IEEE P802.11 Wireless LANs

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| Minutes for TGbe MAC Ad-Hoc teleconferences in November 2020 and Janunary 2021 | | | | |
| Date: 2020-11-02 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Jeongki Kim | LG Electronics |  |  |  |
| Liwen Chu | NXP |  |  |  |
|  |  |  |  |  |

Abstract

This document contains the meeting minutes for the TGbe MAC ad hoc teleconferences held in November 2020 and January 2021.

Revisions:

* Rev0: Added the minute from the telephone conference held on November 02, 2020.
* Rev1: Added the minute from the telephone conference held on November 05, 2020.
* Rev2: Added the attendance list on the telephone conference held on November 05, 2020.
* Rev3: Added the minute from the telephone conferences held on November 12, 2020 and removed the attendance lists on the telephone conferences held on November 02&05, 2020.
* Rev4: Added the minute from the telephone conference held on November 16, 2020.
* Rev5: Added the minute from the telephone conference held on November 19, 2020.
* Rev6: Added the minute from the telephone conference held on November 30, 2020.
* Rev7: Added the minute from the telephone conference held on December 3, 2020.
* Rev8: Added the minute from the telephone conference held on December 7, 2020.

**Monday 02 November 2020, 19:00 –21:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 19:05am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
     1. 1) login to [imat](https://imat.ieee.org/attendance), 2) select “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “TGbe <MAC/PHY/Joint> conference call that you are attending.
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

The Chair reminds that the agenda can be found in 11-20/1615r5. The agenda is modified

**Submissions**

* 1. [992r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0992-04-00be-mac-pdt-nsep-tbds.docx) **MLO mandatory/optional** Laurent Cariou [7 SPs]

**SP #2:**

* **Do you agree to add the following to the SFD**
  + the MLO basic framework support is mandatory for 11be AP and 11be STA
    - discovery procedure, Setup procedures, Security procedures, default mapping (all TIDs mapped to all links, all setup links enabled), TIM indicating BUs at MLD level, BA at MLD level, Power save per link, Power state change indications per link
    - Note: TSF alignment rules on AP MLD side TBD
    - Note: Single radio single band capable STA and AP TBD
    - Note: TID-mapping and other link operations (enable/disable/add/remove) are TBD

**Discussion:**

C: Several TBD are here.

C: Not sure that some parts should be basic framework. Mandatory is fine.

C: I’m not sure that the TSF alignment rules should be TBD. Maybe it’s motion or SP?

A: I haven’t run the SP.

C: how does the single radio single band capable STA perform the MLO operation?

C: Those should not be note.

SP text is changed as following:

**SP #2:**

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

the support of the following MLO features is mandatory for 11be AP and 11be STA- discovery procedure, Setup procedures, Security procedures, default mapping (all TIDs mapped to all links, all setup links enabled), TIM indicating BUs at MLD level, BA at MLD level, Power save per link, Power state change indications per link, BSS parameter critical update procedure

Note: the above does not preclude other functionalities being added to the list

68/8/31

* 1. [1722r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1722-00-00be-mac-pdt-nsep-tbds.docx) PDT for TBDs Subir Das

Summary: Proposes the PDT for NS/NE priority access

Discussion:

C: What information is getting for this authorization?

C: How is this authorized?

C: This information is going to be out of the scope.

C: AP can also use other procedures for this authorization information.

A: Yes. It could be. Interaction with SSPN.

A: Basically, If the SSPNInterfaceActivated is set to true, this NSEP service via SSPN could be supported

C: What is the old AP and new AP for?

A: That is related to reassociation.

C: The second last paragraph has still TBD. Is this neogotiation for enabling or disalbing?

A: This is not about enable and disable.

C: After disable, this priority access is not used?

A: Yes

C: Is this diable procedure two way handshake procedure?

C: What happen if the non-AP does not respond this request?

SP is defered

* 1. [1312r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1312-00-00be-triggered-su-ppdu-for-11ber1.pptx) Triggered SU PPDU for 11be R1 Dibakar Das

Summary: Proposing for non-AP to send UL/P2P SU PPDU through the resource allocated by AP

Discussion:

C: This is similar to HCCA mechanism.

A: HCCA triggers the CF-Poll frame.

C: slide 5, after MU-RTS and CTS, STA sends PPDU here, in 11ax, AP sends PPDUs. This is differece between them.

C: Why do you use MU-RTS instead of Trigger frame?

A: MU-RTS is also the type of Trigger frame.

C: This scheme is also for single link. This could be adopt to multi-link?

A: Yes.

C: In this case, TXOP duration is different on each link?

A: It depends on the STA type. STR STA has different TXOP on each link. NSTR could have the same TXOP.

C: P2P STA also has PIFS error recovery procedure?

C: slide 5, NAV resetting rule discussion. If STA receives MU-RTS frame and does not receive CTS , the STA can reset the NAV.

C: Why this STA need to know intra-TXOP SP?

C: I have similar comment on the sequence of MU-RTS/CTS procedure.

C: It seems like RDG.

A: RDG can allow the entire time duration for it. RDG can control only one STA.

C: You may extend this to more than one STA?

A: Yes. Maybe R2

C: If this is for single User, why not use RTS/CTS procedure?

C: New type of Trigger frame is good to me instead of reuse MU-RTS. You don’t need to combine this allocation and channel protection mechanism.

SP is defered

* 1. [1730r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1730-01-00be-ul-sync-channel-access-procedure.pptx) UL Sync Channel Access Procedure Yongho Seok et. al. [1 SP]

Summary: Proposing that when BO becomes zero, the STA does not send a frame and keeps BO , and then the STA MLD can send the frame with other link’s transmission

Discussion:

C: channel is busy, if slot boundary is aligned busy/idle status, what happens?

C: When BO becomes zero and keep BO, if the channel is busy, SP text can not cover that procedure. In this case, STA needs to check the channel status.

* **Do you support an STA that is affiliated with a non-STR MLD shall follow the channel access procedure described below?**
  1. The STA may initiate transmission on a link when the medium is idle and one of the following conditions is met:
     1. The backoff counter of the STA reaches zero on a slot boundary of that link.
     2. The backoff counter of the STA is already zero, and the backoff counter of another STA of the affiliated MLD reaches zero on a slot boundary of the link that the other STA operates.
  2. When the backoff counter of the STA reaches zero, it may choose to not transmit and keep its backoff counter at zero.
  3. If the backoff counter of the STA has already reached zero, it may perform a new backoff procedure. CW[AC] and QSRC[AC] is left unchanged.

SP is deferred

The meeting was recessed at 21:00 ET

**Thursday 05 November 2020, 09:00 –11:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 09:00am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
     1. 1) login to [imat](https://imat.ieee.org/attendance), 2) select “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “TGbe <MAC/PHY/Joint> conference call that you are attending.
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

The Chair reminds that the agenda can be found in 11-20/1615r5. The agenda is modified

**Submissions**

1. [992r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0992-04-00be-mac-pdt-nsep-tbds.docx) **MLO mandatory/optional** Laurent Cariou [7 SPs]

* **SP #5: Do you agree to add the following to the SFD**
  + An AP MLD shall support operation with single radio non-AP MLD

Discussion:

C: The SP text is not clear to me. What does it mean support here?

A: Ok, I can change it based on the comment.

* **SP #5: Do you agree to add the following to the SFD**

An AP MLD shall be able to serve a single radio non-AP MLD

**Approved with unanimous consent**

* **SP#7: Do you agree to add the following to the SFD:**
  + An STR AP MLD with 2 or more affiliated EHT APs
    - shall be capable to receive a PPDU on one each EHT AP link independently to the transmit/reception status on the other affiliated EHT APs links
    - shall be capable to transmit concurrent PPDUs simultaneously to the same non-AP MLD by at least two affiliated EHT APs on at least one pair of links among all the affiliated EHT APs possible pairs of links
    - shall support asynch channel access across all the affiliated EHT APs links

Discussion:

C: This requirement is AP MLD only?

A: Yes

C: On second bullet, is it for non-STR?

A: It’s for STR. This is just for channel aggregation.

C: Do we need all the affiliated EHT APs there?

A: I can delete it.

C: at least one pair of links…? Do you mean that there are two APs?

A: Yes, I can change it like that.

C: AP MLD only contains EHT APs?

A: Currently it’s right. At the future, it can mean other than EHT AP.

C: Add the note.

C: concurrent PPDU means the alignment of start time?

A: No, it means overlapped.

SP texts are changed.

**SP#7: Do you agree to add the following to the SFD:**

An STR AP MLD with 2 or more affiliated EHT APs

* shall be capable to receive a PPDU on each affiliated EHT AP independently to the transmit/reception status on the other affiliated EHT APs
* shall be capable to transmit concurrent PPDUs simultaneously to the same non-AP MLD by at least two affiliated EHT APs on at least 2 affiliated EHT APs of the AP MLD
* shall support asynch channel access across all the affiliated EHT APs linksNote: all APs affiliated with an AP MLD are EHT APs

96/6/42

1. [1730r](https://mentor.ieee.org/802.11/dcn/20/11-20-1730-03-00be-ul-sync-channel-access-procedure.pptx)3 UL Sync Channel Access Procedure Yongho Seok et. al. [1 SP]

Summary: Added slide 8 compared to previous version which is relate to busy channel status. In busy cases, STA may not perform a new backoff procedure or may perform a new backoff procedure.

Discussion:

C: In slide 8, if the STA3 checks the CCA before sending the frame, how long the STA need to wait? SIFS or PIFS? Do we need anything?

C: may not or may? What does it mean? Does it mean STA’s decision?

A: Yes

A: This is general direction. We will have more discussion on the details.

* **Do you support an STA that is affiliated with a non-STR MLD shall follow the channel access procedure described below?**
  1. The STA may initiate transmission on a link when the medium is idle and one of the following conditions is met:
     1. The backoff counter of the STA reaches zero on a slot boundary of that link.
     2. The backoff counter of the STA is already zero, and the backoff counter of another STA of the affiliated MLD reaches zero on a slot boundary of the link that the other STA operates.
  2. When the backoff counter of the STA reaches zero, it may choose to not transmit and keep its backoff counter at zero.
  3. If the backoff counter of the STA has already reached zero, it may perform a new backoff procedure. CW[AC] and QSRC[AC] is left unchanged.

