

TGax March 2016 Meeting Agenda

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Authors:

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IEEE 802.11 TGax: High Efficiency WLAN Task Group

Macau

March 13-18, 2016

Chair: Osama Aboul-Magd (Huawei Technologies)

Vice Chair: Simone Merlin (Qualcomm)

Vice Chair: Ron Porat (Broadcom)

Secretary: Yasuhiko Inoue (NTT)

Technical Editor: Robert Stacey (Intel)

Meeting Protocol

- **Please announce your affiliation when you first address the group during a meeting slot**

Attendance

- <http://newton.meeting.verilan.com>

1. Register
2. Indicate attendance

Attendance, Voting & Document Status

- Make sure your badges are correct
- If you plan to make a submission be sure it does not contain company logos or advertising
- Questions on Voting status, Ballot pool, Access to Reflector, Documentation, member' s area
 - see Jon Rosdahl – jrosdahl@ieee.org
- Cell Phones Silent or Off

Patent Policy

- **Following 5 slides**

Instructions for the WG Chair

The IEEE-SA strongly recommends that at each WG meeting the chair or a designee:

- Show slides #1 through #4 of this presentation
- Advise the WG attendees that:
 - The IEEE's patent policy is described in Clause 6 of the *IEEE-SA Standards Board Bylaws*;
 - Early identification of patent claims which may be essential for the use of standards under development is strongly encouraged;
 - There may be Essential Patent Claims of which the IEEE is not aware. Additionally, neither the IEEE, the WG, nor the WG chair can ensure the accuracy or completeness of any assurance or whether any such assurance is, in fact, of a Patent Claim that is essential for the use of the standard under development.
- **Instruct the WG Secretary to record in the minutes of the relevant WG meeting:**
 - That the foregoing information was provided and that slides 1 through 4 (and this slide 0, if applicable) were shown;
 - That the chair or designee provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or the holder of patent claim(s)/patent application claim(s) of which the participant is personally aware and that may be essential for the use of that standard
 - Any responses that were given, specifically the patent claim(s)/patent application claim(s) and/or the holder of the patent claim(s)/patent application claim(s) that were identified (if any) and by whom.
- The WG Chair shall ensure that a request is made to any identified holders of potential essential patent claim(s) to complete and submit a Letter of Assurance.
- It is recommended that the WG chair review the guidance in *IEEE-SA Standards Board Operations Manual* 6.3.5 and in FAQs 14 and 15 on inclusion of potential Essential Patent Claims by incorporation or by reference.

Note: **WG** includes Working Groups, Task Groups, and other standards-developing committees with a PAR approved by the IEEE-SA Standards Board.

Participants, Patents, and Duty to Inform

All participants in this meeting have certain obligations under the IEEE-SA Patent Policy.

- Participants [Note: Quoted text excerpted from IEEE-SA Standards Board Bylaws subclause 6.2]:
 - “Shall inform the IEEE (or cause the IEEE to be informed)” of the identity of each “holder of any potential Essential Patent Claims of which they are personally aware” if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents
 - “Should inform the IEEE (or cause the IEEE to be informed)” of the identity of “any other holders of potential Essential Patent Claims” (that is, third parties that are not affiliated with the participant, with the participant’s employer, or with anyone else that the participant is from or otherwise represents)
- The above does not apply if the patent claim is already the subject of an Accepted Letter of Assurance that applies to the proposed standard(s) under consideration by this group
- Early identification of holders of potential Essential Patent Claims is strongly encouraged
- No duty to perform a patent search

Patent Related Links

All participants should be familiar with their obligations under the IEEE-SA Policies & Procedures for standards development.

Patent Policy is stated in these sources:

IEEE-SA Standards Boards Bylaws

<http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6>

IEEE-SA Standards Board Operations Manual

<http://standards.ieee.org/develop/policies/opman/sect6.html#6.3>

Material about the patent policy is available at

<http://standards.ieee.org/about/sasb/patcom/materials.html>

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit <http://standards.ieee.org/about/sasb/patcom/index.html>

This slide set is available at
<https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.ppt>

Call for Potentially Essential Patents

- If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance:
 - Either speak up now or
 - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible or
 - Cause an LOA to be submitted

Other Guidelines for IEEE WG Meetings

- **All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.**
 - **Don't discuss the interpretation, validity, or essentiality of patents/patent claims.**
 - **Don't discuss specific license rates, terms, or conditions.**
 - Relative costs, including licensing costs of essential patent claims, of different technical approaches may be discussed in standards development meetings.
 - Technical considerations remain primary focus
 - **Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.**
 - **Don't discuss the status or substance of ongoing or threatened litigation.**
 - **Don't be silent if inappropriate topics are discussed ... do formally object.**

See *IEEE-SA Standards Board Operations Manual*, clause 5.3.10 and “Promoting Competition and Innovation: What You Need to Know about the IEEE Standards Association's Antitrust and Competition Policy” for more details.

Agenda Items for the Week

- **Approve TG and Telecons minutes since January meeting.**
- **Continue to advance task group documents.**
 - Simulation Scenarios
 - Evaluation Methodology
 - Channel Model
 - Function Requirements
 - Specification Framework
- **Ad Hoc group meetings**
- **Technical Presentations and related straw polls and/or motions**
- **Approve draft D0.1 and start a comment collection process.**
- **Schedule Telecon times.**

General Flow of the Meeting

- **Monday March 14, 13:30 – 15:30**
 - Call Meeting to order
 - IEEE 802 and 802.11 IPR Policy and procedure.
 - Review from November 2014 meeting
 - Call for submissions
 - Agenda setting and approval
 - TG Motions
 - Presentations
 - Recess
- **Monday March 14, 19:30 – 21:30**
 - Ad Hoc Group Meetings
- **Tuesday March 15, 10:30 – 12:30**
 - Ad Hoc Group Meetings
- **Tuesday March 15, 16:00 – 18:00**
 - Ad Hoc Group Meetings
- **Tuesday March 15, 19:30 – 21:30**
 - Call Meeting to order
 - IEEE 802 and 802.11 IPR Policy and procedure.
 - Presentations
 - Recess
- **Wednesday March 16, 13:30 – 15:30**
 - Ad Hoc Group Meetings
- **Wednesday March 16, 16:00 – 18:00**
 - Ad Hoc Group Meetings
- **Thursday March 17, 10:30 – 12:30**
 - Call Meeting to order
 - IEEE 802 and 802.11 IPR Policy and procedure.
 - Presentations
 - TG Motions
 - Recess
- **Thursday March 17, 16:00 – 18:00**
 - Call Meeting to order
 - IEEE 802 and 802.11 IPR Policy and procedure.
 - Presentations
 - TG Motions
 - Goals for May 2016
 - Telecon Schedule
 - Adjourn

