IEEE P802.11
Wireless LANs

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

TGax meeting minutes from the IEEE 802.11 Bangkok PHY Ad hoc session, September, 2015.

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

**Sept 2015 Bangkok Meeting**

**Monday, Sept 13th, 2015, PM1 TGax Session (13:35-15:30)**

1. **Meeting called to order by Jianhan Liu (Mediatek) at 13:35.**
	1. The agenda is contained in 11-15/1125r1 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. Call Meeting to order
		2. IEEE 802 and 802.11 IPR Policy and procedure.
		3. Presentations follow the order of DCN.
		4. Recess
	2. Chair asked for approval of the proposed agenda. – Agenda approved.
4. **Presentations**
	1. 11-15/0580r2 11ax Coding Discussions

**Hongyuan Zhang** (Marvell) presented.

**Discussions:**

No questions.

**SP #1:**

* **Do you agree to make the following text changes in 11ax SFD (3.3.3 Coding)?**
	+ *LDPC is the only coding scheme in the HE PPDU Data field for allocation sizes of 484 tones, 996 tones and 996\*2 tones.*
	+ *….*
	+ *Support of LDPC code for both TX and RX is mandatory for HE STAs declaring support for at least one of HE 40/80/160/80+80 SU-PPDU bandwidths,* ……..

**SP Result:**

**Y40 N0 A18**

**SP passed.**

* 1. 11-15/1031r0 DL MU Signaling

Katsuo Yunoki (KDDI R&D Laboratories) Presented

**Discussions:**

**SP #1:**

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

The amendment shall define Group ID expression to identify stations multiplexed in DL MU PPDU with MU-MIMO, OFDMA or combined usage of both.

**SP Result:**

**Y1, N many**

SP failed

* 1. 11-15/1051r0 HE NDP Frame for Sounding

Young Hoon Kwon (Newracom) Presented

**Discussions:**

Sameer (Qualcomm): Terminology of “OFDM” format

Answer: lack of a good name now.

Hongyuan (Marvell): LTF compression of 2x/4x is open for discussion. Also have issue on the “SU” frame format.

Answer: also due to lack of a good name.

**SP:**

* **Do you agree to add to the TG Specification Framework:**
	+ 4.y.z An HE NDP frame for DL sounding shall use Non-OFDMA (SU) frame format.

Sameer requested to delay the SP after his contribution is presented since they are close related.

Sameer: still wondering if there is a better name for “non-OFDMA”. How about just say “SU” frame.

Bin Tian: have we defined “SU” frame? Is it related to data portion? Everyone agrees the intention. Suggest to defer and work offline for a better phrase.

Answer: will work offline to harmonize and bring back.

* 1. 11-15/1071r2 Tone grouping Factors and NDP Format for 802.11ax

Sameer Vermani (Qualcomm) presented.

**Discussions:**

Young Hoon (Newracom): what if AP allows UL OFDMA-type of sounding from multiple STA at the same time?

Sameer: that is a good point. Need to think more. Generally AP has more antenna. BF in UL is less used. Defer the 2nd SP.

Daewon: single stream pilot may not be transmitted over 2x. Outdoor is more freq selective and the steering matrix. May need Ng be smaller.

Sameer: In a real channel Ng can be set back to 2 if such a freq selective has enough rank to support high order MIMO. Our simulation only shows Ng=1 is not required, so we still keep Ng=2 at this moment.

**SP1:**

* **Do you agree to add the following text to the TGax spec framework document:**

*“802.11ax spec shall not support Ng=1 for sounding feedback. Note that the tone grouping factor, Ng is defined with respect to data tones of the 11ax PPDU. ”*

**SP passes unanimously**

**SP2:**

* **Do you agree to add the following text and diagram to the SFD**

*The spec shall define an HE-NDP for collecting sounding feedback, whose frame format is shown in the diagram below. The presence and duration of packet extension at the end of HE-NDP is TBD.*

******

**SP is deferred.**

* 1. 11-15/1059r1 SIGB Encoding Structure Part II

Ron Porat (Broadcom) presents.

**Discussions:**

Daewon: size of CRC, and payload size?

Ron: K is number of user coded together. CRC is 4 bits. Payload size is not important. We are simulating SIGB.

