IEEE P802.11  
Wireless LANs

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| Minutes for 11be PHY ad-hoc sessions November 2019,  Waikoloa, HI | | | | |
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Abstract

This document contains the meeting minutes of the IEEE 802.11be PHY ad-hoc sessions held during the November 2019 interim meeting.

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# Session 1: Monday November 11, AM1

## Introduction

1. The Chair calls the meeting to order at 08:00 AM. The agenda is found in submission 2002.

2. The Chair reminds about attendance and recaps the ad-hoc procedures.

3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.

## Straw Polls

First order of business is to run straw polls from selected submissions that were presented during conference calls, but for which the SPs were deferred to the F2F meeting.

### 1066R1 Tone Plan Discussion

SP#2 (from 1066)

• Do you agree to add the following text to the TGbe SFD?

– 11be supports 240 MHz and 160+80 MHz transmission

Whether 240 / 160+80 MHz is formed by 80MHz channel puncturing of 320 / 160+160 MHz is TBD

Result: Y/N/A: 25/0/10

SP#4 (from 1066)

• Do you agree to add the following text to the TGbe SFD?

– For the OFDMA tone plan in 240MHz and 160+80MHz, 11ax 80MHz tone plan is duplicated three times

One of the participants points out that they still have a submission pending with a similar proposal and asks to defer the SP until after the presentation of that submission.

SP is deferred

### 1190R2 Improved Preamble Puncturing in 802.11be

SP#1 from 1190 is discussed. There are some questions on the details of the puncturing mechanism. Is it the same as 11ax? The presenter clarifies that this is a question about the principle of puncturing and that details can be discussed further. The wording in 1190R2 is modified somewhat as a result of the discussion. The following is the final text:

• Do you support to have preamble puncture mechanism for EHT PPDU transmitted to multiple STAs? (Puncturing resolution is TBD)

Result: Y/N/A: 32/0/9

SP#2 from 1190:

• Do you support to have preamble puncture mechanism for EHT PPDU transmitted to a single STA?

It is noted that for SU, the preamble will not just be preamble puncturing. The SP is run as is.

Result: Y/N/A:19/0/14

### 1486R2 Further discussion for 11be preamble

The following SP is proposed:

• Do you agree to incorporate the following text into the 11be SFD?

The LENGTH field value in L-SIG set to mod3 = 0

At least one participant asks for the SP to be deferred to first allow for other similar submissions to be presented.

The SP is deferred

The following SP is then proposed for a vote:

• Do you agree to add the following text into the 11be SFD?

– The fixed information bits (e.g., PHY identifier) indicating the PPDU version (e.g., 11be and future generation) are included in EHT-SIG field of 11be PPDU?

Several people comment on the fact that the SP is not sufficiently clear. For instance, “EHT-SIG”, “fixed information bits” and “future generation” are all felt to be too vague. There are various attempts to wordsmith the SP, but ultimately the SP is deferred.

The SP is deferred

## Presentation of submissions

### 1314r3 Revisit Tone Plan

This submission proposes an alternative tone plan that is more compatible with 20MHz-only STAs. It is proposed that 11be must define mandatory modes that basically enable any STA to participate in any OFDMA transmission.

Discussion

Can support of multiple RUs help with this issue? The presenter believes that this will not resolve the problem with 20 MHz-only.

The comment is made that the 11ax tone plan is not ideal but involves compromises and constraints. It may not be a good idea to introduce a new tone plan for 11be. The 11ax tone plan will not go away and will have to be implemented anyway.

There is some disagreement with the idea of introducing new RU sizes.

Another comment is that the current tone plan is elegant in terms of 80 MHz. 11be is about wider BWs, so maybe 20 MHz-only STAs should upgrade to 40 MHz as well? The presenter believes that 20 MHz will remain, even in EHT.

The following SP is proposed:

Do you support that:

• Whatever a STA’s capability

• Whatever a STA’s power saving mode

• Whatever subchannel the STA is parked on (P20 or another via SST or similar)

• Whatever is the EHTMU or EHTTB transmission bandwidth determined by the AP

• Whatever subchannels need to be punctured

• … the 802.11be PHY must define mandatory modes of operation that enable the STA to participate in the transmission?

Several people feel that this is too generic and vague to vote on.