TGax Schedule in a Glance

	Monday		Tuesday		Wednesday		Thursday
AM1							
AM2			PHY	MAC			TGax
PM1	TGax				PHY	MAC	
PM2			SR	MAC	MAC	MU	TGax
EVE	SR	MU	TGax				

Submissions (PHY)

DCN	Title	Author	Ad Hoc
11-16/0319	I-Q Decoupled OFDM: A Solution To I/Q Imbalance	Shouxing Simon Qu	PHY
11-16/0335	HE-STF sequences for 160/80+80MHz	Eunsung Park	PHY
11-16/0343	Spectral Mask Discussion	Hongyuan Zhang	PHY
11-16/0344	PHY Padding Related Issues	Hongyuan Zhang	PHY
11-15/1354r2	SIGA fields and Bitwidths	Ron Porat	PHY
11-16/0346	11ax Pilot Sequence	Bin Tian	PHY
11-16/0349	HE-SIG-B Compression Mode	Kaushik Josiam	PHY
11-16/0367	Power Scaling of L-LTF and L-STF	Yakun Sun	PHY
11-16/0389	Sounding Design	Sriram Venkateswaran	PHY
11-16/0397	HE-SIG-B Signaling Discussions	John Son	PHY
11-16/0395	Preamble transmission for Uplink OFDMA	GanMing	PHY

Please add 11-16/0203 to the agenda.

11 Submissions

Submissions (MAC)

DCN	Title	Author	Ad Hoc
11-16/0345	Simultaneous NAK for MU GCR-BA	Jinsoo Ahn	MAC
11-16/0347	Fragmentation for MU frames-Follow up on parameters	Alfred Asterjadhri	MAC
11-16/0352	Considerations on MU initial link setup	Woojin Ahn	MAC
11-16/0353	MU-RTS/CTS for TWT Protection	Hanseul Hong	MAC
11-16/0358	maximal A-MPDU size	Liwen Chu	MAC
11-16/0359	management ack	Liwen Chu	MAC
11-16/0361	Ack Policy of UL MU frame	Jeongki Kim	MAC
11-16/0362	Multi-TID Aggregation Limit	Chittabrata Ghosh	MAC
11-16/0365	Multi-STA BA Design	Xiaofei WANG	MAC
11-16/0368	MAC padding options for legacy trigger frame	Zhou Lan	MAC
11-16/0369	M-BA aggregated trigger frame	Zhou Lan	MAC
11-16/0377	Sounding Sequences Clarifications	Simone Merlin	MAC
11-16/0378	Extended BA Bitmap	Simone Merlin	MAC
11-16/0383	RU Signaling in Trigger Frame	Yurbo Li	MAC
11-16/0404	BlockAck-Bitmap	Dengyu Qiao	MAC
11-16/0297	Results for beacon collisions	Evgeny Khorov	MAC
11-16/0399	Considerations on Trigger Frame for Random Access Procedure	Evgeny Khorov	MAC
11-16/0396	Issues on BSS Color Bits Collision	John Son	MAC

18 Submissions

Submissions (SR)

DCN	Title	Author	Ad Hoc
11-16/0212r4	Enterprise Scenario DSC and Color	Graham Smith	SR
11-16/0310	DSC Proposed Text	Graham Smith	SR
11-16/0350	Enterprise Scenario TPC and DSC	Graham Smith	SR
11-16/0360	Simulation results of spatial reuse with various MCSs	Junichi Iwatani	SR
11-16/0382	Discussion on Spatial Reuse Operations in 11ax	Yunbo Li	SR
11-16/0414	Adjustment Rules for Adaptive CCA and TPC	james Wang	SR
11-16/0403	Spatial Re-Use with Adaptive CCA and TPC Simulation	Frank HSU	SR

7 submissions

Submissions (MU)

DCN	Title	Author	Ad Hoc
11-16/0331	Power Control for Multi-User Transmission in 802.11ax	Kome Oteri	MU
11-16/0333	Issue related to unused UL OFDMA RUs	Stephane Baron	MU
11-16/0340	Random Access UL MU Resource Allocation and Indication	Leonardo Lanante	MU
11-16/0371	Further consideration for MU-RTS/CTS	Jing Ma	MU
11-16/0379	Trigger Frame Format	Simone Merlin	MU
11-16/0413	Power Control for UL MU	Arjun Bharadwaj	MU

6 submissions

Submissions (TG)

DCN	Title	Author	Ad Hoc
11-15/1095r6	OFDMA performance in llax	Suhwook Kim	TG
11-16/066r5	Views on UL-MU Features	Joonsuk Kim	TG
11-16/0355	Snapshot of Residential Use 2016	Carol Ansley	TG
11-16/0364	AID Assign Rules Based on BSS Color and HE Operation Element	Jianhan Liu	TG
11-16/0394	Achieving High Efficiency in Medium Access via Roster Mode	Sean Coffey	TG

5 Submissions

Agenda for Monday March 14, 13:30 – 15:30

- Call meeting to order
- Patent policy, etc.
- Call for submissions
- Set Ad Hoc Groups schedule and approve agenda
- Summary from January 2016 meeting
- SFD review – Editor
- TG motions
 - Approve TG meeting and Telecon minutes since November meeting.
 - Approve the latest SFD revision
- Timeline
- Ad Hoc group Rules
- Presentations
 - 11-16/0066r5, “Views on UL MU Features” Joonsuk Kim
 - 11-15/1095r6, “OFDMA Performance in 11ax” Suhwook Kim
- Recess

Summary since January 2016 Meeting

- Passed a number of affecting aspects of the TG Specification Framework.
 - PHY
 - MAC
 - MU
- Latest revisions of the Specification Framework is available at:
 - <https://mentor.ieee.org/802.11/dcn/15/11-15-0132-15-00ax-spec-framework.docx>
- Presentation on draft TG specification 11-16/0024r0
- The TG conducted a couple of Telecons (Feb 4th , and March 3rd)
 - <https://mentor.ieee.org/802.11/dcn/16/11-16-0212-00-00ax-enterprise-scenario-dsc-and-color.pptx>
 - <https://mentor.ieee.org/802.11/dcn/16/11-16-0024-01-00ax-proposed-draft-specification.docx>