82/23/52

1. [968r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0968-02-00be-multi-link-rts-cts-operations-with-non-str-sta-mld.pptx) Multi-link RTS-CTS operations with non-STR STA MLD Ronny Y. Kim

Summary: Proposes **several cases for a semi-synchronized ML RTS-CTS procedure**

* + Case1: Second link’s backoff success < First link’s CTS TX start time
  + Case2: Second link’s backoff success < First link’s PPDU TX start time
  + Case3: Second link’s backoff success > First link’s PPDU TX start time

**it is recommended not to transmit RTS frame on the second link when using a semi-synchronized ML transmission**

Discussion:

C: slide 7, you’re suggesting that AP2 sends CTS-to-self. STA2 sets the NAV based on it. In case of multiple frame exchanges, STA2 may not change any frame.

A: I’ll think about it more.

C: slide 7, if AP is non-STR AP, it’s not possible.

A: Here, I don’t consider non-STR AP. Just STR AP.

C: AP2 sends CTS-to-self. Here if the channel is busy, how does the AP send it?

A: We can reuse the UL sync tx mechanism.

C: Is it yongho’s suggestion?

A: Yes.

A: CTS to self is just to protect the TXOP.

C: Do you consider only CTS frame?

A: Yes, here STA just sends on link 1. The lengths are same on both links.

C: RTS is mandatory in 11ax based on the frame length.

C: Similar to old Zhou’s contributions. Please check it.

A: I haven’t checked it.

C: Why do you prevent to send RTS? AP can send RTS.

C: We already discussed these issues several months ago. I don’t like them. RTS and CTS are short frames. I don’t think it’s critical issue.

Not running SP

1. [1062r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1062-00-00be-error-recovery-for-non-str-mld.pptx) Error recovery for non-STR MLD Yunbo Li

Summary:

* **Potential error recovery scenarios for response non-STR MLD are listed, and possible solutions are introduced;**
* **Several factors are considered during the design**
  + Avoid simultaneous transmit and receive for non-STR non-AP MLD
  + Initiating AP MLD may also be non-STR MLD (soft AP)
  + Delay of cross link information exchange

Discussion:

C: slide 5, Regarding the STR AP, the start time of PPDU is not critical. Just end time is critical.

A: This is just non-STR AP.

C: Ok, slide 10,

A: Here, the start time can not be aligned.

C: There are several cases, one is that BA only on one link is not received, the other case is that Bas on two links are not received.

A: Additionally, delayed cross link exchanged delay can be considered.

C: slide 11 seems like be covered by Younghoon’s contribution.

A: it does not consider cross link delay.

C: slide 5, are you proposing that the gap between BA and next PPDU is PIFS?

A: if you consider delayed cross link

C: slide 7, the gap between BA10 and PPDU11 should be PIFS?

A: Yes right. It should be changed.

C: BA size could be different on each link corresponding to MCS and several factors. But you’re assuming the size is same.

C: If the exchanged delay is larger, how can the AP or non-AP sychronize?

A: If the delay happens, how can the PPDU be synchronized? We can have more offline discussion

* SP 1: **Do you agree to allow PIFS time interval between the ending of successful response frame and following PPDU for non-STR AP MLD in R1?**

C: Are you allowing only PIFS here or PIFS and SIFS?

A: Basically, STA chooses SIFS after successful reception.

C: Is it within TXOP?

A: Yes.

C: Is this only for non-STR AP?

A: non-STR non-AP MLD can be used

C: how about STR AP?

A: No issue for STR AP.

SP is defered

The meeting is adjourned at 11am ET.

**Thursday 11 November 2020, 10:00 –12:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 10:02am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
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**Recorded attendance through Imat and e-mail:**

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| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 11/12 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| 11/12 | Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| 11/12 | Adhikari, Shubhodeep | Broadcom Corporation |
| 11/12 | Akhmetov, Dmitry | Intel Corporation |
| 11/12 | Alexander, Danny | Intel Corporation |
| 11/12 | Asterjadhi, Alfred | Qualcomm Incorporated |
| 11/12 | Baek, SunHee | LG ELECTRONICS |
| 11/12 | Baik, Eugene | Qualcomm Incorporated |
| 11/12 | Bankov, Dmitry | IITP RAS |
| 11/12 | baron, stephane | Canon Research Centre France |
| 11/12 | Bhandaru, Nehru | Broadcom Corporation |
| 11/12 | Bluschke, Andreas | Signify |
| 11/12 | Boldy, David | Broadcom Corporation |
| 11/12 | Bravo, Daniel | Intel Corporation |
| 11/12 | Carney, William | Sony Corporation |
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| 11/12 | Das, Dibakar | Intel Corporation |
| 11/12 | da Silva, Claudio | Intel Corporation |
| 11/12 | de Vegt, Rolf | Qualcomm Incorporated |
| 11/12 | Ding, Baokun | Huawei Technologies Co. Ltd |
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| 11/12 | Fang, Juan | Intel |
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| 11/12 | Ghosh, Chittabrata | Intel Corporation |
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| 11/12 | Ho, Duncan | Qualcomm Incorporated |
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| 11/12 | Levy, Joseph | InterDigital, Inc. |
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| 11/12 | Lorgeoux, Mikael | Canon Research Centre France |
| 11/12 | Lou, Hanqing | InterDigital, Inc. |
| 11/12 | Lu, kaiying | MediaTek Inc. |
| 11/12 | Lu, Liuming | ZTE Corporation |
| 11/12 | Ma, Mengyao | HUAWEI |
| 11/12 | Malinen, Jouni | Qualcomm Incorporated |
| 11/12 | Max, Sebastian | Ericsson AB |
| 11/12 | McCann, Stephen | Huawei Technologies Co.,  Ltd |
| 11/12 | Monajemi, Pooya | Cisco Systems, Inc. |
| 11/12 | Montemurro, Michael | Huawei Technologies Co. Ltd |
| 11/12 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| 11/12 | Ouchi, Masatomo | Canon |
| 11/12 | Palm, Stephen | Broadcom Corporation |
| 11/12 | Patil, Abhishek | Qualcomm Incorporated |
| 11/12 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 11/12 | Petrick, Albert | InterDigital, Inc. |
| 11/12 | Petry, Brian | Broadcom Corporation |
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| 11/12 | Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| 11/12 | Qi, Emily | Intel Corporation |
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| 11/12 | Reshef, Ehud | Intel Corporation |
| 11/12 | Sadeghi, Bahareh | Intel Corporation |
| 11/12 | Sedin, Jonas | Ericsson AB |
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| 11/12 | Stacey, Robert | Intel Corporation |
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| 11/12 | Ustunbas, Seda | ITU,Vestel |
| 11/12 | Venkatesan, Ganesh | intel corporation |
| 11/12 | Verma, Sindhu | Broadcom Corporation |
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| 11/12 | Wang, Chao Chun | MediaTek Inc. |
| 11/12 | Wang, Huizhao | Quantenna Communications, Inc. |
| 11/12 | Wang, Lei | Futurewei Technologies |
| 11/12 | Wilhelmsson, Leif | Ericsson AB |
| 11/12 | Wullert, John | Perspecta Labs |
| 11/12 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 11/12 | Young, Christopher | Broadcom Corporation |
| 11/12 | Zein, Nader | NEC Laboratories Europe |
| 11/12 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 11/12 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r11. The agenda was slight modified.

**Submissions**

1. [992r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0992-06-00be-mac-pdt-nsep-tbds.docx) **MLO mandatory/optional** Laurent Cariou [1 SP]

C: For the last bullet, regular AP MLD will not support NSTR link pairs?

A: I means regular AP MLD will be STR AP MLD.

C: Then need to change it like that.

C: Is this only for R1 or it could not be in the future?

A: I don’t think this would be in R2 as well. I don’t like it.

C: I think in the future we can have it. It’s not reasonable. We can decide it in R2. We don’t need to prevent it at this time.

A: I’d like to restrict this.

C: Could you remove “if defined” in the second bullet because it is already in R1?

A: Yes

C: we don’t have the definition of soft-AP yet. So, I think the “if defined” is important.

A: Fine with it.

**SP8: Do you agree to add the following to the SFD:**A multi-radio non-AP MLD that is operating on a pair of links on which it is STR capable shall be capable of operating with channel aggregation on that pair of links?A regular AP MLD (that corresponds to an AP MLD that is not a soft-AP MLD, if defined) shall be an STR AP MLD

70/32/18

1. [1140r5](https://mentor.ieee.org/802.11/dcn/20/11-20-1140-05-00be-ecsa-for-multi-link-operation.pptx) eCSA for multi link operation Laurent Cariou [6 SP]
   * SP1bis (merging SP1 and SP4)
   * If an AP (AP1) of an AP MLD includes a (extended) Channel Switch Announcement element and a Max Channel Switch Time element (if present) or includes a Quiet element and optionally a Quiet Channel element in a beacon frame or probe response frame it transmits, then another AP (AP2) of the AP MLD shall include in the beacon and probe response frames it transmits (or if another AP (AP2) of the AP MLD corresponds to a nontransmitted BSSID, then the transmitted BSSID in the same multiple BSSID set as AP2 shall include in the beacon and probe response frame it transmits) the (extended) Channel Switch Announcement element and Max Channel Switch Time element or the Quiet element and Quiet Channel element in the per-STA profile corresponding to AP1 in a Multi-link element
     + The timing fields in the Quiet element, Quiet Channel element, (extended) Channel Switch Announcement element shall be applied in reference to the most recent TBTT and BI indicated in the corresponding element(s) of AP1 and not to the TBTT and BI of the other AP (AP2) of the AP MLD
     + Note: the CSA/eCSA/Max Channel Switch Time elements will be included in every beacon and probe response frames on all links of the AP MLD from right after the time AP1 includes the elements in its beacons until the intended channel switch time

C: Beacon frame will be quite long. We already have critical update procedure. I don’t think this should be mandatory. SP text is also complicated.

A: For overhead, this extended channel switching will not happen often. It will be included only when it happens.

C: It’s very nice.

59/22/34

1. 1358r5,

* **SP2: Do you support to amend the TGbe SFD as the following?**

In R1, 802.11be defines a directional-based TID-to-link mapping mechanism among the setup links of a MLD.

