IEEE P802.11 Wireless LANs

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| Minutes for TGbe MAC Ad-Hoc teleconferences in July and September 2020 | | | | |
| Date: 2020-07-13 | | | | |
| 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 July 2020 and September 2020.

Revisions:

* Rev0: Added the minutes from the telephone conferences held on July 13, 2020.
* Rev1: Added the minutes from the telephone conferences held on July 15, 2020.
* Rev2: Added the minutes from the telephone conferences held on July 20, 2020.
* Rev3: Added the minutes from the telephone conferences held on July 22, 2020.
* Rev4: Added the minutes from the telephone conferences held on July 23, 2020.
* Rev5: Added the minutes from the telephone conferences held on July 27, 2020.
* Rev6: Added the minutes from the telephone conferences held on July 29, 2020.
* Rev7: Added the minutes from the telephone conferences held on August 3, 2020.
* Rev8: Added the minutes from the telephone conferences held on August 5, 2020.
* Rev9: Added the minutes from the telephone conferences held on August 6, 2020.
* Rev10: Added the minutes from the telephone conferences held on August 17, 2020.
* Rev11: Added the minutes from the telephone conferences held on August 19, 2020.
* Rev12: Added the minutes from the telephone conferences held on August 24, 2020.
* Rev13: Added the minutes from the telephone conferences held on August 26, 2020.

**Monday 13 July 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 19:04am 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))