Daewon: overhead changes with K and impacts the performance. So that is why I asked the size of each specific fields.

**SP:**

**Do you agree to add the following text to the SFD: The encoding structure of each BCC in SIG-B is as shown in the figure and as described below:**

* 2 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 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

SIG-B

**Common**

**User-specific**

2 users + CRC + Tail

…

2 users + CRC + Tail

1 or 2 users + CRC + Tail

Common bits (+ CRC) +Tail

**1 BCC Block**

**1 BCC Block**

**Last BCC Block**

Padding

**Results:**

**Y43 N0 A21**

**SP passes**

* 1. 11-15/1066r0 HE-SIGB contents

Kaushik Josiam (Samsung)

Interdigital: does the 106RU means the all the user has the same ID?

Kaushik: doesn’t mean all users have the same user ID

**Discussions**

**SP#1**

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

The RU allocation signaling in the common field of HE-SIG-B signals an 8 bit  per 20MHz PPDU BW for signaling

* + The RU arrangement in frequency domain
	+ Number of MU-MIMO allocations: The RUs allocated for MU-MIMO and the number of users in the MU-MIMO allocations.

 The exact mapping of the 8 bit to the RU arrangement and the number of MU-MIMO allocations is TBD.

Signaling for the center 26 unit in 80MHz is TBD

**SP#2**

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

The user specific subfields of HE-SIG-B containing the per user dedicated information  include the following fields

* + STA-ID
	+ For single-user allocations in a RU:  NSTS (Number of Spatial Streams), TxBF (transmit beamforming ), MCS (Modulation and Coding Scheme) and Coding (Use of LDPC)
	+ For each user in a multi-user allocation in a RU:  Spatial Configuraiton Fields, MCS and Coding.

Other fields are TBD.

**SP#3**

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

The length of the user specific subfield in HE-SIG-B for a single-user allocation is equal to the length of the user specific subfield of each user in a multi-user allocation.

**SP#4**

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

For MU-MIMO allocation of RU size > 20MHz, the user-specific subfields is dynamically split between two HE-SIG-B content channels(1/2) and the split is decided by the AP (on a per case basis)

**Monday, Sept 13th, 2015, PM1 TGax Session (19:40-21:30)**

1. **Meeting called to order by Jianhan Liu (Mediatek) at 19:40.**
	1. The agenda is contained in 11-15/1125r2 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. Call Meeting to order
		2. IEEE 802 and 802.11 IPR Policy and procedure.
		3. Presentations follow the order of DCN.
		4. Recess
	2. Chair asked for approval of the proposed agenda. – Agenda approved.
4. **Presentations**
	1. 11-15/1066r0 HE-SIGB contents

Kaushik Josiam (Samsung) continued the Q&A from the last session

**Discussions:**

Amin (Newracom): request to defer SP. Has a very close contribution. Not sure 8bits are enough for the allocations.

KDDI: will a STA need to decode all user specific subfield?

Answer: it is up to the group.

Interdigital: Does this mean only one RU is allocated to one user?

Answer: Doesn’t mandate.

**SP #1:**

Deferred

**SP#2**

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

The user specific subfields of HE-SIG-B containing the per user dedicated information  include the following fields

* + STA-ID
	+ For single-user allocations in a RU:  NSTS (Number of Spatial Streams), TxBF (transmit beamforming ), MCS (Modulation and Coding Scheme) and Coding (Use of LDPC)
	+ For each user in a multi-user allocation in a RU:  Spatial Configuraiton Fields, MCS and Coding.

Other fields are TBD.

43Y 0N 17A

**SP#3**

Deferred.

**SP#4**

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

For MU-MIMO allocation of RU size > 20MHz, the user-specific subfields is dynamically split between two HE-SIG-B content channels(1/2) and the split is decided by the AP (on a per case basis)

 39Y 0N 15A

* 1. 11-15/1051r0 HE NDP Frame for Sounding

Young Hoon Kwon (Newracom) returned for SP

**SP:**

* **Do you agree to add to the TG Specification Framework:**
	+ 4.y.z The spec shall define an HE-NDP for DL Sounding. The frame format of HE-NDP is based on the 11ax SU PPDU format is shown in the diagram below. The presence and duration of packet extension at the end of HE-NDP is TBD.