* + By default, after the multi-link setup, all TIDs are mapped to all setup links.
  + The multi-link setup may include the TID-to-link mapping negotiation.
    - TID-to-link mapping can have the same or different link-set for each TID unless a non-AP MLD indicates that it requires to use the same link-set for all TIDs during the multi-link setup phase.
      * NOTE – Such indication method by the non-AP MLD is TBD (implicit or explicit).
  + The TID-to-link mapping can be updated after multi-link setup through a negotiation, which can be initiated by any MLD.
    - Format TBD.
      * NOTE – When the responding MLD cannot accept the update, it can reject the TID-to-link mapping update.
  + The support of the TID-to-link mapping negotiation is optional.

[Motion 54, [29] and [169]]

C: What is new information for R1?

A: TID-link-mapping is negotiation procedure.

C: We already defined this is for R2.

A: No we didn’t decide this for R2.

C: What is new thing for this?

A: This is for QoS and lower latency support.

C: I support this can support the lower latency. This should be critical for R1.

C: I support this direction for lower latency traffic. We already simulated. Our contribution is in the queue. I can show it later.

84/13/29

1. 1835r1 ML Element Common Format and Types Rojan Chitrakar

C: Option 1 has several restrictions on NDP Probe Request. During the NDP Probe Request, some common information can be included. We haven’t decided which information should be included in NDP Probe Request. And partial request information could be included in Per-STA Profile.

C: I prefer the option 2. ….

Many people mentioned that they prefer the option 2 rather than option 1.

C: Link ID has different meaning for some cases. For example, in association request, it can indicate the targeting AP instead of its non-AP STA. I’m preparing the PDT. We can discuss it there.

C: For format of two control fields, TBD is in Multi-link Control field and reserved is in Per-STA control field. Any reason?

A: I didn’t modify that part. It’s already in D0.1. I don’t have strong opinion. Abhi, what do you think?

C: Basically, we need more discussion on Complete Profile field in Per-STA Profile. However, I’m fine with aligning both them each other.

A: Ok, I change TBD to Reserved in Multi-link control field.

A: Option 2 has the majority. I can remove the option 1 at this time.

C: Size of Type field can be TBD? We didn’t have much discussion on that. At the future, we may have other types. So, not sure that we have fixed 4 bits for types at this time.

A: What size do you have in your mind?

A: I can defer this SP

1. [1651r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1651-01-00be-pdt-tbds-mac-mlo-discovery-discovery-procedures-including-probing-and-rnr.docx) MLO–Discovery Laurent Cariou

C: For partial information request, we need more discussion. We can discuss it in my document.

A: Fine. I will remove this part in this SP.

C: For issue 4, is there any difference from baseline?

C: Regarding the size of change sequence, in the baseline, the size is 1 octect. 4 bits is risky.

A: If group wants it, I can make it TBD at this time.

C: For addressing part in MLD Probe request, do you think there is no other case?

A: I’m fine that you bring other cases if you have any. At this time we can remove TBD.

C: Regarding the Type field, there are two types. Among them, the basic ML element will contain the Per-STA profile.

A: I’ll not touch that part at this SP. Rojan will cover this. You can talk to Rojan.

A: Can we run SP except issue 4?

C: I have a concern on issue 3 also.

A: Issue 3 is basic one.

C: What about the change sequence?

A: I already changed the size of the change sequence to TBD.

1651r4:

SP: Do you support to incorporate the proposed draft text in 11-20/1651r4 except the text related to issue 4 into TGbe Draft 0.2?

43/18/26

The meeting is adjourned at 11:53 ET

**Monday 16 November 2020, 10:00 –12:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 10:03am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

**Recorded attendance through Imat and e-mail:**

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| Timestamp | Name | Affiliation |
| 11/16 | Abouelseoud, Mohamed | Sony Corporation |
| 11/16 | Adhikari, Shubhodeep | Broadcom Corporation |
| 11/16 | Akhmetov, Dmitry | Intel Corporation |
| 11/16 | Baek, SunHee | LG ELECTRONICS |
| 11/16 | Bahn, Christy | IEEE STAFF |
| 11/16 | Bankov, Dmitry | IITP RAS |
| 11/16 | Bluschke, Andreas | Signify |
| 11/16 | Bredewoud, Albert | Broadcom Corporation |
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| 11/16 | CHAN, YEE | Facebook |
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| 11/16 | Chu, Liwen | NXP Semiconductors |
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| 11/16 | Fang, Yonggang | Self |
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| 11/16 | Han, Jonghun | SAMSUNG |
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| 11/16 | kim, namyeong | LG ELECTRONICS |
| 11/16 | Kim, Sang Gook | LG ELECTRONICS |
| 11/16 | Klein, Arik | Huawei Technologies Co. Ltd |
| 11/16 | Klimakov, Andrey | Huawei Technologies Co., Ltd |
| 11/16 | Ko, Geonjung | WILUS Inc. |
| 11/16 | Kwon, Young Hoon | NXP Semiconductors |
| 11/16 | Lalam, Massinissa | SAGEMCOM BROADBAND SAS |
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| 11/16 | Levy, Joseph | InterDigital, Inc. |
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| 11/16 | Liu, Jianfei | HUAWEI |
| 11/16 | Liu, Yong | Apple, Inc. |
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| 11/16 | Nezou, Patrice | Canon Research Centre France |
| 11/16 | Ozbakis, Basak | VESTEL |
| 11/16 | Park, Minyoung | Intel Corporation |
| 11/16 | Patil, Abhishek | Qualcomm Incorporated |
| 11/16 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
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| 11/16 | Rege, Kiran | Perspecta Labs |
| 11/16 | RISON, Mark | Samsung Cambridge Solution Centre |
| 11/16 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 11/16 | Salman, Hanadi | Istanbul Medipol University; VESTEL |
| 11/16 | Seok, Yongho | MediaTek Inc. |
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| 11/16 | Wang, Huizhao | Quantenna Communications, Inc. |
| 11/16 | Wang, Lei | Futurewei Technologies |
| 11/16 | Wentink, Menzo | Qualcomm |
| 11/16 | Wullert, John | Perspecta Labs |
| 11/16 | Yang, Jay | Nokia |
| 11/16 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 11/16 | Yee, James | MediaTek Inc. |
| 11/16 | yi, yongjiang | Futurewei Technologies |
| 11/16 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 11/16 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r12.

**Submissions**

* Technical Submissions: **Run SPs from Previous Topics [nominally 10 mins total]**

1. [680r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0680-02-00be-operating-bandwidth-indication-for-eht-bss.pptx) Operating Bandwidth Indication for EHT BSS Guogang Huang [2 SPs]

**SP3: Do you support to use 3 bits of Channel Width field in EHT operation element to indicate the channel width for EHT BSS as following**

* 1. 0: 20
  2. 1: 40
  3. 2: 80
  4. 3: 160
  5. 4: 320
  6. 5~7: reserved

Discussion: None

SP is approved with unanimous consent

* **SP2: Do you support to define EHT Operation element with N number of CCFS subfields to indicate channel configuration for EHT BSS?**
  + Option 1. N=1
  + Option 2. N=2
  + Abstain

Discussion:

C: Why do we need the CCFS ?

A: we need to know the location of the corresponding channel. I know one CCFS is enough to indicate this. The legacy things will be used for legacy CCFs.

Option 1/Option 2/Abstain: 20/26/43

Discussion:

C: More people likes option 2. You can do your SP with option 2.

**SP4 of r3: Do you support to define EHT Operation element with two CCFS subfields to indicate channel configuration for EHT BSS?YNAbstain**

C: Option 2 needs BW field?

A: Yes, we need BW field.

C: why? CCFs implies BWs in Option2.

A: My proposal still need BWs

C: I think two CCFs and BW have too much overhead.

A: Someone wants to reuse 11ac methods.

C: there is two type of 320Mhz. So, this SP text is not clear.

C: why do we need 2 CCFs for indicating 320Mhz? One is author already mentioned. The other is we may need 2 CCFs for implementation of the STAs which uses 2 RFs for 320MHz.

Y/N/A: 24/31/31

**SP5 of r3: Do you support to define EHT Operation element with one CCFS subfield to indicate channel configuration for EHT BSS?YNAbstain**

Y/N/A: 28/19/38

1. [702r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0702-01-00be-fragmentation-in-mlo.pptx) Fragmentation in MLO Abhishek Patil [4 SPs]

**SP1 of 702r2: Do you support that the 802.11be amendment shall disallow static fragmentation in MLO?**

Discussion:

C: Do you want to disallow this for MLO only?

A: Basically, I want to disallow this for EHT.

C: I disagree with the complexity of fragmentation. I’m fine with disallowing the fragmentation of A-MPDU but it should allow the fragmentation of S-MPDU.

C: Do you mean this disallows any fragmentation?

A: 11ax allows the dynamic fragmentation.

C: It’s not between two MLDs. I think they should be for two MLOs. They can be allowed in link level association. Right.

C: Do you mean the static fragmentation is disallowed in STAs in the same MLDs?

A: we already have dynamic fragmentation.

C: You still want to disallow dynamic fragmentation?

Y/N/A: 35/16/25

* **SP2: Do you support that dynamic fragmentation between two MLDs is not supported in R1?**

C: Dynamic fragment is useful for PPDU alignments. So, this should be in R1. If Retransmission of the fragmentation should be on the same link or different link can be in R2.

Y/N/A: 41/30/26

* Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

1. [1594r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1594-03-00be-mlo-critical-updates-indication-address-missing-details.docx) MLO critical updates indication - address missing details Abhishek Patil

Summary:

Discussion:

C: what does that link mean?

A: The link that the AP is operating.

C: Could you make it clearly?

C: What about non-transmitted BSSID case?

A: Yes, we need to cover that case. The SP related to that is still pending.

SP: Do you support to incorporate the proposed draft text in 11-20/1594r4 into Tgbe Draft0.2?

Y/N/A: 41/1/37

* Technical Submissions: **ML-Constrained ops [10 mins if SP only, 30 mins otherwise]**

1. [1062r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1062-03-00be-error-recovery-for-non-str-mld.pptx) Error recovery for non-STR MLD Yunbo Li [SP]

* **SP1: Do you agree that after two PPDUs with end time alignment are transmitted by a NSTR MLD on link 1 and link2 respectively, STA 1 affiliated with this NSTR MLD may use a greater than SIFS time interval between the ending of successful response frame and following PPDU within a TXOP on link1 when PHY-RXSTART.indication is received but FCS is not correct for response frame on link 2?**
  + STA 1 shall transmit the following PPDU only if the CS mechanism indicates that the medium is idle;
  + The usage is to leave enough time for PIFS sensing on link 2;
  + Note: it is for R1

Discussion:

C: This means just to use larger than SIFS and the detailed value is TBD? Right

A: Yes.