Approval of TG Minutes (January 2016 Meeting and Telecon Minutes)

Approve TGax minutes of meetings and teleconferences from January 2016 interim meeting to today:

- <https://mentor.ieee.org/802.11/dcn/16/11-16-0096-02-00ax-tgax-january-2016-atlanta-meeting-minutes.docx>
- <https://mentor.ieee.org/802.11/dcn/16/11-16-0262-01-00ax-tgax-teleconference-minutes-february-4th-2016.docx>
- <https://mentor.ieee.org/802.11/dcn/16/11-16-0301-01-00ax-tgax-teleconference-minutes-march-3rd-2016.docx>
- <https://mentor.ieee.org/802.11/dcn/16/11-16-0150-00-00ax-tgax-mu-ad-hoc-meeting-minutes-january-2016.docx>
- <https://mentor.ieee.org/802.11/dcn/16/11-16-0110-00-00ax-jan-2016-atlanta-tgax-mac-ad-hoc-meeting-minutes.docx>
- <https://mentor.ieee.org/802.11/dcn/16/11-16-0119-00-00ax-ieee-802-11-tgax-january-2016-atlanta-phy-ad-hoc-meeting-minutes.docx>

•**Move:** Al Petrick **Second:** Yasu Inoue

•**Accepted with no objection**

SFD Review

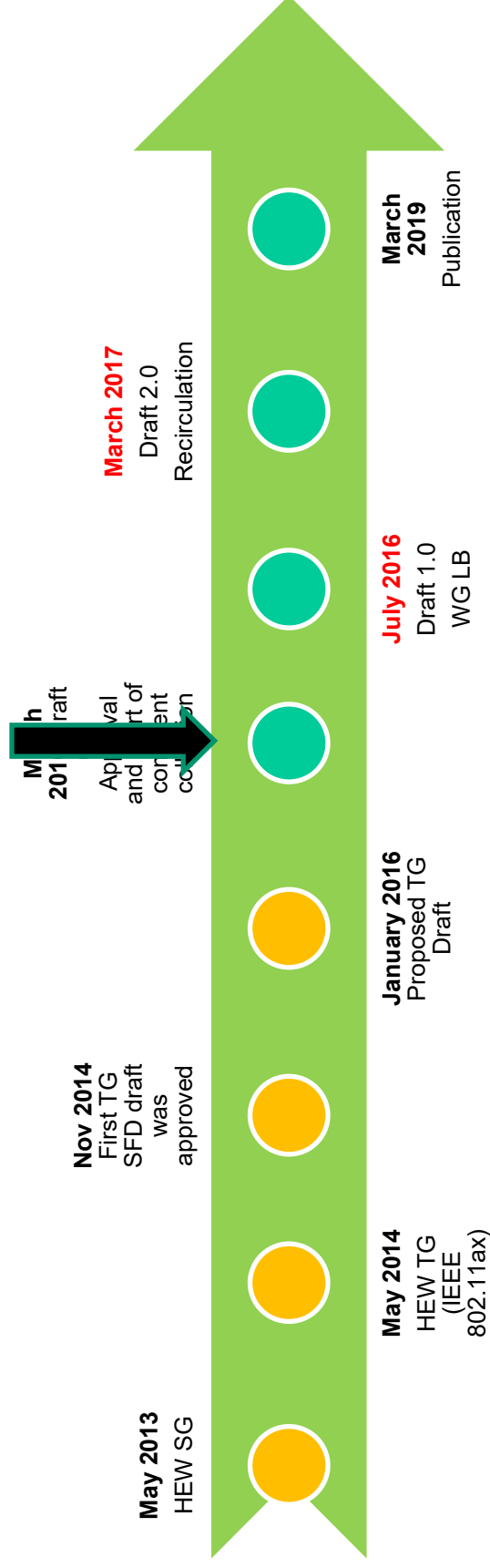
- **Editor**
- <https://mentor.ieee.org/802.11/dcn/15/11-15-0132-15-00ax-spec-framework.docx>

SFD Motion

- **Move to accept document 11-16/0132r15 as the current revision of the TG Specification Framework document**
- **Move: Robert Stacey**
- **Second: Rakesh Taori**
- **Y/N/A**
- **accepted with no objection**

Timeline

We are Here



Ad Hoc Group Rules

- A straw poll needs to achieves at least 75% at the ad-hoc level to be converted to a motion at the TG level.
- In the case a consensus can not be reached within an Ad Hoc group (a stalemate that prohibits further progress), the subject is moved to the Task group, if an Ad Hoc straw poll vote to move the subject to the Taskgroup achieves > 50% approval.
- A straw poll affecting the Spec Framework has to start with,
 - **Do you agree to add to the TG Specification Framework document?**
 - **x.y.z. <feature description>**
- For further details, please see 11-15-0075r0
- Minutes of the Ad Hoc group meetings will be available on mentor.

Agenda for Monday March 14, 19:30 – 21:30

- **Ad Hoc Group Meetings**
 - SR → Venetian Ballroom A/B (L3)
 - MU → Florence 2305 and 2306 (L1)

Agenda for Tuesday March 15, 10:30 – 12:30

- **Ad Hoc Group Meetings**
 - PHY → Venetian Ballroom A/B (L3)
 - MAC → Florence 2202+2203+2302+2303 (L1)

Agenda for Tuesday March 15, 16:00 – 18:00

- **Ad Hoc Group Meetings**
 - SR → Venetian Ballroom AB (L3)
 - MAC → Florence 2202+2203+2302+2303 (L1)

Agenda for Tuesday March 15, 19:30 – 21:30

- **TG Meeting**
- **Call Meeting to order**
- **IEEE 802 and 802.11 IPR Policy and procedure**
- **Progress from ad hoc groups**
- **Presentations**
 - <https://mentor.ieee.org/802.11/dcn/16/11-16-0364-01-00ax-aid-assign-rules-based-on-bss-color-and-he-operation-element.pptx>
 - <https://mentor.ieee.org/802.11/dcn/16/11-16-0394-00-00ax-achieving-high-efficiency-in-medium-access-via-roster-mode.pptx>
- **Draft Approval and Comment Collection Process**
- **Recess**

Draft Approval and Comment Collection Process

- Approval of document 11-16/0024r1 as draft D0.1
- Start a comment collection (CC) period for 21 days on the draft (D0.1)
- Draft D0.1 will be modified as a result of two inputs:
 - Resolution of comments received during the CC period.
 - New features (can be part of the CC, i.e new features can be submitted as part of the comment resolution).
- A new draft (D0.2) will be generated in YYYY and may go to another CC period (??)
- Draft 1.0 in September 2016.