SP withdrawn

### 1487r1 11be tone plan

There are no agreements yet for the 320 MHz and 240 MHz non-OFDMA tone plan. This submission proposes a “harmonized tone plan”. Null tones between 80 MHz segments are replaced with new 26-tone RUs. The plan can be used for both OFDMA and non-OFDMA mode.

SP deferred until other presentations on the topic are presented.

### 1492 Non-OFDMA Tone Plan for 320MHz

A non-OFDMA tone plan is proposed that is consistent with 320 and 160+160. It is built with repeated 160 MHz segments.

Discussion

One commenter believes using repeated 160 MHz segments is the right direction but disagrees with redefining the 160 MHz structure compared to 11ax.

Another question is how to define the 240 MHz tone plan. This is the subject of another submission.

SP#1

• Do you agree to add the following to the TGbe SFD?

– A 160MHz tone plan is duplicated for the Non-OFDMA tone plan of 320/160+160 MHz PPDU

The 160MHz tone plan is TBD

Result: Y/N/A: 26/1/14

SP#2

• Do you agree to add the following to the TGbe SFD?

– 12 and 11 null tones are used at the left and right edges in each 160MHz segment for the Non-OFDMA tone plan of 320/160+160 MHz PPDU

There is some confusion about the meaning of the words “are used”, so the SP is modified as follows:

– 12 and 11 null tones are placed at the left and right edges in each 160MHz segment for the Non-OFDMA tone plan of 320/160+160 MHz PPDU

Result: Y/N/A: 25/2/8

## Adjourn

Meeting is adjourned at 10:00 AM

# Session 2: Monday November 11, Evening

## Introduction

1. The Chair calls the meeting to order at 7:30 PM. The agenda is found in submission 2002.

2. The chair explains that submissions will be grouped by topic to see if progress can be made. The focus of this session will be tone plans and preamble.

## Presentation of submissions

### 1521 Further Thoughts on 11be Tone Plan

This submission reviews some of the supported SPs to date on tone plans. It further discusses the tone plan for 320/160+160MHz Non-OFDMA and 240/160+80 MHz. For 160+160MHz PPDU, it is desirable that each 160MHz segment reuses the same tone plan as the 160 MHz PPDU. Also, For 320MHz PPDU, it is desirable to have the same tone plan as in the 160 + 160MHz case.

It is recommended that the tone plan of 240/160+80 consists of 3x 80MHz where each 80MHz segment is the same as in HE80.

Discussion

Q: Prefer more efficient 160 MHz definition. For 240 MHz transmissions, should PPDU have 240 MHz BW indication or is it a punctured case?

A: two possible ways to indicate BW (240 MHz Bw or 320 MHs with 80 MHz punctured). How exactly needs to be discussed.

SP#4:

• Do you support in 11be the 320/160+160 MHz non-OFDMA tone plan uses duplicated HE160?

Note: puncturing design TBD.

Q: can we add that usage of DC and guard tones is TBD?

A: this means using a different tone plan for non-OFDMA, not consistent with SP.

Y/N/A: 33/9/9

The presenter proposes to run another modified version of the previous SP:

SP#4a

• Do you support in 11be the 320/160+160 MHz non-OFDMA tone plan uses duplicated HE160?

Note: puncturing design TBD.

The usage of null tones between 80 MHz segments TBD

Q: in each 80 MHz there are 5 DC tones.

C: this looks contradictory

C: implies you may have two tone plans.

SP withdrawn

SP#5

• Do you agree with in 11be the tone plan of 240/160+80 consists of 3x 80MHz while each 80MHz segment is the same as HE80 in 11ax?

Q: will there be 240 MHz channelization as well?

A: need to think about it. Needs further discussion. Some people want 240 MHz PPDU, others want through puncturing.

Q: for both OFDMA and non-OFDMA?

A: yes

Q: we already have multiple RU, so can be done already for OFDMA.

A: is it PPDU BW or punctured mode? Change wording of SP to avoid word “tone plan”

The SP is modified as follows:

SP#5

• Do you agree with in 11be the 240/160+80 consists of 3x 80MHz while each 80MHz segment is the same as HE80 in 11ax?

Y/N/A: 27/0/16

### 1189 Discussion on 240MHz Bandwidth

Submission proposes that 11be supports 240 / 160+80 MHz transmission using three 80 MHz channels. 240 / 160+80 MHz can be formed by 80MHz preamble puncturing in the 320 / 160+160 MHz bandwidth. Tone plan is discussed. For a simple implementation, 11ax 80MHz tone plan can be repeated three times for both OFDMA and non-OFMDA tone plans.