C: Is this for non-STR MLD?

C: What about TX is STR and RX is N-STR?

A: I don’t see any problem on that case.

C: You only consider that case for non-STR Transmitter?

A: Yes.

Y/N/A: 34/20/26

1. [1365r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1365-01-00be-further-discussion-about-blindness-for-non-str-mld.pptx) Further Discussion about Blindness for non-STR MLD Yunbo Li

Summary:

Discussion:

C: I support this.

C: There is opposite direction such as RTS sending mechanism which SP is pending on the server. Some agreement on that. We agree that we need to further discuss on that issue.

A: If RTS is sent in mediumSyncDelay, the RTS can be collided with BA. This can solve that problem.

C: If the preamble is decoded and data is not decoded, STA can initiate EIFS. ... Need more discussion.

C: I also agree with the previous commenters. Need more discussion.

SP is defered

1. [1085r4](https://mentor.ieee.org/802.11/dcn/20/11-20-1085-04-00be-str-capability-signaling.pptx) STR-Capability-Signaling Dibakar Das

Discussion:

C: What is the maximum number of links? Is this for STR or non-STR?

A: It’s independent from STR or non-STR. Just the number of radio/links.

C: Got it.

C: how does it indicate the single radio case?

A: So, I mentioned here that it’s related to Data frame exchange in the SP text.

C: SP 3, because the signaling indication overhead is not big. ...

C: Your intention is only bitmap. Or other additional information can be included?

A: This is just common part on either method.

C: Other indication could be discussed together.

C: SP 2, you have two subfields, EMLSR mode and EMLMR. I think 1 bit is enough. STA cannot have both mode.

A: AP MLD can support two modes.

The meeting is adjourned at 11:58 ET

Thursday **19 November 2020, 19:00 –22:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 19:03am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

**Recorded attendance through Imat and e-mail:**

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 11/19 | Adachi, Tomoko | TOSHIBA Corporation |
| 11/19 | Asterjadhi, Alfred | Qualcomm Incorporated |
| 11/19 | Baek, SunHee | LG ELECTRONICS |
| 11/19 | Bravo, Daniel | Intel Corporation |
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| 11/19 | chen, jindou | Huawei Technologies Co. Ltd |
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| 11/19 | Cheng, Paul | MediaTek Inc. |
| 11/19 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 11/19 | Coffey, John | Realtek Semiconductor Corp. |
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| 11/19 | Kain, Carl | USDoT |
| 11/19 | kamath, Manoj | Broadcom Corporation |
| 11/19 | Kim, Jeongki | LG ELECTRONICS |
| 11/19 | kim, namyeong | LG ELECTRONICS |
| 11/19 | Kim, Sang Gook | LG ELECTRONICS |
| 11/19 | Kim, Sanghyun | WILUS Inc |
| 11/19 | Kim, Yongho | Korea National University of Transportation |
| 11/19 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 11/19 | Kneckt, Jarkko | Apple, Inc. |
| 11/19 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 11/19 | Kwon, Young Hoon | NXP Semiconductors |
| 11/19 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 11/19 | Liu, Jianfei | HUAWEI |
| 11/19 | Lou, Hanqing | InterDigital, Inc. |
| 11/19 | Lu, kaiying | MediaTek Inc. |
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| 11/19 | Montemurro, Michael | Huawei Technologies Co. Ltd |
| 11/19 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
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| 11/19 | yi, yongjiang | Futurewei Technologies |
| 11/19 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 11/19 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r16.

* 1. [903r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0903-01-00be-multi-link-group-addressed-data-frame-delivery-follow-up.pptx) Multi-link Group Addr. Data Frame Delivery Follow up Po-Kai Huang [1 SP]
* **SP1: Do you support the following in R1?**
  + - if a non-AP MLD chooses to receive group addressed data frame, the non-AP MLD shall follow the baseline rules to receive the group address data frames on any link that the non-AP MLD selects to receive group addressed data frames.
    - AP MLD duplicates a group addressed data frame that is expected to be received by the non-AP MLD and schedules for transmission in the setup links with the non-AP MLD

Discussion:

C: 442 is similar to this. The wording is a little different. Can we say one link instead of any link?

A: Ok

C: AP MLD behavior is related to what is duplicating.

C: I can bring that part.

C: What does the first bullet mean?

A: STA can choose to receive group addressed frame.

C: In second bullet, what does the scheduled mean? The frame is sent via all links.

A: This is legacy device behavior.

C: Intends instead of choose

A: Ok.

C: Generally separate SN is used for all links?

A: I don’t touch that in this SP. Need more discussion on that.

**SP1(will be r5): Do you support the following in R1?-** if a non-AP MLD intends to receive group addressed data frame, the non-AP MLD shall follow the baseline rules to receive the group address data frames on any one link that the non-AP MLD selects to receive group addressed data frames.- A group addressed data frame that is expected to be received by the non-AP MLD shall be scheduled for transmission in all the links setup with the non-AP MLD

40/4/32

* 1. [1052r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1052-01-00be-eht-bss-follow-up-eht-bss-operating-parameter-update.pptx) EHT operating parameter update Liwen Chu [SP 1]

SP1: Do you support to announce the EHT operating mode through adding the additional fields (EHT Channel Width, Additional EHT Rx Nss) to Operating Mode Notification element?

Discussion:

C: AP and STA use this?

A: Yes, both can use it.

C: Should it be negotiated between them?

A: This is just announcement. Need ack

C: There are two things for this. Broadcast and individual mode. What do you consider?

A: I consider both

C: We can have more discussion for draft text.

C: Need to change text

A: Ok

C: Is this new element or existing element?

A: existing element. New fields are added.

**SP1 of (will be r2): Do you support to announce the EHT operating mode change by adding the additional fields (EHT Channel Width, Additional EHT Rx Nss) to Operating Mode Notification element?**

Discussion:

A: This is for R1 and SFD

43/0/32

* 1. [1835r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1835-02-00be-pdt-mac-mlo-ml-element-common-format-and-types.docx) ML Element Common Format and Types Rojan Chitrakar [SP]

Discussion:

C: we do not know how many type do we have. Thank you for considering my comment.

C: we have two octets for mult-link control. We can change the size of the field later after deciding the size.

**Straw Poll: Which option do you support for the size of the Type subfield?**Option 1: 4 bitsOption 2: TBDAbstain

Discussion:

C:Can we have different name of Type subfield?

A: We can do it later.

C: Fine

Option1 19/ Option 2 33/Abstain 19

**Straw Poll: Do you support to incorporate the proposed draft text in document 11-20/1835r3 (with Type subfield size option2) to the next revision of TGbe Draft?**Yes/No/Abstain: 53/3/13

* 1. [1651r6](https://mentor.ieee.org/802.11/dcn/20/11-20-1651-05-00be-pdt-tbds-mac-mlo-discovery-discovery-procedures-including-probing-and-rnr.docx) PDT MAC MLO – Discovery Laurent Cariou [SP]

Discussion:

C: By address field, it can indicate the current AP or other AP/link?

C: Regarding the addresse field, we can keep TBD for other conditions.

C: For link id, how does the STA indicate the transmitting AP if it does not include Per-STA profile. I think it does not make sense.

C: I think the transmitting AP information should be included in Probe Response due to inheritance approch.

**Straw Poll: Do you support to incorporate the proposed draft text in document 11-20/1651r6 without issue 4 to the next revision of TGbe Draft?**Yes/No/Abstain: 34/10/28

* 1. [1743r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1743-01-00be-pdt-tbd-mac-emlsr-operation.pptx) PDT TBD MAC EMLSR Operation Minyoung Park

Discussion:

C: Regarding the rate, I recommend to use the basic rate. Trigger frame is using MU-RTS or BSRP Trigger. In this case, STA use MU.

A: Are you suggesting that instead of listing 3 rates, <=24 Mbps?

C: I just want to use the basic rates.

A: For second trigger frame, if the STA does not support UL MU, do you have concern on BSRP Trigger? If this feature is supported e.g., BSRP, then STA can send UL MU.

C: I mean MU-RTS is Trigger frame.

A: MU-RTS uses non-HT or non-HT dup PPDU.

C: I have similar to Chunyu, is it possible 1Mbps?

A: This is just non-HT and non-HT dup. 6Mbps is the minimum rate in OFDM.

C: RTS/CTS could be one of possible initial frames.

C: If optionally, STA chooses 0 us, RTS/CTS can be used.

C: Do we need BSRP?

A: Some members say that BSRP is useful for initiating UL frame.

C: How about DL ?

C: For delay, the second sentence is much better. Time need for what?

A: You want to have explanation for what they have for the time. I’ll check the proper term in the legacy spec.

C: Do we need to define TBD element? MLD level capability element?

A: ML element can contain the MLD level capapbility element.

* 1. [1881r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1881-00-00be-resolve-tbds-in-35-3-8.docx) Resolve TBDs in 35.3.8 Abhishek Patil

Discussion:

C: Can we have more than 1 bits of this flag for synchronization?

A: I already had offline discussion. We can discuss it later.

**Straw Poll: Do you support to incorporate the proposed draft text in document 11-20/1881r0 to the TGbe Draft 0.2?**

**Approved with unanimous consent**

* 1. [1545r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1545-00-00be-mld-security-considerations.pptx) MLD security considerations Gaurav Patwardhan

Discussion:

C: External Key-holder is needed for both STA and AP side always? Or one of them depending on scenarios?

A: Both sides can use the external key-holder use case independently but the AAD and Nonce needs to be populated by both the sides to correctly encrypt and decrypt the frame.

A: Basically, MLD MAC addresses will be used for generating AAD and nounce.

C: I’m favor of this. I already presented the similar thing early in March. For retransmission, the use case is slightly different. I support of this proposal.

C: For MAC address randomization, how this is sloved today?