Agenda for Wednesday March 16, 13:30 – 15:30

- **Ad Hoc Group Meetings**
 - PHY → Venetian AB (L3)
 - MAC → Florence 2202+2203+2302+2303 (L1)

Agenda for Wednesday March 16, 16:00 – 18:00

- **Ad Hoc Group Meeting**
 - MAC → Venetian AB (L3)
 - MU → Florence 2202+2203+2302+2303 (L1)

Agenda for Thursday March 17, AM2 and PM2

- **TG Meeting**
- **Call Meeting to order**
- **IEEE 802 and 802.11 IPR Policy and procedure.**
- **Presentations (if any)**
- **TG Motions**
- **Timeline Update**
- **Goals for May 2016**
- **Telecon Schedule**
- **Adjourn**

Draft 0.1 Motion

- **Move to accept document 11-16/0024r1 as the TG draft specification D0.1, and start a 21 day comment collection period.**
 - <https://mentor.ieee.org/802.11/dcn/16/11-16-0024-01-00ax-proposed-draft-specification.docx>
- **Move: Robert Stacey**
- **Second: Simone Merlin**
- **Y/N/A: 75/0/5**
- **Motion passes**

PHY Motion #132

- **Move to add the following 1x/2x HE-STF sequences for 160/80+80MHz to the 11ax SFD**

- 1x HE-STF_{160MHz}(-1008:16:1008) = [M, 1, -M, 0, -M, 1, -M, 0, -M, -1, M, 0, -M, 1, -M] * (1+j)/sqrt(2)
- M = {-1 -1 -1 +1 +1 +1 -1 -1 +1 +1 -1 +1 -1 +1}
- 1x HE-STF_{80+80MHz} = [1x HE-STF_{80MHz,Prime}, 1x HE-STF_{80MHz,Second}]
 - 1x HE-STF_{80MHz,Prime}(-496:16:496) = [M, 1, -M, 0, -M, 1, -M] * (1+j)/sqrt(2)
 - 1x HE-STF_{80MHz,Second}(-496:16:496) = [-M, -1, M, 0, -M, 1, -M] * (1+j)/sqrt(2)
- 2x HE-STF_{160MHz}(-1016:8:1016) = [M, -1, M, -1, -M, -1, M, 0, -M, 1, M, 1, -M, 1, -M, 0, -M, 1, -M, 1, M, 1, -M, 1, -M] * (1+j)/sqrt(2)
- 2x HE-STF_{160MHz}(±1016) = 0
- 2x HE-STF_{160MHz}(±8) = 0
- 2x HE-STF_{80+80MHz} = [2x HE-STF_{80MHz,Prime}, 2x HE-STF_{80MHz,Second}]
 - 2x HE-STF_{80MHz,Prime}(-504:8:504) = [M, -1, M, -1, -M, -1, M, 0, -M, 1, M, 1, -M, 1, -M] * (1+j)/sqrt(2)
 - 2x HE-STF_{80MHz,Prime}(±504) = 0
 - 2x HE-STF_{80MHz,Second}(-504:8:504) = [-M, 1, -M, 1, M, 1, -M, 0, -M, 1, M, 1, -M, 1, -M] * (1+j)/sqrt(2)
 - 2x HE-STF_{80MHz,Second}(±504) = 0

• **Move: Eunsung Park Second: Ron Porat Y/N/A**

• **DCN 11-16/0335r0 SP Result: 28/0/13**

• **Accepted with no objection**

- **Move to add the following text in SFD chapter 3.4**

- For 20MHz PPDU, the transmit spectrum shall not exceed the maximum of the interim transmit spectral mask and -53 dBm/MHz at any frequency offset, for both 2.4GHz and 5GHz bands.
- For 40MHz PPDU, the transmit spectrum shall not exceed the maximum of the interim transmit spectral mask and -56 dBm/MHz at any frequency offset, for both 2.4GHz and 5GHz bands.
- For 80MHz and 160MHz PPDU, the transmit spectrum shall not exceed the maximum of the interim transmit spectral mask and -59 dBm/MHz at any frequency offset.

- **Move: Hongyuan Zhang** **Second: Ron Porat**
- **Y/N/A**
- **DCN: 11-16/0343r0** **SP Result: 41/0/3**
- **Accepted with no objection**

PHY Motion #134

- Move to replace *Table-3 $N_{SD,short}$* in 3.3.5 Padding and packet extension of SFD to the following table

RU Size	$DCM=0: N_{SD,short}$	$DCM=1: N_{SD,short}$
26	6	2
52	12	6
106	24	12
242	60	30
484	120	60
996	240	120
996x2	492	246

- Move: Hongyuan Zhang Second: Ron Porat
- Y/N/A
- DCN: 11-16/0344r0 SP Result: 40/0/5

PHY Motion #135

- **Move to add the following text in SFD 3.3.5**
 - The post-FEC bits are un-specified by 11ax spec
 - The content of PE field is un-specified by 11ax spec
- **Move: Hongyuan Zhang Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0344 SP Result: 41/0/5**

PHY Motion #136

- **Move to add a Doppler bit in SIGA for HE SU and HE SU extended range, in TBD location for HE MU and in the trigger frame.**
- **Move: Ron Porat**
- **Second: Yasu Inoue**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-15/1354r2 SP Result: 37/0/5**

PHY Motion #137

- **Move to add to the spec framework : 1bit is added for STBC indication in SIGA of the MU PPDU**
 - This bit indicates STBC for all users in the payload and doesn't apply to SIGB
 - STBC is not applied in MU-MIMO Rus
- **Move: Ron Porat**
- **Second: Yasu Inoue**
- **Y/N/A**
- **DCN: 11-15/1354r2 SP Count: 30/0/4**
- **Accepted with no objection**