Bandwidth indication can be done in several ways: entire BW, multiple RU, puncturing case. For SU, puncturing needs to be indicated in BW field. Details on possible BW indication.

C: How is BW indication done? For320 MHz puncturing there are many different options. BW coding: need more time to look at all supported PPDU BWs.

Q: Could there be cases that have two 80 MHz punctured?

A: is possible

Q: intention is to use BW to signal all cases? Like 80+80.

A: may need more than 3 bits. Further discussion needed.

Q: 160+80 could have many different options.

C: 160+80 could be internally separated by any number of MHz. How to deal with that? Not every 160+80 can be seen as punctured 320 MHz.

SP#1

• Do you agree to add the following text to the TGbe SFD?

– 11be supports 240 MHz and 160+80 MHz transmission

240 / 160+80 MHz bandwidth is constructed from three 80MHz channels which include primary 80MHz

Q: main difference with previous SP is including the primary 80?

A: Yes.

Results: Y/N/A: 24/0/19

Chair asks if there are additional SPs on the topic of tone plans. There appear to be n further submissions. The remainder of the session focuses on preamble design.

### 1497 Auto-detection in 11be

This considers the signature symbol to classify between legacy PPDU and 11be format. Signature symbol contains signature sequence. Simulation results are presented.

Q: about simulation results. P\_miss worse than RL\_SIG detection. This could become bottleneck.

A: This may be one corner case.

Q: Are more signature bits needed? P\_miss should not be worse than RL-SIG.

Q: You have to make sure that n0 possible combination of HE-SIG-A bits can collide with signature sequence.

Q: how many bits in signature sequence?

No SP

### 1516 11be Preamble Structure

General discussion of preamble structure. Use same structure as 11ax. A Pre-Sig field is added before EHT-preamble and after RL-SIG. The Pre-SIG has fixed structure starting with 11be. Example of content of Pre-Sig is presented. Propose to use 2 symbols for Pre-sig. Auto-detection reuses the RL-SIG. Additionally, use either LENGTH field or masked RL-SIG to help with auto-detect.

Q: masking of RL-SIG. Not sure extra correlator needed.

Q: When can the PPDU version be identified? Looks like it is only known after second symbol of Pre-Sig. Should be possible to decode something from just the first symbol.

A: don’t think there is an issue with buffering.

C: Pre-Sig is tax on every PPDU. Making it shorter would be better.

SP#1

Do you agree that the L-STF, L-LTF, L-SIG and RL-SIG fields in the 11be PPDU are the same as the L-STF, L-LTF, L-SIG and RL-SIG fields in the 11ax PPDU?

C: similar SP already passed, but motion didn’t.

SP skipped

SP#2

Do you agree to add the Pre-SIG field after the RL-SIG field?

Note 1: The contents of the Pre-SIG are TBD.

Note 2: The functions of the Pre-SIG field include but not limited to the ones listed in page 6 (Future proof, and cross-wifi coexistence).

Note 3: The EHT preamble follows the Pre-SIG field.

Q: request SP after later presentation. There are similar SPs in other submissions as well.

SP deferred until all relevant submissions are presented.

## Adjourn

Meeting is adjourned at 9:20 PM.

# Session 3: Tuesday November 11, PM1

## Introduction

1. The Chair calls the meeting to order at 1:30 PM. The agenda is found in submission 2002R2.

## Presentations

### 1519 Forward Compatibility for WiFi Preamble Design

It is proposed to bring future compatibility to WiFi preambles starting with 802.11be. This should solve auto-detection for all future Wi-Fi generations. Richer Co-ex info (e.g. color) is currently not understood by previous generations. Concept of “universal fields” is introduced. Preamble structure needs to be fixed for future generations (“Pre-Sig”). Pre-Sig has universal fields at fixed locations (independent of version of the standard). Candidates for universal fields are PHY format identifier, TXOP duration, Color, … A length of two symbols is suggested for the Pre-Sig field. Pre-sig may contain both universal and version dependent fields.

Discussion

Q: terminology – should we call it Pre-Sig?

A: not hung up on terminology. Just avoid using “EHT” to describe it.

Q: how many bits for universal fields?

A: currently about 17 bits. We have up to 42 available. Boundary could move as Wi-Fi evolves.