**SP1: In R1 do you support :**

1. **replacing Addresses A1 and A2 with MLD MAC Addresses for AAD computation,**
2. **replacing Address A3 (only in case when A3 is set to BSSID) with MLD MAC Address for AAD computation,**
3. **Using MLD MAC address in A2 for constructing Nonce**

**for the cases <To DS =0, From DS = 1> and <To DS = 1, From DS = 0> for individually addressed Data frames?**

38/8/23

SP2: **In R1 do you support:**

1. **replacing Addresses A1 and A2 with MLD MAC Addresses for AAD computation,**
2. **replacing Addresses A3 and A4 (only in case when A3 and A4 both are set to BSSID) with MLD MAC Addresses for AAD computation,**
3. **Using MLD MAC address in A2 for constructing Nonce**

**for the case <To DS =1, From DS = 1> for individually addressed Data frames?**

Discussion:

C: This is for managed network?

A: Yes.

C: Then, The issue of the managed network is we need to define how to establish the mesh communication peer relationship. I don’t know what the name called. If we accept this one, we need to extend the mesh peer relationship. This is not the complete solution.

C: I have a similar comment that this mesh hasn’t been discussed in 11be.

C: Sometimes, A3 and A4 are not equal. But in your SP, A3 and A4 have the same MLD MAC address.

A: we want to change this only for the case of To DS and From DS set to 1. A3 and A4 are set to BSSID. We are not changing all. Any other case, we are not bringing this.

C: I don’t see any problem on this. Why do you say the mesh here?

30/8/27

The meeting is adjourned at 21:58 ET

**Monday 30 November 2020, 19:00 –22:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 19:03am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

**Recorded attendance through Imat and e-mail:**

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 11/30 | Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| 11/30 | Adachi, Tomoko | TOSHIBA Corporation |
| 11/30 | Baek, SunHee | LG ELECTRONICS |
| 11/30 | Carney, William | Sony Corporation |
| 11/30 | CHAN, YEE | Facebook |
| 11/30 | chen, jindou | Huawei Technologies Co. Ltd |
| 11/30 | Cheng, Paul | MediaTek Inc. |
| 11/30 | CHERIAN, GEORGE | Qualcomm Incorporated |
| 11/30 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 11/30 | Chu, Liwen | NXP Semiconductors |
| 11/30 | Das, Subir | Perspecta Labs Inc. |
| 11/30 | de Vegt, Rolf | Qualcomm Incorporated |
| 11/30 | Ding, Baokun | Huawei Technologies Co. Ltd |
| 11/30 | Dong, Xiandong | Xiaomi Inc. |
| 11/30 | Fang, Yonggang | Self |
| 11/30 | GUIGNARD, Romain | Canon Research Centre France |
| 11/30 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 11/30 | Haasz, Jodi | IEEE Standards Association (IEEE-SA) |
| 11/30 | Haider, Muhammad Kumail | Facebook |
| 11/30 | Hamilton, Mark | Ruckus/CommScope |
| 11/30 | Han, Zhiqiang | ZTE Corporation |
| 11/30 | Han, Zhiqiang | ZTE Corporation |
| 11/30 | Ho, Duncan | Qualcomm Incorporated |
| 11/30 | Hong, Hanseul | WILUS Inc. |
| 11/30 | Hu, Chunyu | Facebook |
| 11/30 | Huang, Guogang | Huawei |
| 11/30 | Inohiza, Hirohiko | Canon |
| 11/30 | Jang, Insun | LG ELECTRONICS |
| 11/30 | Jiang, Jinjing | Apple, Inc. |
| 11/30 | Jung, hyojin | Hyundai Motor Company |
| 11/30 | Kandala, Srinivas | SAMSUNG |
| 11/30 | Kedem, Oren | Huawei Technologies Co. Ltd |
| 11/30 | Kim, Jeongki | LG ELECTRONICS |
| 11/30 | kim, namyeong | LG ELECTRONICS |
| 11/30 | Kim, Sang Gook | LG ELECTRONICS |
| 11/30 | Kim, Sanghyun | WILUS Inc |
| 11/30 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 11/30 | Kneckt, Jarkko | Apple, Inc. |
| 11/30 | Ko, Geonjung | WILUS Inc. |
| 11/30 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 11/30 | Kwon, Young Hoon | NXP Semiconductors |
| 11/30 | Levy, Joseph | InterDigital, Inc. |
| 11/30 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 11/30 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 11/30 | Liu, Yong | Apple, Inc. |
| 11/30 | Lorgeoux, Mikael | Canon Research Centre France |
| 11/30 | Lou, Hanqing | InterDigital, Inc. |
| 11/30 | Lu, kaiying | MediaTek Inc. |
| 11/30 | Lu, Liuming | ZTE Corporation |
| 11/30 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 11/30 | Ma, Mengyao | HUAWEI |
| 11/30 | Montemurro, Michael | Huawei Technologies Co. Ltd |
| 11/30 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| 11/30 | Naribole, Sharan | SAMSUNG |
| 11/30 | Ng, Boon Loong | Samsung Research America |
| 11/30 | Ng, Boon Loong | Samsung Research America |
| 11/30 | Ouchi, Masatomo | Canon |
| 11/30 | Palayur, Saju | Maxlinear Inc |
| 11/30 | Park, Minyoung | Intel Corporation |
| 11/30 | Patil, Abhishek | Qualcomm Incorporated |
| 11/30 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 11/30 | Petrick, Albert | InterDigital, Inc. |
| 11/30 | Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| 11/30 | Raissinia, Alireza | Qualcomm Incorporated |
| 11/30 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 11/30 | Sedin, Jonas | Ericsson AB |
| 11/30 | Sun, Li-Hsiang | InterDigital, Inc. |
| 11/30 | Sun, Yanjun | Qualcomm Incorporated |
| 11/30 | Tanaka, Yusuke | Sony Corporation |
| 11/30 | Torab Jahromi, Payam | Facebook |
| 11/30 | Wang, Chao Chun | MediaTek Inc. |
| 11/30 | Wang, Lei | Futurewei Technologies |
| 11/30 | Wullert, John | Perspecta Labs |
| 11/30 | Yang, Jay | Nokia |
| 11/30 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 11/30 | Yee, James | MediaTek Inc. |
| 11/30 | yi, yongjiang | Futurewei Technologies |
| 11/30 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 11/30 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r18.

1. [586r9](https://mentor.ieee.org/802.11/dcn/20/11-20-0586-09-00be-mlo-signaling-of-critical-updates.pptx) MLO: Signaling of critical updates Abhishek Patil [2 SPs]

**SP#7: Do you support the following:**

- if an AP corresponding to a nontransmitted BSSID in a multiple BSSID set is affiliated with an AP MLD, then the AP corresponding to the transmitted BSSID in the same Multiple BSSID set shall include in the Beacon and Probe Response frames it transmits the Change Sequence fields that indicate changes of system information for that AP corresponding to a nontransmitted BSSID and other APs within the AP MLD to which that AP corresponding to the nontransmitted BSSID is affiliated with, where the change sequence field value for each AP is initialized to 0, and is incremented when there is a critical update to the operational parameters for that AP

Approved with unanimous consent

**SP#8: Do you agree that**

* + For the AP corresponding to nontransmitted BSSID in a multiple BSSID set, that is part of an MLD, the early indication shall be carried in the Nontransmitted BSSID Capability field (for that Nontransmitted BSSID) in the Beacon frame(s) transmitted by the transmitted BSSID until (and including) the next DTIM Beacon frame of the nontransmitted BSSID when there is a change to the change sequence value for any other AP of that MLD reported in the RNR

Approved with unanimous consent

* **Do you agree that a STA of a non-AP MLD may send an individually addressed Probe Request frame to the peer AP on its link, to gather updates to the operational parameter(s) of another AP of the AP MLD with which the non-AP MLD has setup ML setup.**

C: Is this a multi-link Probe Request?

A: At this time, it’s open. Other contribution by Namyeong can cover that part.

C: I think this should be ML Probe Request. The detail is missing.

C: Is this for multi radio or a single radio? If STAs send this frame for other Aps, they can collide other frame?

A: This can apply to a single radio or multi-radio. Broacast Probe Response can help it.

C: Is this just ML Probing or a specific probing?

C: I have a concern for flooding probing.

1. [593r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0593-01-00be-eht-bss-follow-up-eht-bw-nss-mcs-and-he-bw-nss-mcs.pptx) EHT BSS Op.-EHT BW Nss MCS and HE BW Nss MCS Liwen Chu [SP1-3]

* **SP1: Do you support that the max supported HE BW capability indicated in HE capabilities element by an EHT STA is no more than the max supported EHT BW capability indicated in EHT capabilities element by the EHT STA**
  + When the max supported EHT BW capability indicated in EHT capabilities element by an EHT STA is no more than 160MHz, the max supported HE BW capability indicated in HE capabilities element by the EHT STA is same as the max supported EHT BW capability indicated in EHT capabilities element.
  + When the max supported EHT BW capability indicated in EHT capabilities element by an EHT STA is 320 MHz, the max supported HE BW capability indicated in HE capabilities element by the EHT STA is 160MHz

Discussion: None

Approved with unanimous consent

* **SP2: Do you support that at any BW+MCS allowed by HE, the max supported HE Nss capability indicated in HE capabilities element (Nss for transmitting HE PPDU) by an EHT STA/AP is no more than the max supported EHT Nss capability indicated in EHT capabilities element (Nss for transmitting EHT PPDU) by the EHT STA.**
  + When the max supported EHT Nss capability indicated in EHT capabilities element by an EHT STA at a BW+MCS is no more than 8, the max supported HE Nss capability indicated in HE capabilities element by the EHT STA is same as the max supported EHT Nss capability indicated in EHT capabilities element at the BW+MCS.
  + When the max supported EHT Nss capability indicated in EHT capabilities element by an EHT STA at a BW+MCS is more than 8, the max supported HE Nss capability indicated in HE capabilities element by the EHT STA at the BW is 8 at the BW+MCS

Discussion:

C: We don’t have any rule for defining Nss value less than 8 here. That’s just 8 or more than 8.

A: We have. No more than 8.

C: Got it.

C: What do you mean EHT Nss capability? Is that a supported EHT Nss capabilitiy?

A: Similar to the 11ax. This EHT Nss capability is announced based on the BW and MCS. We don’t have the detailed format in this SP here. Similar with 11ax.