38Y 0N 4A

* 1. 11-15/1111r0 SIG-B Resource unit allocation coding

Amin Jafarian (Newracom)

Shenaz: 4MHz = 52 tone? It is not exact to refer to 4MHz.

Answer: we can rephrase.

Shernaz: slide 4, the user needs to decode the tree to know the number of users

Answer: yes.

Jianhan: it is variable length. How to decode?

Answer: don’t need the tail bits, just start to trace back from the minimum codeword length.

Kaushik: how to cover MU-MIMO in signaling?

Answer: don’t need to.

Kaushik: how to know the number of users?

Answer: by the SIGB length

Kaushik: there will be ambiguity.

Kaushik: how does two methods compare when you have more than 9 users in 20MHz?

Answer: not practical.

Arjun: if all RU is allocated, 11 bits

Answer: Y

Arjun: again how to decode SIGB?

Answer: Y

Arjun: cannot resolve number of users from SIGB length.

Arjun: cannot signal 484tone.

**SP:**

Deferred.

* 1. 11-15/1070r3 1024 QAM Proposal

Eunsung Park (LG) presents

Sigard: have you simulated CFO?

A: no

Daewon: EVM is TxEVM?

A: Y

Interdigital: no channel estimation loss?

A: No. will do.

**SP:**

* **Do you agree to add the following text to the 11ax SFD:**
	+ 1024 QAM is used as an optional feature for SU and MU using resource units equal to or larger than 242 tones in 11ax?

**35Y 0N 18A**

**SP passes**

* 1. 11-15/1077r0 HE-SIGA content

Jiayin Zhang (Huawei) presents

Daewon: why BW length is TBD?

Jiayin: there has been proposal on non-contigous channel bonding. So we left some flexibility here.

Daewon: why BW is fixed for SU?

Jiayin: to control implementation complexity, channel bonding is not suggested.

Daewon: PE has been agreed.

Jiayin: still want to keep the field.

Ron: Many proposal have talked about PE.

Daewon: need to think about if to support STBC

Jiayin: for each PPDU to exclude STBC? For some cases we want to keep it.

Interdigital: SR fields to add later on?

Jiayin: need further discussions

**SP1**

* **Do you agree to add to SFD**
	+ HE-SIG-A shall include the following fields in SU PPDU.
		- The size of each field is TBD
		- The other fields are TBD

|  |
| --- |
| Format indication |
| TXOP duration |
| BW |
| Payload GI |
| PE |
| MCS |
| coding |
| LTF compression |
| Nsts |
| STBC |
| BF |
| CRC |
| tail |

Y53 N14 A6

**SP2**

* **Do you agree to add to SFD**
	+ - HE-SIG-A shall include the following fields in MU DL PPDU.
			* The size of each field is TBD
			* The other fields are TBD

|  |
| --- |
| Format indication |
| TXOP duration |
| Number of HE-SIG-B symbols |
| MCS of SIGB |
| CRC |
| tail |

Y53 N14 A6

**SP3**

* **Do you agree to add to SFD**
	+ - HE-SIG-A shall include the following fields in MU UL PPDU.
			* The size of each field is TBD
			* The other fields are TBD

|  |
| --- |
| Format indication |
| TXOP duration |
| CRC |
| tail |

Y52 N0 A16

* 1. 11-15/1122r0 **Identifiers in HE PPDUs for power saving**

Alfred Asterjadhi (Qualcomm) presents

**SP1**

* Do you support to add to the SFD:
	+ The spec shall support adding a BSS COLOR field in the SIG-A field
		- The BSS COLOR field is an identifier of the BSS (size TBD)

Newracom: already in 15/0077?

A: no

60Y 0N 3A

**SP2**

* Do you support adding the following rules to the SFD:
	+ An HE non-AP STA may enter the Doze state until the end of an HE DL MU PPDU if:
		- the value of the PPDU’s BSS COLOR field is equal to the BSS COLOR of its BSS, and
		- the value derived from any of the STA Identifiers in the SIG-B field does not match its own identifier or that of a broadcast/multicast identifier
	+ An HE non-AP STA may enter the Doze state until the end of an HE UL MU PPDU if:
		- the value of the PPDU’s BSS COLOR field is equal to the BSS COLOR of its BSS

52Y 0N 9A

**SP3**

* Do you support adding an UL/DL Flag field in the SIG-A of an HE SU PPDU?
	+ The UL/DL Flag indicates whether the frame is Uplink or Downlink
		- The value of this field for TDLS is TBD

??: how about RTS/CTS?