Q: universal Sig may be better name. Sig fields are a universal tax. Like to keep it as small as possible. Reuse across generations is fine. We could consider non-1/2 rate codes to fit bits into single symbol. Would there be cases with more than 27 bits?

A: some pieces of information may be useful, e.g. BW. Will not stop at exactly 27 bits. Bits are not wasted since they can be shared with version-specific bits.

Q: suggests Color>6 bits.

A: there has been discussion in the MAC proposing this. Exact numbers left up for discussion.

Q: Pre-Sig should allow to extract standard version ASAP. One symbol may be better than two.

A: one symbol may not be enough for all cases.

Q: with one symbol, more freedom to design preamble following Pre-Sig (e.g. using higher MCS)

A: if MCS is signaled in Pre-Sig, one symbol definitely not enough.

Q: given that color, … are already in 11ax, are we better of the reuse HE fields and fill them up with other needed bits?

A: it’s a possibility. Detecting the packet as 11ax may have unintended consequences for existing 11ax devices.

Q: where is PPDU type to be allocated?

A: in version-dependent section part of Pre-Sig.

SP#1

* **Do you agree with introducing “universal fields” in the EHT preamble ?**
  + The intent of the *universal fields* is to allow for certain “version independent” content for better co-existence among future 802.11 generations
  + The exact field definition, location and number of bits are TBD

Deferred until all presentations on the topic are done

## 1540r2 EHT Preamble Design

Propose to advance the preamble design philosophy to support a unified structure enabling future coexistence and simple PPDU format detection. From EHT on, limit complexity for auto-detection. High-level structure contains “Common Sig” between RL-SIG and EHT SIG. Static bits are common across generations, signaling co-existence bits. EHT-SIG contains other PPDU decoding related information, MU info, … Common Sig combines both version-independent bits and version-dependent bits.  
Unified two-step PPDU format signaling for EHT and beyond: (1) implicit signaling indicating PPDU is EHT or beyond (2) explicit signaling using bits in common Sig.

Q: Why is proposed mechanism called “mature”. 11ax has different criterion?

A: only difference is LENGTH%3 value, so very similar to 11ax.

Q: intention is to use LENGTH field to identify format. It limits LENGTH field, equivalent to losing a signaling bit. Maybe use other features like phase rotation, masked RL-SIG, … can be used

A: this is simplest mechanism. No changes needed compared to 11ax. Other mechanisms need more changes. This first step only needs one bit of information. Trying to signal more bits may not be very clean.

SP#1

**Do you agree to add the following to 11be SFD?**

* The next SIG field following the BPSK symbol after LSIG, is modulated on 20MHz basis.
  + The number of symbols is TBD
  + The SIG field name is TBD
  + The content of the SIG field is TBD

Q: can we make it more general. Defer SP becauseit does not constrict location of 20 MHz SIG part. Upcoming presentation conflicts with proposal.

Deferred

## 1569r1 Preamble Design Consideration for 11be follow-up

Previously, a common header field immediately following the RL-SIG, were proposed. The question was asked how 11ax would behave when receiving this. 11ax standard behavior is reviewed. Observations: 11ax PHY reports TXOP\_DURATION, BSS\_COLOR to the MAC layer when HE-SIG-A CRC is valid, independent of a reserved/non-reserved HE-SIG-A indication. Using this, an 11ax+ PPDU can be received by 11ax receiver as an UL MU PPDU (L\_LENGTH%3==2, EHT-SIG-A2 BPSK), with an HE-SIG-A reserved indication. Remaining bits can be used for 11be signaling.

Q: reuse everything up to HE-SIG-A. For SU format, need more signaling bits after HE-SIG-A2.

A: don’t know the features of PPDU yet.

Q: your design reuses HE-SIG-A. Rest of the bits need to be fit in. May need another symbol.

A: Slide 12 shows bits that can be reused. Reused bits are put in places where 11ax can understand them.

Q: TXOP and BSS color can not be expanded with this proposal.

A: additional bits could be added.

Q: coexistence is a good point, but standard text was added at late stage. Receive procedure is just for information to the implementation. Real systems may not follow this.

A: that’s why UL flag is set. 11ax knows this PPDU is not intended for its receiver.

Q: some products may not follow this and already use reserved bits in different ways.

A: will work for compliant 11ax. For others looks like UL 11ax PPDU.