* Approved with unanimous consent

1. [1085r5](https://mentor.ieee.org/802.11/dcn/20/11-20-1085-04-00be-str-capability-signaling.pptx) STR-Capability-Signaling Dibakar Das [SP]

**SP1: Do you agree to add the following to SFD:**

* **the common info part of the basic ML element transmitted by a non-AP MLD in a (Re)Association Request frame shall include a field that indicates the maximum number of affiliated STAs in the non-AP MLD that support simultaneous exchange of Data frames (n)**
  + a field value that corresponds to n=1 indicates that the non-AP MLD is a single radio MLD
  + a field value that corresponds to n=2 or more indicates that the non-AP MLD is a multi-radio MLD ?

Discussion:

C: Regarding the data frame, do you have any reason to limit to the data? Because the control frame also can be set ....

A: We have EMLSR stuff. I don’t know we can receive the control frames on two links .

C: EMLSR also can use one radio.

A: But eventually you can receive control frame on two links. Right?

C: it can just misleading that. We cannot transmit the control frame or management simultaneously.

A: My understanding is there is nothing preventing you’re receiving RTS or some control frames.

C: Data frame, we can also exchange control frame and management frame

C: But in EMLSR case, you cannot exchange control frame of the multiple links simultaneously.

C: we can generalize it just removing the data or adding the control frame.

C: You mention the common info part is going to contain fields when it’s transmitted by an non-AP MLD in certain frame, does it mean you will have basic ML element that will conditionally depending on where is carried by who is transmitted

A: I don’t know who is transmitted basic ML element send outside the association request frame non-AP MLD can also send it. At least that time, Association and reassociation can contain the basic ML element.

C: How would you signal if you’re going to operate in 2.4 independently of 5 , 6 within a single STA?

A: You can still signal two. Intension is not to support this. It’s hard to signal

C: there is no confusion of data frame. Data frame is more clear way to say that.

A: I agree with that. If we need additional thing for control, we can add that in the future.

42Y/7N/36A

**SP2: Do you agree to add the following to SFD:**

* **The common part of the basic ML element transmitted by an MLD contains an EMLSR Mode subfield and an EMLMR Support subfield ?**

C: Can both them be set to 1 at the same?

A: AP can set both them to 1. Non-AP probably not. Doesn’t make sense.

Approved with unanimouse consent

**SP3: Do you agree to add the following to SFD:**

* **an MLMR non-AP MLD that has at least one NSTR pair of links shall include in the STA profiles of a basic ML element, a bitmap where each bit represents STR/NSTR capability for a pair of links containing this STA, otherwise it shall not include the bitmap?**
  + whether additional signaling is provided is TBD ?

C: additional signaling should be in R2 instead of TBD. TBD is meaningless.

A: Yunbo’s propoal will cover whether it is for R1 or not. We need more discussion. Let’s see others.

C: Each bit represent STR/NSTR capability. The capability is not always transmitted. only indicates the NSTR not includes the both since we have so many bitmaps to indicates the both types.

A: What is the second part?

C: Only indicate NSTR not indicate the STR.

A: If you’re STR, you don’t signal it. Any problem?

C: You can remove the STR.

A: Let’s have more discussion.

C: Echo Yongho’s. A lot of people want to keep additional information. My suggestion is that this additional information is provided in R2 as a compromised solution. TBD seems so meaningless.

A: We can remove this here? You can present thsi You can propose it in your contribution.

C: We need both them together. They are dependent. Instead of separate them, I prefer to add that together.

A: Seems like we need more discussion. I got your point.

C: If you change the links, you may add the signaling which is not association request. I don’t know what the frame is used.

A: We are not thinking about that.

C: SFD asks R1 or R2. Can you add this is for R1? The additional signaling could be in R2. It’s clear we’re not mixing. My personal suggestion is why mixing. We’re open for R2. That could be anybody could propose to R2.

A: I wanna defer it.

C: I think George suggestion is reasonable. Why not runing SP without subbullet?

C: How about adding ”the the additional signaling is provided in R2” and main text is R1?

C: Editorial, do we have MLMR? Just MR is correct.

**SP3: Do you agree to add the following to SFD:**

* **an MR non-AP MLD that has at least one NSTR pair of links shall include in the STA profiles of a basic ML element, a bitmap where each bit represents STR/NSTR capability for a pair of links containing this STA, otherwise it shall not include the bitmap?**

30Y/32N/17A

1. [1263r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1263-01-00be-non-str-blindness-rules-discussion.pptx) Non-STR Blindness Rules Discussion Sharan Naribole

Discussion:

C: In Scenario 2(slide7), Why do you say that the situation is different in intra-BSS PPDU case?

A: Intra-BSS PPDU is related to the PPDU PS. NAV is considering the multiple frame exchanges.

C: I think the probability is not very high.

A: I did not want to exclude any scenario.

C: I agree with option 1. We should not allow blindness recovery.

A: Thanks,

C: AP can provide the some information for this.

A: AP may not know this situation.

C: RTS can cause some collision.

C: Scenario 2, why do we need additional rules?

A: I’ll update more details why we need.

C: Confusing some options. Option 1 is clear.

A: Dibakar proposed blindness recovery to be skipped if NAV is non-zero.

C: Option 3 is opposite thing with option1

A: option 1 is not mine. That is originated from dibakar, yongho, duncun. I don’t want to exclude it.

C: You wanna SP

A: No, not now.

1. [902r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0902-01-00be-group-addressed-frames-delivery-for-mlo-follow-up.pptx) Group addressed frames delivery for MLO follow up Ming Gan

Discussion:

C: Generally, I agree with the general direction. But, need more disucussion for the detailed signaling such as using TIM bitmap. Review some approaches.

C: Do you want this in every Beacon or DTIM Beacon?

A: Usually DTIM Beacon, we can extend this to Beacon.

C:

A: This is similar to other discovery mechanism of other APs. In MLD, one STA wakes and other STAs in doze state. In this case, STA can get the information of other APs with waking up other STAs in doze state.

C: [5] just mentions miss and duplicate group addressed data .

A: STA can change the link to receive the group addressed data of other AP.

C: You want to reuse AID of other AP as one option. It’s confusing.

A: In baseline spec, bit 0 indicates TX BSSSID and other bits are used for non-TX BSSIDs.

C: For other bits, legacy STA thinks differently.

A: Legacy STA ignores thoes bits.

C: What is the assumption of AP?

A: AP2 can know when the AP1 sends group addressed BU1 after which DTIM Beacon.

A: CSN has the same situation.

C:how many bits do you expect?

C: AP MLD should provide that information.

A: The baseline already mentions AP shall provide those information...

C: Need more discussion.

1. [1692r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1692-01-00be-tdls-handling-in-mlo.pptx) TDLS handling in MLO                                                 Abhishek Patil

Discussion:

C: MLD to legacy, you can limit the action. MLD to MLD, we can use the MLD way. But Yours does not seems like MLD way.

Will allocate time for more Q&A.

The meeting is adjourned at 21:58 ET

**Thursday 3 December 2020, 10:00 –12:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 19:03am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
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   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

**Recorded attendance through Imat and e-mail:**

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 12/3 | Adhikari, Shubhodeep | Broadcom Corporation |
| 12/3 | Akhmetov, Dmitry | Intel Corporation |
| 12/3 | Ambede, Abhishek | Ericsson AB |
| 12/3 | Ansley, Carol | IEEE member / Self Employed |
| 12/3 | Asterjadhi, Alfred | Qualcomm Incorporated |
| 12/3 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| 12/3 | Baek, SunHee | LG ELECTRONICS |
| 12/3 | Bankov, Dmitry | IITP RAS |
| 12/3 | Bluschke, Andreas | Signify |
| 12/3 | Bravo, Daniel | Intel Corporation |
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| 12/3 | Choi, Jinsoo | LG ELECTRONICS |
| 12/3 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| 12/3 | Chu, Liwen | NXP Semiconductors |
| 12/3 | CHUN, JINYOUNG | LG ELECTRONICS |
| 12/3 | Coffey, John | Realtek Semiconductor Corp. |
| 12/3 | Das, Subir | Perspecta Labs Inc. |
| 12/3 | Derham, Thomas | Broadcom Corporation |
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| 12/3 | Dong, Xiandong | Xiaomi Inc. |
| 12/3 | Erceg, Vinko | Broadcom Corporation |
| 12/3 | Fang, Yonggang | Self |
| 12/3 | Fischer, Matthew | Broadcom Corporation |
| 12/3 | Gong, Bo | Huawei Technologies Co. Ltd |
| 12/3 | GUIGNARD, Romain | Canon Research Centre France |
| 12/3 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 12/3 | Haasz, Jodi | IEEE Standards Association (IEEE-SA) |
| 12/3 | Haider, Muhammad Kumail | Facebook |
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| 12/3 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
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| 12/3 | Hu, Chunyu | Facebook |
| 12/3 | Huang, Guogang | Huawei |
| 12/3 | Huang, Po-Kai | Intel Corporation |
| 12/3 | Jang, Insun | LG ELECTRONICS |
| 12/3 | kamath, Manoj | Broadcom Corporation |
| 12/3 | Khorov, Evgeny | IITP RAS |
| 12/3 | Kim, Jeongki | LG ELECTRONICS |
| 12/3 | kim, namyeong | LG ELECTRONICS |
| 12/3 | Kim, Sang Gook | LG ELECTRONICS |
| 12/3 | Kim, Sanghyun | WILUS Inc |
| 12/3 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 12/3 | Klein, Arik | Huawei Technologies Co. Ltd |
| 12/3 | Klimakov, Andrey | Huawei Technologies Co., Ltd |
| 12/3 | Ko, Geonjung | WILUS Inc. |
| 12/3 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 12/3 | Kwon, Young Hoon | NXP Semiconductors |
| 12/3 | Levy, Joseph | InterDigital, Inc. |
| 12/3 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 12/3 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 12/3 | Lim, Dong Guk | LG ELECTRONICS |
| 12/3 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| 12/3 | Liu, Jianfei | HUAWEI |
| 12/3 | Lorgeoux, Mikael | Canon Research Centre France |
| 12/3 | Lou, Hanqing | InterDigital, Inc. |
| 12/3 | Lu, kaiying | MediaTek Inc. |
| 12/3 | Lu, Liuming | ZTE Corporation |
| 12/3 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 12/3 | Ma, Mengyao | HUAWEI |
| 12/3 | Martinez Vazquez, Marcos | MaxLinear Corp |
| 12/3 | Max, Sebastian | Ericsson AB |
| 12/3 | Montemurro, Michael | Huawei Technologies Co. Ltd |
| 12/3 | Montreuil, Leo | Broadcom Corporation |
| 12/3 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| 12/3 | Nezou, Patrice | Canon Research Centre France |
| 12/3 | Ng, Boon Loong | Samsung Research America |
| 12/3 | Ouchi, Masatomo | Canon |
| 12/3 | Ozbakis, Basak | VESTEL |
| 12/3 | Park, Minyoung | Intel Corporation |
| 12/3 | Patil, Abhishek | Qualcomm Incorporated |
| 12/3 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 12/3 | Petrick, Albert | InterDigital, Inc. |
| 12/3 | Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| 12/3 | Raissinia, Alireza | Qualcomm Incorporated |
| 12/3 | Reshef, Ehud | Intel Corporation |
| 12/3 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 12/3 | Sedin, Jonas | Ericsson AB |
| 12/3 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| 12/3 | Sun, Li-Hsiang | Sony Corporation |
| 12/3 | Sun, Yanjun | Qualcomm Incorporated |
| 12/3 | Tanaka, Yusuke | Sony Corporation |
| 12/3 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| 12/3 | Verma, Sindhu | Broadcom Corporation |
| 12/3 | VIGER, Pascal | Canon Research Centre France |
| 12/3 | Wang, Chao Chun | MediaTek Inc. |
| 12/3 | Wang, Huizhao | Quantenna Communications, Inc. |
| 12/3 | Wilhelmsson, Leif | Ericsson AB |
| 12/3 | Wullert, John | Perspecta Labs |
| 12/3 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 12/3 | Yee, James | MediaTek Inc. |
| 12/3 | yi, yongjiang | Futurewei Technologies |
| 12/3 | Zaman, Malia | IEEE Standards Association (IEEE-SA) |
| 12/3 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 12/3 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r21.