PHY Motion #138

- **Move to add to the TG Specification Frame work document:**
 - in trigger based UL PPDU, multiple SR fields (≥ 2) are signaled, where each SR field corresponds to a different subband of the PPDU
- **Move: Ron Porat**
- **Second: Yasu Inoue**
- **Y/N/A**
- **Accepted with noobjection**

PHY Motion #139

- **Move to agree that 11ax pilot sequences shall reuse the 11ac/ah pilot sequences as shown in slides 13 and 14 in the document 11-16/0346r0.**
- **Move: Bin Tian**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN 11-16/0346r0 SP Result: 43/0/3**

PHY Motion #140

- **Move to agree that 11ax pilot sequence shall be applied in the same way as in 11ac SSP**
 - Pilot values are shifted on pilot tones from symbol to symbol for each RU
 - Overlapping pilot polarity value: same as in 11ac
- **Move: Bin Tian**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**

PHY Motion #141

- Move to add the following description to the SIGB number of symbols fields in Table 2 in the SFD: HE-SIG-A fields for the HE MU PPDU of the SFD.

Field	Length (bits)	Description	Encoding
SIGB Number Of Symbols	4	<u>When SIGB compression mode is enabled, the number of symbols are re-purposed to indicate the number of MU-MIMO users</u>	

- Move: Kaushik Josiam
- Second: Ron Porat
- Y/N/A
- Accepted with noobjection
- DCN: 11-16/0349r1 SP Result: 40/0/4

PHY Motion #142

- **Move to modify the HE-SIG-B compression mode description in the SFD [Page 9, line 2-4 in 11-15-0132-15-00ax-spec-framework.docx] as follows:**

–In an HE MU PPDU the HE-SIG-A field shall indicate the number of STAs when full bandwidth MU-MIMO compressed SIG-B mode is indicated.

~~Details are TBD.~~ [When SIGB compression mode is enabled, the SIGB number of symbols are re-purposed to indicate the number of MU-MIMO users](#)

–[PHY Motion 111, Janaury 2016, see [26]]

- Move: Kaushik Joasim Second: Ron Porat**
- Accepted with no objection**
- DCN 11-16/0349 SP Result: 43/0/3**

PHY Motion #143

- **Move to modify the HE-SIG-B compression mode description in the SFD [Page 9, line 15-20 in 11-15-0132-15-00ax-spec-framework.docx] as follows:**
 - 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-SIG-B common [field](#) is not signaled
 - For bandwidths > 20 MHz, the user specific sub-fields are split equitably between the two HE-SIG-B Channels i.e., [For \$k\$ user MU-MIMO PPDU, \$1, \dots, \lfloor k/2 \rfloor\$ user specific sub-fields in HE-SIG-B channel 1 and \$\lfloor k/2 \rfloor + 1, \dots, k\$ user specific sub-fields in HE-SIG-B channel 2](#)
- [PHY Motion 87, November 2015, see [25]]

Mobe: Kaushik Josiam

Second: Ron Porat

Y/N/A

Accepted with no objection

DCN - 11-16/0349r1

SP Result: 43/0/3

Slide 47

Osama Aboul-Magd (Huawei Technologies)

Submission

PHY Motion #144

- **Move to modify the current SFD as following**
 - The L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields are always transmitted with same **total** power **per tone** as L-LTF field (in cases when L-LTF is not being boosted). **The L-STF has the same total power as the L-LTF**
- **Move: Lei Wang**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**

PHY Motion #145

- Move to add to the spec framework that
- The tones used for channel feedback shall be a subset of the sets given below:
-
- NDP bandwidth 20 MHz:
 - $N_g = 4 \rightarrow [-120:4:-4, 4:4:120] + \text{edge}(\pm 2, \pm 122)$
 - $N_g = 16 \rightarrow [-116:16:-4, 4:16:116] + \text{edge}(\pm 2, \pm 122)$
-
- NDP bandwidth 40 MHz:
 - $N_g = 4/16 \rightarrow [-244:N_g:-4, 4:N_g:244]$
-
- NDP bandwidth 80 MHz:
 - $N_g = 4/16 \rightarrow [-500:N_g:-4, 4:N_g:500]$
-
- Move: Sriram Venkateswaran Second: Ron Porat Y/N/A
- Accepted with no objection

PHY Motion #146

- **Move to add to the spec framework that**
 - 2X HE-LTF sequence shall be the only mandatory mode for NDP.
 - 4X HE-LTF shall not be supported in NDP.
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0389 SP Results: 39/0/4**

PHY Motion #147

- **Move to add to the spec framework that**
 - The NDP always has extension of 4uS
 - The NDP shall support the CP values 0.8 us and 1.6 us
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0389 SP Result: 40/0/2**

PHY Motion #148

- **Move to add to the spec framework that**
 - AP can request beamforming feedback over partial BW which is less than the NDP BW. The indication of the feedback BW goes in NDPA.
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0389 SP Result: no objection**

PHY Motion #149

- **Move to add to the spec framework that**
 - The granularity of channel feedback requested by the AP is a 26 tone RU. The AP signals *start* and *end* 26 tone RUs requested for feedback.
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0389 SP Result: no objection**

PHY Motion #150

- **Move to add to the spec framework that**
 - The max Nc for sounding feedback that a BFee can support shall be negotiated through a capability exchange at association
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0389** **SP Result: no objection**

PHY Motion #151

- **Move to add to the spec framework that**
 - AP shall control the N_g , quantization, and N_c of the sounding FB in NDPA except in the special case of a NDPA addressed to a single STA which requests SU type feedback. In the aforementioned special case, the STA controls these quantities.
- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **DCN: 11-16/0389 SP Result: no objection**

PHY Motion #152

- **Move to add to the spec framework that**
 - A channel quality indicator only (CQI-only) feedback (exact metric TBD) will be supported by the sounding protocol in 11ax. The request for CQI-only feedback goes in NDPA.