Q: there were always devices that didn’t follow the standard. The effect of disrupting devices is great. We always respected existing devices, even if non-compliant.

## 1870 Further Ideas on EHT Preamble Design

This contribution contains further thoughts on preamble design for EHT, namely Pre-SIG Contents and High-Level SIG field structure for EHT (see also 1519). Propose to include the following version-independent fields: Version identifier: 3 bits, PPDU BW and puncturing information: TBD bits, UL/DL: 1 bit, TXOP: >=7 bits, BSS color: >=6 bits. PPDU type will be carried as version-dependent field.  
For EHT SIG design, reuse SIG-B principles as much as possible. For TB PPDU, there are a lot of free bits to accommodate any new fields of EHT.

Q: size of BSS color and TXOP may need to be increased. This may depend on version.

A: should stay constant for a few versions of Wi-Fi. Don’t see putting a field that only applies to EHT. If we expect expansion, we should do it now.

Q: you mentioned unify MU and SU format. Do we still need common and per-user information in that case?

A: we can discuss later.

Q: you include BW in Pre-Sig. Is there an issue if it is included in the next symbol instead?

A: Version independent may be better as it gives info on medium utilization.

Q: like more discussion on what bits should go in version independent part of Pre-Sig.

A: no need to make it one symbol, since any “remainder” is used by version-dependent bits.

Q: For range extension mode, will Pre-Sig be longer.

A: Probably but need for extended range in EHT need to be discussed.

## Adjourn

Meeting is adjourned at 3:30 PM

# Session 4: Tuesday November 11, Evening

## Introduction

1. The Chair calls the meeting to order at 7:30 PM. The agenda is found in submission 2002r2.

## Presentations

### 1874 11be preamble autodetection follow-up

This contribution addresses the comments received on 1511. An enhancement to the previous proposal is presented. Simulations are run to assess the performance of the scheme. The performance gap between 11ax and the proposed scheme is not significant in both indoor and outdoor channels.

### 1883 802.11be Preamble and Auto-Detection Analysis and Comparison

Follow-up of prior proposal based on masked RL-SIG. Performance of three options is compared. Content of “SIG1” is also discussed. The goal is to allow the receiver to detect PPDU/standard version as early as possible.

Q: false detection of 11ba shows 100% false detection. CRC check done later will allow detection.

A: this will only happen 2 symbols after RL-SIG. Not clean separation.

C: issues with Option 0 can be resolved.

Q: option 1: only difference from 11ac is LENGTH%3?

A: trying to spoof 11ac.

Q: Some implementations may not check LENGTH and go into weird behavior.

A: 11ac devices do not have to do differentiation. If LENGTH is not checked, it will be detected as 11ac by 11ac device.

Q: Option 2 looks fairly “ugly”. Single symbol SIG1 may not carry enough bits for the universal fields. Option 0 issue with 11ba may still be fixed in 11ba comment resolution.

A: storing SIG1 is feasible. Believe that option1 is better than option 2. If one symbol is not enough, an extra symbol can be added later. Unlikely that 11ba can still change.

Q: we can reduce miss prob in Option 0 by using information bits.

A: this may be very late in the preamble processing.

Q: every option includes masked RL-SIG?

A: not necessary to do masking, but provides benefits

Q: we should make preamble design simple. Autodetection is small issue. We have enough tools to do detection. We should choose one simple option.

A: agree. Option 0 is not workable. Option 1 is better.

Q: Wi-Fi needs interoperability. Devices in the field should be considered. Prefer Option 0. Safer and friendly to existing products.

A: some issues can be resolved with masked RL-SIG.

Q: Option 0 works. Really don’t want option 2. Option 1 works, but other proposals have no rotation.

A: phase comparison is preferred. It’s simpler than correlation.

*This concludes the contribution on preamble structure and autodection.*

## Preamble-related strawpolls

SP#1 (1486)

* **Do you agree to incorporate the following text into the 11be SFD?** 
  + The LENGTH field value in L-SIG set to mod3 = 0.

C: this may impact 11ax compatibility, so prefer to not make decision now

C: also affects 11ba, better to have more discussion

Results: Y/N/A: 34/13/1

SP#2 (1486)

* **Do you agree to add the following text into the 11be SFD?** 
  + 11be shall define a field which indicates standard version (e.g., 11be and future standards) in a SIG field of 11be preamble.
  + The contents of the SIG field is TBD.
  + The location and size of the SIG field is TBD.