**Technical submissions:**

1. [974r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0974-02-00be-channel-access-for-str-ap-mld-with-non-str-non-ap-mld.pptx) Chan. Access 4 STR AP MLD with non-STR non-AP MLD Liangxiao Xin [1SP]

**SP1: Do you agree to add the following to 11be R1 SFD:**

* 1. 11be defines a mechanism to solve the following fairness issue in case of channel access between STR MLD and NSTR MLD
     1. Fairness issue: the NSTR non-AP MLD does not gain channel access on any link of one of its NSTR link pairs for a long time because the STR AP MLD always occupies at least one link of the NSTR link pair to transmit DL QoS Data frames to the NSTR MLD
     2. The solution is TBD

Discussion:

C: Do you have any simulation results? Here STR AP MLD ocuppies only one link.

A: Non-STR non-AP MLD could not occupy the channel for a long time. STR AP only can occupy the channel.

C: I’m still not clear what is the fairness issue.

C: What do we need in terms of spec? Implementation? I also want to see the simulation results.

C: I think we need to propose the solution if there is a problem instead of high level approach.

C: I have the same option with George. I think it is implementation issue. We already have start time alignment and end time alignment mechanism for that.

10Y/52N/38A

1. [1743r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1743-03-00be-pdt-tbd-mac-emlsr-operation.pptx) PDT TBD MAC EMLSR Operation Minyoung Park

Discussion:

C: Data rate uses only 6, 12, 24 Mbps. Other data rates are not used?

A: Yes, other rates will not be used.

C: It’s correct. Why cannot we use 1 Mbps?

A: DSSS (1Mbps) is the link quality is not good. DSSS will not be much sense.

C: In 2.4GHz, DSSS can be used.

A: The benefit is not much of it.

C: The spec needs to support the all possible implementations.

C: Editorial comments of name of ML element. The exact name is Common Info field of the Basic variant ML element.

C: OFDMA PPDU is 11a PPDU only? If we use 6, 12, 24 Mbps, non-HT means OFDM PPDU. MAC perspective, non-HT is better.

C: Regarding Delay time, the value is 0us, in that case, the STA may include it? Is it optional?

A: Ok, I can change it to shall.

**SP of 1743r5: Do you support the text changes proposed in Slide 8 of this presentation [11-20/1743r5] for the next revision of 802.11be draft?**

56Y/3N/33A

1. [760r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0760-02-00be-multi-link-sm-power-save-mode.pptx) Multi Link SM Power Save Mode Jason Y. Guo [1SP]

Discussion

C: Other links could be in power saving state. Need more discussion on motivation. SP text need to be working more. I suggest you defer this SP. We can do offline.

A: I can defer this to next call.

C: What does the start of a frame mean? Preamble.

C: How do you signaling the specific link?

A: It’s initial link.

SP is deferred

1. 761r2, **Multi Link Group Addressed Frame delivery for non-STR MLD, Jason Yuchen Guo**

Discussion:

C: how does the STA 2 terminate TXOP?

A: STA can terminate the TXOP before TBTT.

* **SP1: Do you support the following rule?**
  + For a NSTR link pair of a non-AP MLD, if the non-AP MLD successfully obtains a TXOP on one link before the TBTT of the other link, then it should end its TXOP before the TBTT of the other link if it intends to receive Beacon frames on the other link
    - Note: the non-STR MLD may not do so if it is not aware of the TSF of the other link

47Y/12N/43A

1. [1914r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1914-00-00be-mac-pdt-motion-112-sp-27.docx) MAC-PDT-Motion-112\_SP-27 Abhishek Patil

Discussion:

C: Can we change the text to peer MLD, TID couple?

A: Yes

**SP of 1914r1: Do you support the text proposed in the document [11-20/1914r1] for the next revision of 802.11be draft?**

Approved with unanimous consent

1. [1924r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1924-00-00be-pdt-for-clarification-of-mld-association.docx) PDT for clarification of MLD association Po-Kai Huang

Discussion:

C: Disassociation may fails to send. In that case, the STA can send association request?

C: In the third bullet, AP reject the assocation request.

A: This is about the case without ML element.

C: non-AP STA may try to associate on the other link.

A: This is for non-AP MLD associated with an AP MLD.

C: Disassociation may not synchronize each STAs.

A: In case of non-AP MLD associatied with AP MLD, the STA should not send association request without ML element.

C: In that case, non-AP MLD can send association request with ML element?

C: I have a concern on preventing going back to legacy mode. It seems like that ML element should be always included in the association frame.

A: If you want to be legacy, you can still do it. This is only case that non-AP MLD is associtated with AP MLD.

C: Yes, multiple association may be confusing. ...

C: For the first case, the STA shall not send association request without ML element to the same AP MLD? It’s possible to the different MLD.

A: No, the current spec doesn’t allow it. Do you want to have two DS mapping?

C: yes, it’s possible with the different MAC address.

A: What is the use case of that?

C: MLD Roaming.

C: fall back from MLD to legacy STA without de-association. I think it makes AP implementation compliciated. I prefer this direction that you propose. Need more discussion about what yong mentioned.

The meeting is adjourned at 11:53 ET

**Monday 7 December 2020, 10:00 –12:00 ET (TGbe MAC ad hoc conference call)**

Chairman: Liwen Chu (NXP)

Secretary: Jeongki Kim (LG Electronics)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen, NXP) calls the meeting to order at 19:03am EDT. The Chair introduces himself and the Secretary, Jeongki Kim (LG)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Liwen Chu ([liwen.chu@nxp.com](mailto:liwen.chu@nxp.com)) and Jeongki Kim ([jeongki.kim@lge.com](mailto:jeongki.kim@lge.com))