A: RTS/CTS in legacy format and not covered here. If it is in HE format, it depends on STA/AP.

55Y 0N 13A

**SP4**

* Do you support to add the following rules to the SFD:
	+ An HE STA may enter the Doze state until the end of an HE SU PPDU if:
		- the value of the PPDU’s BSS COLOR field is equal to the BSS COLOR of its BSS, and
		- the value of the UL/DL Flag field indicates that the frame is uplink

55Y 0N 10A

* 1. **d**

**Tuesday, Sept 14th, 2015, AM2 TGax Session (10:30-12:30)**

1. **Meeting called to order by Jianhan Liu (Mediatek) at 10:30.**
	1. The agenda is contained in 11-15/1125r3 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. Call Meeting to order
		2. IEEE 802 and 802.11 IPR Policy and procedure.
		3. Presentations follow the order of DCN.
		4. Recess
	2. Chair asked for approval of the proposed agenda. – Agenda approved.
4. **Presentations**
	1. 11-15/1075r1 **Number of BSS Color bits**

**SP:**

**Do you support to assign 6 bits for BSS Color?**

**43Y 0N 6A**

* 1. **11-15/0579r4 preamble design and autodetection**

**SP#1**

* **Do you support to add to the SFD as below:**

11ax preamble shall have a 4us symbol repeating the L-SIG content, right after the legacy section?

* + This symbol shall be modulated by BPSK and rate ½ BCC.



**74Y 16N 5A**

**SP#2**

* **Do you agree to insert the following in SFD:**
	+ In L-SIG, the L-LENGTH field is set to a value not divisible by 3.
	+ The value of L\_LENGTH mod 3 will be used for signaling of one bit of TBD information.

**71Y 12N 4A**

* 1. **11-15/0823r3 Preamble Design and Auto-Detection for 11ax**

**SP#1**

* **Do you support the following?**

HE PPDU is with a separately encoded signature symbol immediately after L-SIG. The bitwidth of the signature in the signature symbol is TBD.

Withdrawn

* 1. **11-15/1068r1 Reliable Dual Sub-Carrier Modulations (DCM) for HE-SIG-B and Data**

Quantenna: every bit is transmitted on two subcarriers?

A: yes

Quantenna: you can only carry half of data?

A: modulation is up, so data rate is the same

Quantenna: so you are comparing BPSK w/ QPSK?

A: yes, same data rate

Interdigital: how to separate the repetition?

A: k and k+N/2, simplest

Interdigital: compliant with OFDMA?

A: N is the RU size then

Interdigital: if you know where the interference will be, use it to separate bits

A: fixed separation is simulated.

Newracom: what is used on BPSK?

A: it is like MCS10 in 11ah, half data rate with 3dB gain

Newracom: interleaver?

A: no new interleaver design

Marvell: it is equivalent to interleave before or after interleaver.

A: it is TBD how to handle interleaver. Here we are proposing high level concept

**SP#1**

* **Do you agree to add dual sub-carrier modulations (DCM) as optional modulation schemes for HE-SIGB and Payload to 11ax SFD?**
	+ Dual sub-carrier modulation (DCM) are only applied to BPSK, QPSK and 16QAM modulations.

**66Y 1N 15A**

**SP#2**

* **Do you agree to add one bit DCM indication in HE-SIGA to 11ax SFD?**

**64Y 1N 12A**

* 1. **11-15/0826r2 HE-SIG-A transmission for range extension**

Interdigital: why HESIGA RE performance is different with RLSIG?

A: different number of bits.

**SP#1**

* **Do you support that HE-SIG-A have a repetition mode for range extension?**
	+ In the repetition mode, HE-SIG-A symbols are repeated once in time. The bit interleaver is bypassed in the repeated HE-SIG-A symbols?
	+ The repetition mode is indicated before HE-SIG-A.