- **Move: Sriram Venkateswaran**
- **Second: Ron Porat**
- **Y/N/A**
- **Accepted with no objection**

- **DCN: 11-16/0389** **SP Result: No objection**

PHY Motion #153

- **Move to add the following text into 11ax SFD**
 - **3.1 General**
 - *The non-contiguous channel bonding will be supported in 802.11ax by:*
 - *Transmitting using OFDMA PPDU format by nulling the tones of one or more secondary channels in 80 MHz and 160 (80+80) MHz;*
 - *Modes for non-contiguous channel bonding are TBD;*
 - *Non-contiguous channels within primary or secondary 80 MHz only exists at AP side.*
 - Signaling for non-contiguous channel bonding is contained in BW subfield of HE-SIG-A and/or HE-SIG-B. Details are TBD.
- **Move: John Son Second: Greg Ko**
- **Y/N/A: 40/14/31 → Motion fails**
- **DCN: 11-16/0397 SP Result: 10/2/many**

PHY Motion #154

- **Move to add the following text to the IEEE 802.11ax SFD**
 - UL pre-HE-STF preamble is sent only on the 20MHz- CH(s) where the HE modulated fields are located.
 - The UL pre-HE-STF preamble includes legacy preamble, RL-SIG and HE-SIG-A and HE modulated fields refer to HE-STF, HE-LTF and data fields.
- **Move: Ming Gan**
- **Second: Yunbo Li**
- **Accepted with no objection**
- **Y/N/A**

MAC Motion #67

- **Move to add the following text to 11ax SFD:**
 - A HE STA can announce its maximum A-MPDU length limits to²²¹ or ²²²
- **Move: Liwen Chu**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0358** **SP Result: 29/0/13**

MAC Motion #68

- **Move to add to the 11ax SFD**
 - the recipient indicates the maximum number of TIDs of the MPDUs that the originator can aggregate in a multi-TID A-MPDU in MU PPDU
- **Move: Robert Stacey**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0362 SP Results: 38/0/11**

MAC Motion #69

- **Move to add to the 11ax SFD**
 - Within a single A-MPDU containing MPDUs with different value of TIDs, the MPDUs with the same TID value are not required to be in contiguous A-MPDU subframes
- **Move: Robert Stacey**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0362 SP Results: 33/0/10**

MAC Motion #70

- **Move to add to the SFD the definition of a variant of the Compressed BA frame format with a 256-bits BA Bitmap field**
- **Move: Simone Merlin**
- **Second: George Cherian**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0378r1 SP Result: 42/0/7**

MAC Motion #71

- **Move to add to the SFD:**
 - Reserved bit(s) in Fragment Number field are used to indicate the length of the BA Bitmap within the same BA Information field
- **Move: Simone Merlin**
- **Second: George Cherian**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0378r1 SP Result:37/1/7**

MAC Motion #72

- **Move to add the following text into the SFD**
 - The spec shall define a length indication of Block Ack Bitmap subfield included in Fragment Number subfield of the Block Ack Starting Sequence Control field for a multi-STA BA frame, if the Block Ack Bitmap and the Block Ack Starting Sequence Control subfields are present.
- **Move:** Dengyu Qiao
- **Second:** Simone Merlin
- **Accepted with no objection**
- **DCN: 11-16/0404 SP Result:36/0/5**

MAC Motion #73

- **Move to insert into the 802.11ax SFD**
 - “The RA field of a Multi-STA BA for a single STA should be set to the MAC address of that STA.”
- **Move: Xiaofei Wang**
- **Second: Kome Oteri**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0365r1** **SP Result: 7/0/28**

MAC Motion #74

- **Do you support to add to SFD**
- 9.3.1.23 Trigger frame
 - Use 8 bits to signal the RU allocation for each STA in per user info field of Trigger frame.
 - The first bit indicates the allocated RU is located in the primary or non-primary 80 MHz.
 - The mapping of the subsequent 7 bits indices to the RU allocation is defined in the table below.

7 bits indices	Message	Number of entries
0000000 ~ 0100100	Possible 26 RU cases in 80MHz	37
0100101 ~ 0110100	Possible 52 RU cases in 80MHz	16
0110101 ~ 0111100	Possible 106 RU cases in 80MHz	8
0111101 ~ 1000000	Possible 242 RU cases in 80MHz	4
1000001 ~ 1000010	Possible 484 RU cases in 80MHz	2
1000011	996 RU cases in 80MHz	1
1000100	160MHz/80+80MHz case	1
Total		69

- **Move: Yunbo Li**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0383r0 SP Result: 28/0/6**

MAC Motion #75

- **Move to add to the SFD**
 - the draft specification shall specify that when a Trigger needs to be padded to allow sufficient UL PPDU transmission preparation time, the padding shall be at the MAC layer and the padding shall not include an FCS
- **Move: Matt Fischer**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**

MAC Motion #76

- **Move to add to the SFD:**
 - The draft specification shall specify that M-BA/BA/ACK may be aggregated with a trigger frame in an A-MPDU without accompanying Data
- **Move: Matt Fisher**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0369r1**
- **SP Results: 48/0/2**

MAC Motion #77

- **Move to add to SFD**
 - The ACK Policy of the QoS data frame(s) sent in an HE trigger-based PPDU shall be set to 00 (Normal Ack or Implicit BAR) when the QoS data frame requires to be acknowledged (i.e., the Ack Policy cannot be set to 11 (Block Ack)).
- **Move: Jeongki Kim**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**

MAC Motion #78

- **Move to add to the SFD:**
 - An HE STA specifies the following parameters related to fragmentation:
 - Minimum Fragment Size: The minimum payload size for the first fragment of an MSDU supported by the STA
 - Possible values: 128, 256, 512, Unspecified/No Limit
 - Maximum Number of F-MSDUs: The maximum number of fragmented MSDUs/MMPDUs that can be concurrently received by the STA
 - Possible values: 1, 2, 4, 8, 16, 32, Unspecified/No Limit
 - Note: Whether the counter is per <RA, TA> or per <RA, TA, TID> is currently TBD.