**Recorded attendance through Imat and e-mail:**

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 12/7 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| 12/7 | Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| 12/7 | Agrawal, abhishek | ON Semiconductor |
| 12/7 | Akhmetov, Dmitry | Intel Corporation |
| 12/7 | Ambede, Abhishek | Ericsson AB |
| 12/7 | Bankov, Dmitry | IITP RAS |
| 12/7 | baron, stephane | Canon Research Centre France |
| 12/7 | Bravo, Daniel | Intel Corporation |
| 12/7 | Bredewoud, Albert | Broadcom Corporation |
| 12/7 | Carney, William | Sony Corporation |
| 12/7 | CHAN, YEE | Facebook |
| 12/7 | chen, jindou | Huawei Technologies Co. Ltd |
| 12/7 | CHERIAN, GEORGE | Qualcomm Incorporated |
| 12/7 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 12/7 | Chu, Liwen | NXP Semiconductors |
| 12/7 | CHUN, JINYOUNG | LG ELECTRONICS |
| 12/7 | Das, Subir | Perspecta Labs Inc. |
| 12/7 | Derham, Thomas | Broadcom Corporation |
| 12/7 | de Vegt, Rolf | Qualcomm Incorporated |
| 12/7 | Ding, Baokun | Huawei Technologies Co. Ltd |
| 12/7 | Dong, Xiandong | Xiaomi Inc. |
| 12/7 | Fang, Yonggang | Self |
| 12/7 | Fischer, Matthew | Broadcom Corporation |
| 12/7 | Goto, Fumihide | DENSO |
| 12/7 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 12/7 | Haider, Muhammad Kumail | Facebook |
| 12/7 | Hamilton, Mark | Ruckus/CommScope |
| 12/7 | Han, Jonghun | SAMSUNG |
| 12/7 | Han, Zhiqiang | ZTE Corporation |
| 12/7 | Handte, Thomas | Sony Corporation |
| 12/7 | Hong, Hanseul | WILUS Inc. |
| 12/7 | Hu, Chunyu | Facebook |
| 12/7 | Huang, Po-Kai | Intel Corporation |
| 12/7 | jiang, yiming | Nokia |
| 12/7 | Kain, Carl | USDoT |
| 12/7 | Kakani, Naveen | Qualcomm Incorporated |
| 12/7 | kamath, Manoj | Broadcom Corporation |
| 12/7 | Kedem, Oren | Huawei Technologies Co. Ltd |
| 12/7 | Khorov, Evgeny | IITP RAS |
| 12/7 | Kim, Jeongki | LG ELECTRONICS |
| 12/7 | kim, namyeong | LG ELECTRONICS |
| 12/7 | Kim, Sang Gook | LG ELECTRONICS |
| 12/7 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 12/7 | Klein, Arik | Huawei Technologies Co. Ltd |
| 12/7 | Klimakov, Andrey | Huawei Technologies Co., Ltd |
| 12/7 | Kneckt, Jarkko | Apple, Inc. |
| 12/7 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 12/7 | Kondylis, George | Broadcom Corporation |
| 12/7 | Kumar, Manish | Marvell Semiconductor, Inc. |
| 12/7 | Kwon, Young Hoon | NXP Semiconductors |
| 12/7 | Lan, Zhou | Broadcom Corporation |
| 12/7 | Lee, Nancy | Signify |
| 12/7 | Le Houerou, Brice | Canon Research Centre France |
| 12/7 | Levitsky, Ilya | IITP RAS |
| 12/7 | Levy, Joseph | InterDigital, Inc. |
| 12/7 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 12/7 | Liu, Jianfei | HUAWEI |
| 12/7 | Lorgeoux, Mikael | Canon Research Centre France |
| 12/7 | Lou, Hanqing | InterDigital, Inc. |
| 12/7 | Lu, kaiying | MediaTek Inc. |
| 12/7 | Lu, Liuming | ZTE Corporation |
| 12/7 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 12/7 | Martinez Vazquez, Marcos | MaxLinear Corp |
| 12/7 | Max, Sebastian | Ericsson AB |
| 12/7 | McCann, Stephen | Huawei Technologies Co.,  Ltd |
| 12/7 | Monajemi, Pooya | Cisco Systems, Inc. |
| 12/7 | Montemurro, Michael | Huawei Technologies Co. Ltd |
| 12/7 | Nezou, Patrice | Canon Research Centre France |
| 12/7 | Ng, Boon Loong | Samsung Research America |
| 12/7 | Ouchi, Masatomo | Canon |
| 12/7 | Palayur, Saju | Maxlinear Inc |
| 12/7 | Park, Minyoung | Intel Corporation |
| 12/7 | Patil, Abhishek | Qualcomm Incorporated |
| 12/7 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 12/7 | Petrick, Albert | InterDigital, Inc. |
| 12/7 | Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| 12/7 | Raissinia, Alireza | Qualcomm Incorporated |
| 12/7 | Reshef, Ehud | Intel Corporation |
| 12/7 | RISON, Mark | Samsung Cambridge Solution Centre |
| 12/7 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 12/7 | Sevin, Julien | Canon Research Centre France |
| 12/7 | Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| 12/7 | Su, Hang | Broadcom Corporation |
| 12/7 | Sun, Li-Hsiang | Sony Corporation |
| 12/7 | Sun, Yanjun | Qualcomm Incorporated |
| 12/7 | THOUMY, Francois | Canon Research Centre France |
| 12/7 | Verma, Sindhu | Broadcom Corporation |
| 12/7 | Wang, Chao Chun | MediaTek Inc. |
| 12/7 | Wang, Huizhao | Quantenna Communications, Inc. |
| 12/7 | Wang, Lei | Futurewei Technologies |
| 12/7 | Wang, Qi | Apple, Inc. |
| 12/7 | Wullert, John | Perspecta Labs |
| 12/7 | Yang, Jay | Nokia |
| 12/7 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 12/7 | Yee, James | MediaTek Inc. |
| 12/7 | yi, yongjiang | Futurewei Technologies |
| 12/7 | Zein, Nader | NEC Laboratories Europe |
| 12/7 | Zeng, Yan | Huawei Technologies Co.,  Ltd |
| 12/7 | Zhou, Yifan | Huawei Technologies Co., Ltd |
| 12/7 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/1615r23.

**Technical submissions:**

1. [1115r6](https://mentor.ieee.org/802.11/dcn/20/11-20-1115-06-00be-mld-ap-power-saving-ps-considerations.pptx) MLD AP Power-saving (PS) Considerations Jay Yang [2 SP]

**SP1: Do you agree that the 11be shall support the multi-link operations which not requires each station affiliated to AP MLD to be an AP for battery powered devices?**

Discussion:

C: At figure (4), what do you mean the battery powered AP MLD? AP and STA are in the MLD?

A:One link is one AP, other links are non-AP STA. Here these STA can use its power saving mechanism.

C: what baseline do you use in this diagram? This is weird.

C: AP and non-AP are in the same device. Why could not they be logical domain? APs are in AP MLD and non-AP STA are in non-AP MLD logically.

A: In the legacy structure, APs or AP MLDs are always on. benefit of not only power saving but also multi-link operation

C: What is the problem of AP Power saving defined in 11ax?

A: TWT framework.

C: what mechanism can be used?

C: Non-AP STAs in AP MLD are still connected to DS? How does the non-AP STA in non-AP MLD connect the distributed system?

17Y/54N/38A

1. 1312r3 Triggered SU, Dibakar

Discussion:

C: It seems like optional mechanism for AP side. how is it for the STA side?

A: Fine with both AP and non-AP.

C: Several problems. RTS use a protect frame. But Trigger frame is not RTS. You change the sequence of RTS. It may increase some critical issues. I support to do trigger SU and trigger P2P. Trigger not RTS. You can defer this and consist of it together.

A: This is not the basic RTS or MU-RTS procedure. We can further define the details. This is not intend to protect. The first frames can protect the TXOP. We don’t see critical issue. We modify the MU-RTS.

C: Critical issue. ...

A: I don’t think so.

C: MU-RTS addresses one STA or multiple STAs? CTS follows the sequence?

A: trigger one STA. Can control the CTS by separate field. Support shall send the CTS.

**SP1 of r4: Do you support the inclusion of the following in the SFD for 802.11be R1:**802.11be shall define a mechanism for an AP to transmit a modified MU-RTS Trigger frame that allocates time within a TXOP, starting after the end of the transmission of the MU-RTS frame, to transmit one or more non-TB PPDUs - This is optional mechanism for non-AP and AP STAs ? - Note: The non-TB PPDUs may be transmitted by the STA to AP or by the STA to a peer of a peer-to-peer link.

64/23/27

1. 760r5 **Multi Link SM Power Save Mode,** Jason

**SP1: Do you support to define a ML (multi-link) SM power save mode in R2 as follows:**

* + 1. A non-AP MLD that is in ML SM PS mode can use only one link and one active receive chain for receiving and responding to an initial frame sent by the AP, and addressed to it
    2. The non-AP MLD becomes available on other links after responding to the initial frame
       1. How and which device determines the “other links” is TBD
    3. The non-AP MLD may become unavailable on any of the “other links” if one of the following is satisfied
       1. The TXOP on the “other link” has ended
       2. Other TBD condition to deal with the case when the non-AP MLD does not receive any frame addressed to it on the “other links”
    4. This is an optional feature for both AP and non-AP MLD

Discussion:

C: what was the part of changes compared with previous? Lined one?

A: Yes. Underlined.

C: how is it going to be applied to EMLSR device? Second, You wanna propose it in R2. In R2, we’re gonna have cross link signaling. If cross link sigaling is defined, even without this mechanism, STA can indicate that it’s gonna be awake state of other link. Can we do that without defining this mechanism?

A: EMLSR is for single link communication. This is just multi-link device.

C: How about EMLMR?

A: It’s target for different scenario. EMLMR is not for power saving but just for receiving from multiple links. This is for saving the power.

C: It means this will not be applied to EMLMR operation?

A: STA can choose which mode between them. Yes. I think it’s different mode.

A: Cross link signaling, STA after receiving the frame decides whether to turn off other links and feedback to AP. There is a delay. AP only knows the explicit signaling from STA on other links.

C: Is this same case as 11ax SMPS?

41/11/48

1. [1924r4](https://mentor.ieee.org/802.11/dcn/20/11-20-1924-04-00be-pdt-for-clarification-of-mld-association.docx) PDT for clarification of MLD association Po-Kai Huang [SP]

Discussion:

C: Doesn’t Non-AP MLD disable other links? In that case the non-AP MLD can have a single link.

C: AP shall reject the STA..... . Some STA wants disassociate . In that case, the STA mismatch happens.

A: If there is a crash, STA can disassoicate.

C: If STA sends disassociation to AP without MLD element what AP MLD would do? Then SA query can be sent before deleting MLD association. Non-AP MLD must include ML element?

A: For this disassociation frame, we don’t mandate Multi-link.

C: If the AP receives disassociation , the AP may send SA query.

A: This one , you don’t have ML element. If a crash, AP follow the existing procedure SA query. That’s all in the baseline.

C: Both cases, AP receives disassociation frame, where include more element a lot, AP will start SA query and eventually delete the record.

C:Note is not clear. After disassocation, the STA can perform a regular association request.

A: Do you want to allow to send regular association?

**SP: Do you support to incorporate the text changes proposed in 11-20/1924r5 to the next revision of 802.11be draft?**

40/9/40

1. [1692r2](https://mentor.ieee.org/802.11/dcn/20/11-20-1692-02-00be-tdls-handling-in-mlo.pptx) TDLS handling in MLO Abhishek Patil [Q&A]

Discussion:

C: AP MLD can check the some special frames

A: In table, TDLS discovery&setup frames are data frame, ...

C: Generally, I agree with this use cases. R1, one solution is legacy. Extension can be in R2. I agree with it.

C: slide 3, link id element, which address is carried? Link MAC address or MLD MAC address?

A: In legacy case, link id is set to STA1 address.

C: when STA3 send the respond, how does the STA3 set the TA and RA, A3? Based on the link id element, the address in MAC header is set?

A: SA is MLD address. It’s up to you. SA is initiator address of link identifier.

C: What’s the useful carried link id element? Just set the RA based MPDU header?

A: If the mismatch, it will not respond. Link identifier element is carried in multiple frames.

C: If non-AP MLD only uses one MAC address, e.g., link MAC address or MLD MAC address, this address mismatching problem does not exist.

A: A1 and A3 are the same MAC address? That will be a problem. That is not what the current spec is saying.

* **SP2: Do you agree to the following for R1:**
  + 802.11be amendment shall provide a mechanism by which a non-AP MLD can request an AP MLD, to perform RTS/CTS exchange before sending DL frame(s) to a particular STA (STA1) of the non-AP MLD operating on an n-STR link
  + Upon receiving such a request, an AP (AP1) of an AP MLD shall precede its DL with an RTS frame and proceed to DL frame(s) to the particular STA (STA1) of the non-AP MLD only if it receives an CTS response to its RTS

NOTE: The signaling to require RTS/CTS exchange is TBD

17/18/44

The meeting is adjourned at 12:00 ET.