**68Y 0N 15A**

* 1. **11-15/1091r0 Considerations on Range Extension with SIG-A Repetition**

**No discussions**

* 1. **11-15/0602r5**

**SP1**

* **Do you agree to add to TGax Specification Framework Document?**
	+ The HE-LTF sequences for UL MU-MIMO shall be generated as follows. For each stream, a common sequence shall be masked repeatedly in a piece-wise manner by a distinct row of an 8x8 orthogonal matrix. When the length of the LTF sequence is not divisible by 8, the last M elements of the LTF sequence (M being the remainder after the division of LTF length by 8) shall be masked by the first M elements of the orthogonal matrix row.

**59Y 1N 12A**

**SP2**

* **Do you agree to add to TGax Specification Framework Document?**
	+ The orthogonal matrix used to mask the HE-LTF sequence in SP1 is the 8x8 Pmatrix used in 11ac.

**Wednesday, Sept 16th, 2015, PM1 TGax Session (13:30-15:30)**

1. **Meeting called to order by Jianhan Liu (Mediatek) at 13:35.**
	1. The agenda is contained in 11-15/1125r1 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. Call Meeting to order
		2. IEEE 802 and 802.11 IPR Policy and procedure.
		3. Presentations follow the order of DCN.
		4. Recess
	2. Chair asked for approval of the proposed agenda. – Agenda approved.
4. **Presentations**
	1. **11-15/1088r0 LTF Design for Uplink MU-MIMO**

**Discussions:**

Qinghua: ZF filtering only replies on CSD values or also related to CSI?

A: Only knows CSD values for simple receiver

Bin: For your time domain processing, do you apply windowing?

A: No

**SP**

* **Do you agree add the following statement to SFD:**
	+ CSD parameters, that result in per-stream orthogonality within a HE-LTF OFDM symbol, shall be used in HE-LTF of uplink MU-MIMO transmission.

16Y 5N many ABS

* 1. **11-15/1089r0 Considerations on PHY Padding and Packet Extension in 11ax**

Hongyuan: STBC is used for Nss=1~2 and won’t be the bottleneck. LDPC with Nss>2 will be.

A: different vendors have different design target.

* 1. **11-15/0810** HE PHY Padding and Packet Extension

Daewon: determine alpha value by tx parameters

A: yes

Daewon: then receiver iteratively compute alpha and PE by PPDU length

A: it is not a concern

* **Do you agree to add the following text into Section 3.4 HE Data Field of the current SFD:**
	+ An 11ax SU  PPDU should apply the MAC/PHY pre-FEC padding scheme as in 11ac, to pad toward the nearest of the four possible boundaries (“*a*” factor) in the last Data OFDM symbol(s), and then use post-FEC padding bits to fill up the last OFDM symbol(s).
		- Packet Extension (PE) field is defined at the end of 11ax PPDUs.
		- PE should have the same average power as data field.

**73Y 0N 17A**

* **Do you agree to add the following text into SFD:**
	+ 11ax shall define the max packet extension modes of 8µs and 16µs, correspond to the short symbol segment padding boundaries (“*a-*factor”) according to the following PE duration (*TPE*) values:
		- Max packet extension mode 8 µs: *TPE* = [0 0 4 8] µs for *a = 1~4* respectively;
		- Max packet extension mode 16 µs: *TPE* = [4 8 12 16] µs for *a = 1~4* respectively.
	+ HE Capability field shall define two constellation level thresholds (*threshold16* and *threshold8*) for a given {NSS, BW} combination, to determine if and when max packet extension modes 8 µs and 16 µs are applied, i.e.
		- 3 bits are used to specify each threshold as the table below.
		- If constellation ≥ *threshold16* apply max PE 16 µs mode, else if constellation ≥ *threshold8* apply max PE 8 µs mode, else no packet extension.
		- If no PE is required for all constellations both *threshold8*and *threshold16*are set to 111
		- If only max PE 8 µs mode is required, set *threshold16* to be 111, and *threshold8* to be the constellation at which max PE 8 µs mode starts
		- If only max PE 16µs mode is required, set *threshold16* to be the constellation at which max PE 16µs mode starts, and *threshold8* to be 111
		- When ≥80 MHz is supported, no thresholds are defined for RU size less than or equal to 242 tones (20 MHz); otherwise, thresholds are defined down to a TBD RU size.

Daewon: now we have mulitiple mode?

A: yes, different than 11ac with 1 mode.