- **Move: Alfred Asterjadhi Second: Simone**

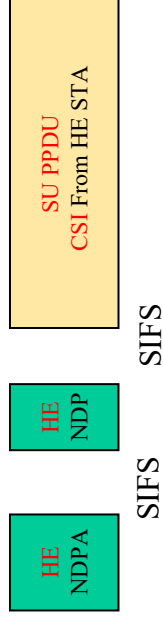
Merlin – accepted with no objection

MAC Motion #79

- **Move to add the following text to 11ax SFD:**
 - A value of 15 in the TID subfield in the Per STA Info field of the M-BA frame indicate the successful acknowledgement of a management frame that requires an immediate response and is carried in the soliciting A-MPDU
- **Move: Liwen Chu**
- **Second: Simone Merlin**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0359 SP Result: 40/0/9**

MAC Motion #80

- **Move to add to the SFD the following sounding sequence**

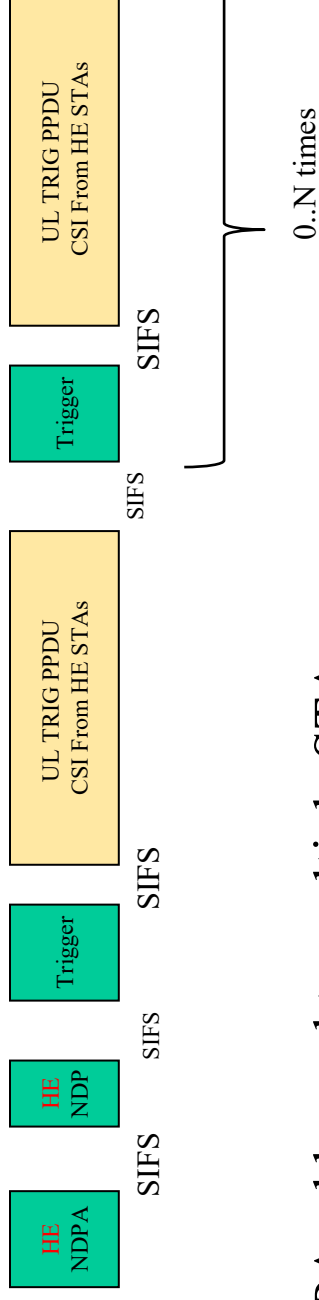


– HE NDPA is addressed to 1 STA

- **Move: Simone Merlin Second: Jianhan Liu**
- **Y/N/Y**
- **Accepted with no objection**
- **DCN:11-16/0377r1 SP Result: 46/0/4**

MAC Motion #81

- Move to replace the sounding sequence figure in SFD section 4.6 with following one



- NDPA addressed to multiple STAs
- Move: Simone Merlin Second: George Cherian
- Accepted with no objection
- DCN: 11-16/0377r1 SP Result: 42/0/3

MAC Motion #82

- **Move to add to the TG Specification Framework document**
 - Spec shall define a mechanism to protect TWT SP.
 - A TWT requesting STA sets the TWT Protection subfield to 1 in TWT Request frame to request the AP to provide protection of the set of TWT SPs using a NAV protection mechanism defined in 802.11ax (e.g. (MU)RTS/CTS or CTS-to-self, etc)
- **Move: Jinsoo Ahn Second: Woojin Ahn**
- **Accepted with no objection**
- **DCN:11-16/0353 SP Result: 8/2/37**

MAC Motion #83

- Move to add the following AID assign rule to the IEEE 802.11ax SFD:

The AP may send a **TBD** IE that includes a field ' N '. If the value indicated by the field N is greater than 0, then the AP shall allocate AIDs according to the formula

$$\begin{aligned} \text{AID}(8 - N + 1:8) &= \text{bin}[(\text{dec}(\text{BCB}(0:N - 1))) \\ &\quad + \text{dec}(\text{BSSID}(47 - N + 1:47) \oplus \text{BSSID}(43 - N + 1:43))] \bmod 2^N, N] \end{aligned}$$

- The **TBD** IE contains the number of partial BSS color bits used and the partial BSS color bits

- Move: Jianhan Liu Second: Simone Merlin
- Accepted with no objection
- DCN:11-16/0364r3 SP Result: 57/0/13

MU Motion #47

- **Move to add following text in SFD**
 - A non-AP STA that is UL MU-MIMO Tx capable shall support DL MU-MIMO Rx
- **Move: Joonsuk Kim**
- **Second: Reza Hedayat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0066r5 SP Result: 67/0/12**

MU Motion #48

- **Move to add following text in SFD**
 - A non-AP STA that is UL OFDMA Tx capable shall support DL OFDMA Rx
- **Move: Joonsuk Kim**
- **Second: Reza Hedayat**
- **Y/N/A**
- **Accepted with no objection**
- **DCN:11-16/0066r5 SP Result: 66/0/9**

MU Motion #49

Move to add the following to the TGax SFD

- In an HE trigger-based PPDU transmission, a power pre-correction mechanism is needed.
- Move: Kome Oteri
- Second: Allan Jones
- Y/N/A
- Accepted with no objection
- DCN: 11-16/0331r2 SP Result: 32/0/4

MU Motion #50

Move to add the following to the TGax SFD

- The power control mechanism shall be flexible enough to allow for scheduling both class A and class B devices in the same HE trigger-based PPDU transmission.

- Move: Kome Oteri
- Second: Allan Jones
- Y/N/A
- Accepted with no objection

MU Motion #51

Move to add the following to the TGax SFD

- In a DL HE-MU-PPDU, the AP may set different transmit powers for different resource units.
- Move: Kome Oteri
- Second: Allan Jones
- Y/N/A
- Accepted with no objection
- DCN: 11-16/0331r1 SP Result: 17/0/13

MU Motion #52

- **Do you agree to add the following power control mechanism for UL MU transmissions to the SFD?**
 - AP signals the following in the Trigger frame that schedules the UL MU transmission
 - In the common info field: AP Tx Power: $Tx_{\text{power}} \uparrow AP \text{ (dBm)}$
 - In the per user info field: $Target \downarrow RSSI \text{ (dBm)}$ for each STA that is scheduled in the Trigger frame
 - The number of bits in the Target RSSI is TBD
 - STA sets its Tx power per the following equation
 - $Tx_{\text{power}} \uparrow STA \text{ (dBm)} = PL \downarrow DL \text{ (dB)} + Target \downarrow RSSI \text{ (dBm)}$
 - where $PL \downarrow DL \text{ (dB)}$ is the DL path loss computed by the STA based on the AP transmit power signaled in the Trigger message and the measured RSSI of the Trigger message
 - $Target \downarrow RSSI \text{ (dBm)}$ is signaled by the AP in the trigger message

Move: Arjun Bharadwaj
Y/N/A

Second: Kaushik Josiam → accepted with no objection

DCN: 11-16/413r0

SP Result: 37/0/9

MU Motion #53

- **Move to add the following text to the SFD**
 - STAs that participate in HE trigger-based PPDU transmit the power headroom in triggered UL MU transmissions to assist in the AP's MCS selection
 - Details of STA headroom definition are TBD
- **Move: Arjun Bharadwaj**
- **Second: Kaushik Josiam**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/413r0 SP Result: 35/0/7**