Y/N/A: 48/0/2

SP#3 (1486)

* **Do you agree to add the following text into the 11be SFD?** 
  + The SIG field can be composed of two signal fields encoded separately in 11be.
    - This field does not include the user specific information.
    - Each field includes the CRC and Tail bits
    - The naming of both SIG1 and SIG2 is TBD.
  + The first field of the SIG field includes the information which indicates standard version.

C: premature to run this SP. This will not be true once we know all the details.

C: need further discussion

Deferred

SP#1 (1516r2)

**Do you agree that 11be keeps the RL-SIG fields (repeated L-SIG) after L-SIG?**

Y/N/A: 48/10/3

SP#2(1516r2)

**Do you agree to add a Pre-SIG field right after the RL-SIG in 11be?**

Note 1: The contents of the Pre-SIG are TBD.

Note 2: The Pre-SIG field can include but not limited to: wifi version, BSS color, etc

Note 3: name of this field is TBD

C: no need to run. Note is not clear. Someone may disagree with name. This is very unclear.

A: there is a list of the functions of this field.

C: try to summarize in better SP.

Q: “future proof”. What does this mean?

SP Deferred

SP1 (1519r1)

* **Do you agree with introducing “universal fields” in the EHT preamble ?**
  + The intent of the *universal fields* is to allow for certain “version independent” content for better co-existence among future 802.11 generations
  + The exact field definition, location and number of bits are TBD

Y/N/A: 45/0/8

SP2 (1519r1)

* **Do you agree to incorporate a *PHY format identifier field* as one of the universal fields in the EHT preamble?**
  + The intent is to simplify auto-detection for future 802.11 generations
  + Size of this field is TBD

Y/N/A: 44/0/7

SP#3 (1519r1)

* **Do you agree to have a 2 OFDM symbols, jointly encoded SIG field in the EHT preamble immediately after RL-SIG?**
  + This SIG field will have universal fields
  + Extended Range Mode is TBD
  + The name for this field can be chosen based in future based on consensus in the group

Q: Common SIG may be better name

A: Common is used elsewhere

C: need to think more about the name

Y/N/A: 41/11/3

SP#4 (1519r1)

* **Do you agree that the SIG field immediately after RL-SIG will be sent using 52 data tones and 4 pilot tones per-20MHz?**

Q: same structure as HE-SIG-A? Pilot tones?

Y/N/A: 46/0/7

SP#5

* **Do you agree that the pre-SIG field can have version dependent fields as well (for EHT)?**

Q: no definition of version dependent

A: SP1 has notion of version independent. This is the complement of that.

Y/N/A: 39/0/6

SP#2 (1540r4)

**Do you agree to add the following to 11be SFD?**

* + EHT and beyond PPDU format is classified by the following combination:
    - LENGTH%3 == 0 + RL-SIG + BPSK on next symbol

Y/N/A: 37/17/1

SP#3 (1540r5)

**Do you agree to add the following to 11be SFD?**

* + The symbol after RL-SIG is BPSK modulated

Y/N/A: 42/17/1

## Adjourn

Meeting is adjourned at 9:30 PM.

# Session 5: Wednesday November 11, PM2

## Introduction

1. The Chair calls the meeting to order at 4:00 PM. The agenda is found in submission 2002.

## Straw Polls

SP#1 (1540r5)

**Do you agree to add the following to 11be SFD?**

* + The next SIG field following RL-SIG, is modulated on 20MHz basis.
    - The number of symbols is TBD
    - The SIG field name is TBD
    - The content of the SIG field is TBD

Q: maybe already covered in previous SP. This also doesn’t talk about repetition.

A: intention of the SP is to specify repetition per 20 MHz.

C: repetition needs more discussion

Modified SP:

**Do you agree to add the following to 11be SFD?**

* + The next SIG field following RL-SIG, is modulated on 20MHz basis
  + The next SIG field is repeated per 20 MHz occupied channel
    - The number of symbols is TBD
    - The SIG field name is TBD
    - The content of the SIG field is TBD

Q: avoiding repetition would be good. Ask to defer.

SP deferred

SP#3 (1540r5)

**Do you agree to add the following to 11be SFD?**

* The “20MHz SIG” includes Version-independent bits followed by Version-dependent bits
  + Version-independent bits have static location and bit definition across different generations/PHY versions.
  + Version-dependent bits may have variable bit definition in each PHY version.