68Y 13N 5A

* **Do you agree to add the following text into SFD:**
	+ The number of uncoded bits for each of the first 3 short symbol segments (a=1~3) equals to the number of uncoded bits corresponding to *NSD.short* subcarriers as specified by the following table, and the number of uncoded bits for the last short symbol segment (a=4) equals to the number of bits of the whole OFDM symbol subtracting the total number of uncoded bits of the first three short symbol segments.



71Y 0N 15A

* **Do you agree to add the following text (this page and next page) into SFD:**
	+ HE-SIG-A field contains a “*a-factor*” field of 2 bits, and a “PE-Disambiguity” field of 1 bit, with setting methods as blow:
	+ In L-SIG, the L-LENGTH field is set by:





* + In HE-SIG-A:
	+ *a-factor* field:



72Y 0N 15A



71Y 0N 15A

* **Do you agree to add the following text into SFD:**
	+ When the AP transmits DL-MU packets:
		- All users use the same *NSYM* and *a-factor* values according to the user with the longest span.
		- Based on *a-factor* value and each user’s PE capabilities, compute the PE duration for each user *TPE,u*, and the PE duration of the whole DL-MU PPDU is *TPE* = maxu(*TPE,u*).
		- In HE-SIG-A field, the “a-factor” field, the “PE Disambiguity” field, and the “LDPC extra symbol” field, are common for all users.

72Y 0N 15A

* **Do you agree to add the following text into SFD:**
	+ For UL-MU packet transmission:
		- AP indicates its desired *Nsym*, *a-factor,* LDPC Extra Symbol indicationand *PE* duration values in trigger frame.
		- Possible PE values for UL-MU are TBD.
		- Each user when transmitting the UL-MU PPDU, shall encode and conduct PHY padding using the parameters:
		- *NSYM* as indicated in the trigger frame;
		- *a-factor* as indicated in the trigger frame;
		- LDPC Extra Symbol as indicated in the trigger frame;
		- Append PE specified in the trigger frame.

Pass Unanimously

* 1. **11-15/0853r3 Extensible Preamble Format Design**

No discussions

* 1. **11-15/1092 Support of 1x/2x/4x OFDM Symbol in HE SU PPDU**

No discussions

* 1. **11-15/1119 Discussions on HE SIG-A Structure**

Jianhan: pilot tones are the same?

A: TBD

**SP:**

* **Do you agree the following?**
	+ Information bits in HE-SIG-A are jointly encoded as in VHT-SIG-A (using 52 tones) with additional pilots on subcarriers of {±27, ±28} before HE-SIG-A symbols.

**7Y 0N many ABS**

* 1. **11-15/1106r1 SIGB structure**

Jianhan: need to indicate the mode

A: yes, in SIGA if per PPDU change.

Ron: why no need for immunity to interference?

A: no much OBSS interference in many scenarios

HW: 1/2/1/2/ have diversity gain.

* **Do you agree to modify the following in 11ax SFD:**

HE-SIG-B is encoded on a per 20 MHz or 40 MHz basis using BCC with common and user blocks separated in the bit domain

For bandwidths ≥ 40 MHz, the number of 20 MHz or 40 MHz subbands carrying different content is two and with structure as shown below. Each square in the figure represents 20 MHz (left) or 40MHz (right) subband and 1/2 represents different signaling information. The method to indicate 20MHz or 40MHz basis is TBD.



**1**

**2**

**80 MHz**

**1**

**2**

**160 MHz**

**1**

**2**

**15Y 27N 22ABS**

* 1. 11-15/1066r0 HE-SIGB contents

Continue the deferred SP.

**SP#1**

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

The RU allocation signaling in the common field of HE-SIG-B signals an 8 bit  per 20MHz PPDU BW for signaling

* + The RU arrangement in frequency domain
	+ Number of MU-MIMO allocations: The RUs allocated for MU-MIMO and the number of users in the MU-MIMO allocations.

 The exact mapping of the 8 bit to the RU arrangement and the number of MU-MIMO allocations is TBD.

Signaling for the center 26 unit in 80MHz is TBD

**56Y 0N 14A**

**SP#3**

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

The length of the user specific subfield in HE-SIG-B for a single-user allocation is equal to the length of the user specific subfield of each user in a multi-user allocation.

**54Y 0N 14A**