MU Motion #54

- **Move to add the following text to the SFD**
 - STAs that participate in HE trigger-based PPDU shall support +/- 3dB Relative Tx power requirements for Class B devices.
 - Relative Tx power accuracy is defined as the accuracy of the change of the transmit power in consecutive UL MU transmissions
- **Move: Arjun Bharadwaj**
- **Second: Kaushik Josiam**
- **Y/N/A**
- **Accepted with no objection**

- **DCN:11-16/0413r0** **SP Result: 29/1/7**

MU Motion

- **Move to add the following text to the SFD**
 - STAs that participate in HE trigger-based PPDU transmit the power headroom in triggered UL MU transmissions to assist in the AP's MCS selection
 - Details of STA headroom definition are TBD
- **Move: Arjun Bharadwaj**
- **Second:**
- **Y/N/A**

- **DCN:11-16/0413** **SP Result: 35/0/7**

MU Motion #55

- **Move to amend the Trigger Frame format in the SFD as shown in document IEEE802.11-16/0379r0**
- **Move: Simone Merlin**
- **Second: George Cherian**
- **Y/N/A**
- **Accepted with no objection**
- **DCN: 11-16/0379r0 SP Result: 27/0/2**

SR Motion #6

- **Move to add to SFD**
 - Include the “SR_allowed” signaling in HE-SIGA to indicate whether SR operation is allowed or not.
 - use a value of Spatial Reuse field to indicate SR is disallowed
 - The conditions to disallow SR are TBD
- **Move: Yunbo Li**
- **Second: Yanchun Li**
- **Y/N/A**
- **Accepted with no objection**

– **DCN: 11-16/0382r0**

SP Result: 21/0/17

SR Motion #7

- Do you support to replace the text in 5.1 of SFD P35L1 “and a reduction in the TXPWR may be accompanied by an TBD increase in the OBSS PD threshold value” with the “following

Adjustment Rule for OBSS_PD

$$OBSS_PD_{Threshold} = \max \left[\min \left(\begin{matrix} OBSS_PD_{threshold_min} \\ OBSS_PD_{threshold_max} \end{matrix} \right) + (TX_PWR_{ref} - TX_PWR) \right]$$

where TX_PWR_{ref} is an absolute reference power level.

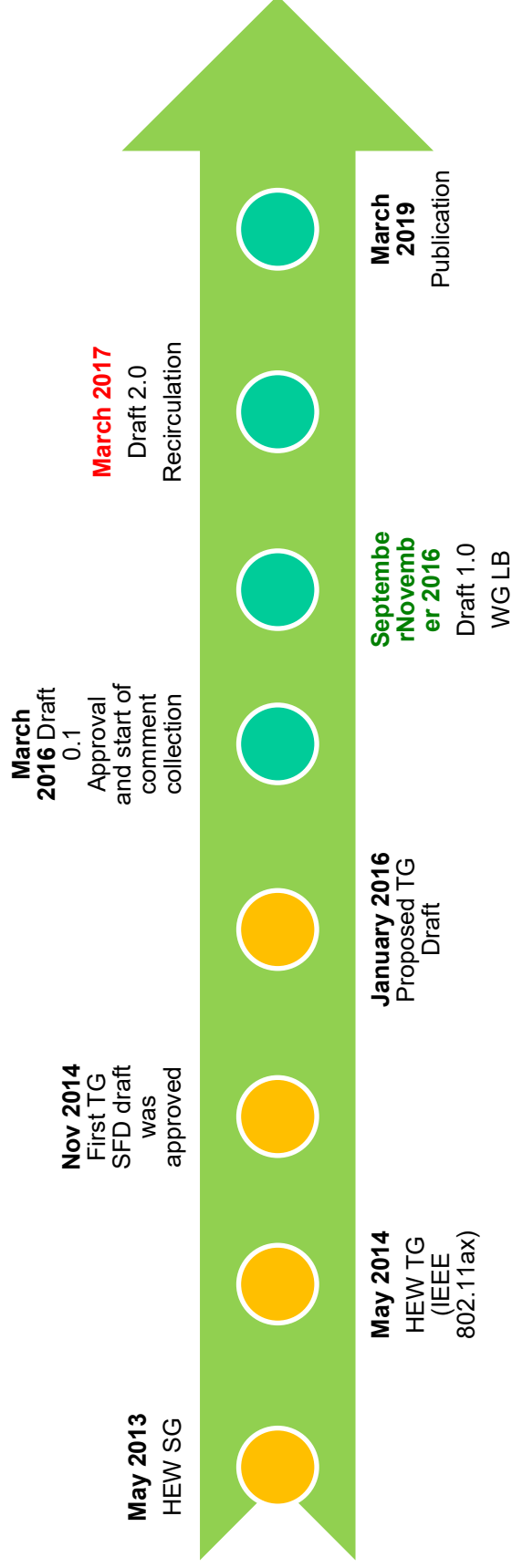
$$OBSS_PD_{Threshold_max} = OBSS_PD_{Threshold_max}(20MHz) + 10 * \log\left(\frac{BW}{20MHz}\right)$$

$$OBSS_PD_{Threshold_min} = OBSS_PD_{Threshold_min}(20MHz) + 10 * \log\left(\frac{BW}{20MHz}\right)$$

- **TX_PWR_{ref} can be a TBD level (preferred value is 23 dBm)**
- **Class A: TX_PWR=transmit power**
- **Class B: TX_PWR=transmit power+TBD dB**

- **Move: Jianhan Liu**
- **Second: Ron Porat**
- **Y/N/A**
- **51/3/24 → Motion Passes**
- **DCN: 11-16/0414r0 SP Result: 22/1/8**

Timeline Update



Goals for May 2016

- **Comment Resolution**
- **Technical Presentation.**

Conference call times

- **Thursday April 14/28 10:00 – 12:00 ET**
- **Thursday April 21, May 5 20:00 – 22:00 ET**

Other Business

PHY Motion #155

- **Move to modify the SFD as follows:**
- **There are only three pre-HE-STF preamble format definition**
 - SU Format(mandatory)/Trigger based UL
 - MU format (mandatory)
 - Extended range SU format (mandatory)
- **Move: David Yang Second: Ross Jian Yu**
- **Results: 49/4/23**
- **Motion Passes**