Q: still looking at 11ax compatibility. Can we defer?

A: this is a clean solution.

Y/N/A: 36/3/6

SP4 (1540r5)

**Do you agree to add the following to 11be SFD?**

* “20MHz SIG” field includes the following bits in Version-independent bits portion:
  + - BSS color, number of bits >=6bits
    - TXOP duration, number of bits >= 7bits

Q: likely to have more discussion on number of bits, can we make it TBD? Possibly smaller than 11ax.

A: will change to TBD

SP modified as follows:

**Do you agree to add the following to 11be SFD?**

* The 2 symbol SIG fields that goes immediately after RL-SIG field includes the following bits in Version-independent bits portion:
  + - BSS color, number of bits TBD
    - TXOP duration, number of bits TBD

Y/N/A: 48/1/4

SP1 (1870r2)

* **Do you agree to including the following version independent fields in the 2 symbol SIG field that goes immediately after the RL-SIG?**
  + PHY version identifier: 3 bits
  + UL/DL: 1 bit

Y/N/A: 50/0/1

SP2 (1870r2)

* **Do you agree with having a variable MCS and variable length EHT-SIG (immediately after the 2 symbol SIG that carries universal fields) in an EHT PPDU sent to multiple users**

Q: we need a name for the field that follows RL-SIG

Q: this does not cover SU PPDU

A: not if there is a separate SU format

Y/N/A: 51/0/2

SP3 (1870r2)

* **Do you agree that the EHT-SIG (immediately after the 2 symbol SIG that carries universal fields) in an EHT PPDU sent to multiple users will have a common field and user-specific field(s) ?**

Q: in 11ax, sometimes EHT-SIG-B has no common field. Sounds like there will always be a common field.

SP is modified as follows:

* **Do you agree that the EHT-SIG (immediately after the 2 symbol SIG that carries universal fields) in an EHT PPDU sent to multiple users will have a common field and user-specific field(s) ?**
  + **Special case compressed modes (e.g. full BW MU-MIMO) are TBD**

Y/N/A: 54/1/2

New SP (Bin Tian)

Do you support that the 2-symbol SIG that goes immediately after the RL-SIG is modulated in the same way as HE-SIG-A in 11ax.

* Extended Range SU is TBD

Y/N/A: 52/0/0

SP#34: SIG naming

* Universal SIG (USIG)
* Multigeneration SIG (MSIG)
* Persistent SIG (PSIG)
* Tenured SIG (TSIG)
* Meta SIG

Opt 1: 46

Opt 2: 11

Opt 3: 12

Opt 4: 1

Opt 5: 18

Field following RL-SIG will be referred to as “Universal SIG” (USIG)

## Presentations

### 1493 Phase Rotation for 320MHz

Three design options are proposed for the phase rotations of a 320 MHZ legacy preamble.

Two considerations are preamble puncturing and RF capability.

Q: maybe not specify this in the standard? Let the transmitter choose.

Q: if PAPR suffers, this could be harmful. We could include some examples.

C: it maybe helpful for RX to know phase rotations.

A: this is only for legacy preamble. For EHT we would need to specify it.

SP1 (1493r1)

* **Do you agree to add the following to the TGbe SFD?**
  + Phase rotation is applied to the legacy preamble part of EHT PPDU
    - Coefficients applied to each 20MHz channel are TBD
    - Application to the other fields is TBD

Q: this applies to all BW

A: yes

C: left to implementation has never been the case before

Y/N/A: 28/5/9

### 1556r1 Lean PHY for EHT

This contribution discusses the relevance of a so-called Lean PHY for EHT in 6 GHz. Lean means low overhead. This PHY would play a role similar to 11a in 5 GHz and is not allowed in 2.4 and 5 GHz.

Q: need to represent the data such that it shows actually system resources needed

Q: explain radio resource

Q: why only 6 GHz?

A: backwards compatibility

Q: we could just use the EHT format. This would avoid the need to define a new mode.

SP2 (1556r1)

**Do you agree that the legacy preamble may be omitted from some EHT PPDUs in 6 GHz? (The conditions that allow the removal of the legacy preamble are TBD, and the preamble format is also TBD.)**

Deferred

## Adjourn

Meeting is adjourned at 5:51PM.