroadCom) Presented

**Discussions:**

No discussion

**SP #1:**

**Do you agree to modify the text in Section 3.2.4 of the SFD as follows**

* **Two users are grouped together and jointly encoded in each BCC block in the user specific section of HE-SIG-B**
* **~~The CRC in the common block is TBD~~**
* **The common block has a CRC separate from the CRC of the user specific blocks**
* **The last user information is immediately followed by tail bits (regardless of whether the number of users is odd or even) and padding bits are only added after those tail bits**

**SP Result: 56Y/0N/7A; SP passed**

* 1. **11-15-1354-00-00ax-siga-fields-and-bitwidths**

Ron Porat (BroadCom) Presented

**Discussions:**

Daewon: More compression mode TBD is not found in any proposal.

Ron: Something between pure MU-MIMO and other operation is under consideration.

Daewon: how to use BW bit for MU transmission?

Ron: potential BW would be 20/40/80/160MHz. But we would think more about BW rules for MU transmission.

**SP #1:**

**Do you support replacing the HE-SIG-A field definitions for SU preamble format in [2] (PHY Motions 43, 46, 48, 54) with the table in slide 11?**

|  |  |
| --- | --- |
| **Field** | **#Bits** |
| **DL/UL** | **1** |
| **Format Indication** | **1** |
| **BSS Color** | **6** |
| **Spatial Reuse** | **TBD** |
| **TXOP duration** | **TBD** |
| **Bandwidth** | **2** |
| **MCS** | **4** |
| **CP+LTF size** | **3** |
| **Coding** | **2** |
| **Nsts** | **3** |
| **STBC** | **1** |
| **TxBF** | **1** |
| **DCM** | **1** |
| **Packet  Extension** | **3** |
| **Beam change** | **1** |
| **CRC** | **4** |
| **Tail** | **6** |

**SP Result: 54Y/0N/7A;** SP passed

**SP #2:**

**Do you support replacing the HE-SIG-A field definition for the MU preamble format [2] (PHY Motions 44, 46, 54) with the table in slide 12?**

|  |  |
| --- | --- |
| **Field** | **#Bits** |
| **DL/UL** | 1 |
| **BSS Color** | 6 |
| **Spatial Reuse** | TBD |
| **TXOP duration** | TBD |
| **Bandwidth** | >=2 |
| **SIGB MCS** | 3 |
| **SIGB DCM** | 1 |
| **SIGB # of symbols** | 4 |
| **SIGB Compression Mode** | >=1 |
| **# of  HE-LTF** | 3 |
| **CP+LTF size** | 3 |
| **LDPC extra symbol** | 1 |
| **Packet  Extension** | 3 |
| **CRC** | 4 |
| **Tail** | 6 |

**SP Result:** **50Y/0N/7A;** SP passed

**SP #3:**

**Do you support replacing the HE-SIG-A field definition for trigger based UL preamble format in [2] (PHY Motion 45) with the table in slide 13?**

|  |  |
| --- | --- |
| **Field** | **#Bits** |
| **Format** | 1 |
| **BSS Color** | 6 |
| **TXOP** | TBD |
| **Spatial reuse** | TBD |
| **Bandwidth** | TBD |
| **CRC** | 4 |
| **Tail** | 6 |

**SP Result: 51Y/0N/10A;** SP passed

1. **The chair adjourned at 17:40pm**