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

|  |  |
| --- | --- |
| Name | Affiliation |
| Abdelaal, Rana | Broadcom Corporation |
| AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| Abouelseoud, Mohamed | Sony Corporation |
| Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| Adachi, Tomoko | TOSHIBA Corporation |
| Adhikari, Shubhodeep | Broadcom Corporation |
| Agarwal, Peyush | Broadcom Corporation |
| Agrawal, Sandeep | C-DOT/Centre for Development of Telematics |
| Ahn, Woojin | Korea Railroad Research Institute (KRRI) |
| Alayasra, Musab | Medipol University; Vestel |
| Alex, Sam | Facebook |
| Asai, Yusuke | Nippon Telegraph and Telephone Corporation (NTT) |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| Au, Oscar | Origin Wireless |
| Auluck, Vijay | Self |
| Baek, SunHee | LG ELECTRONICS |
| Bajko, Gabor | MediaTek Inc. |
| Banerjea, Raja | Qualcomm Incorporated |
| Bankov, Dmitry | IITP RAS |
| baron, stephane | Canon Research Centre France |
| Bhandaru, Nehru | Broadcom Corporation |
| Bims, Harry | Bims Laboratories, Inc. |
| Bober, Lennert | Fraunhofer Heinrich Hertz Institute |
| Calcev, George | Futurewei Technologies |
| Cariou, Laurent | Intel Corporation |
| Carney, William | Sony Corporation |
| Cavalcanti, Dave | Intel Corporation |
| Cha, Jaesun | Electronics and Telecommunications Research Institute (ETRI) |
| CHAN, YEE | Facebook |
| Chen, Cheng | Intel Corporation |
| Chen, Cheng-Ming | Qualcomm Incorporated |
| Chen, Na | MaxLinear Corp |
| Cheng, Paul | MediaTek Inc. |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Chu, Liwen | NXP Semiconductors |
| Chung, Chulho | SAMSUNG |
| Cordeiro, Carlos | Intel Corporation |
| Das, Dibakar | Intel Corporation |
| Das, Subir | Perspecta Labs Inc. |
| Derham, Thomas | Broadcom Corporation |
| de Vegt, Rolf | Qualcomm Incorporated |
| Dong, Xiandong | Xiaomi Inc. |
| Fang, Yonggang | ZTE TX Inc |
| Fischer, Matthew | Broadcom Corporation |
| Gan, Ming | Huawei Technologies Co., Ltd |
| Garg, Lalit | Broadcom Corporation |
| Ghosh, Chittabrata | Intel Corporation |
| GUIGNARD, Romain | Canon Research Centre France |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Hamilton, Mark | Ruckus/CommScope |
| Han, Jonghun | SAMSUNG |
| HAN, Xiao | Huawei Technologies Co., Ltd |
| Han, Zhiqiang | ZTE Corporation |
| Henry, Jerome | Cisco Systems, Inc. |
| Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| Hirata, Ryuichi | Sony Corporation |
| Hiroki, Shigeru | Canon Research Centre France |
| Ho, Duncan | Qualcomm Incorporated |
| Hong, Hanseul | Yonsei University |
| Hsu, Chien-Fang | MediaTek Inc. |
| Hu, Chunyu | Facebook |
| Hu, Glenn | Tencent |
| Huang, Guogang | Huawei |
| Huang, Po-Kai | Intel Corporation |
| Huang, Xiaolong | Qualcomm Incorporated |
| Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| IDO, Tetsuo | Canon |
| Inohiza, Hirohiko | Canon Inc. |
| Inoue, Yasuhiko | Nippon Telegraph and Telephone Corporation (NTT) |
| Iwatani, Junichi | Nippon Telegraph and Telephone Corporation (NTT) |
| Jang, Insun | LG ELECTRONICS |
| Ji, Chenhe | Huawei Technologies Co. Ltd |
| Jiang, Jinjing | Apple Inc. |
| Jones, Allan | Activision |
| Jones, Vincent Knowles IV | Qualcomm Incorporated |
| Jung, hyojin | Hyundai Motor Company |
| JUNG, MYUNG CHEUL | Pantech Inc. |
| Kain, Carl | USDoT |
| Kakani, Naveen | Qualcomm Incorporated |
| Kandala, Srinivas | SAMSUNG |
| Kerry, Stuart | OK-Brit; Ruckus; CommScope |
| Khericha, samir | BRoadcom |
| Khorov, Evgeny | IITP RAS |
| Kim, Jeongki | LG ELECTRONICS |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sang Gook | LG ELECTRONICS |
| Kim, Sanghyun | WILUS Inc |
| Kim, Yongho | Korea National University of Transportation |
| Kim, Youn-Kwan | The Catholic University of Korea |
| Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| Klein, Arik | Huawei Technologies Co. Ltd |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple Inc. |
| Ko, Geonjung | WILUS Inc. |
| Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| Kumar, Manish | Marvell Semiconductor, Inc. |
| Kwak, Jin-Sam | WILUS Inc. |
| Kwon, Young Hoon | NXP Semiconductors |
| Lan, Zhou | Broadcom Corporation |
| Lee, Hyeong Ho | Netvision Telecom Inc. |
| Lee, Jae Seung | Electronics and Telecommunications Research Institute (ETRI) |
| Lee, Nancy | Signify |
| Le Houerou, Brice | Canon Research Centre France |
| Li, Bo | Northwestern Polytechnical University |
| Li, Guoqing | Apple Inc. |
| Li, Nan | ZTE Corporation |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Liu, Jeff | Broadcom Corporation |
| Liu, Yong | Apple Inc. |
| Loginov, Vyacheslav | IITP RAS |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Lv, kaiying | MediaTek Inc. |
| Lv, Lily | Huawei Technologies Co. Ltd |
| Ma, Mengyao | HUAWEI |
| Merlin, Simone | Qualcomm Incorporated |
| Mohanty, Bibhu | Qualcomm Incorporated |
| Monajemi, Pooya | Cisco Systems, Inc. |
| Morioka, Hitoshi | SRC Software |
| Motozuka, Hiroyuki | Panasonic Corporation |
| Murti, Wisnu | SeoulTech |
| Myles, Andrew | Cisco Systems, Inc. |
| Nagai, Yukimasa | Mitsubishi Electric Research Labs (MERL) |
| NAGATA, KENGO | Nippon Telegraph and Telephone Corporation (NTT) |
| Nakano, Hiroki | CAHI Corporation |
| NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| Naribole, Sharan | SAMSUNG |
| Nezou, Patrice | Canon Research Centre France |
| Nguyen, An | DHS/CISA |
| Nurani Krishnan, Neelakantan | Qualcomm Incorporated |
| Ohsawa, Tomoki | NICT |
| Okada, Hiraku | Nagoya University |
| Omar, Hassan | Huawei Technologies Co.,  Ltd |
| Orlik, Philip | Mitsubishi Electric Research Labs (MERL) |
| Ouchi, Masatomo | Canon |
| Palm, Stephen | Broadcom Corporation |
| Pan, Chun | HUAWEI |
| Park, Minyoung | Intel Corporation |
| Patil, Abhishek | Qualcomm Incorporated |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Petranovich, James | ViaSat, Inc. |
| Petrick, Albert | InterDigital, Inc. |
| Petry, Brian | Broadcom Corporation |
| Purwita, Ardimas | University of Edinburgh |
| Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| Qi, Emily | Intel Corporation |
| Raissinia, Alireza | Qualcomm Incorporated |
| Rantala, Enrico-Henrik | Nokia |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Ryan, Mike | Ford Motor Company |
| Sadeghi, Bahareh | Intel Corporation |
| Sakamoto, Takenori | Panasonic Corporation |
| Sakoda, Kazuyuki | Sony Corporation |
| Salem, Mohamed | Huawei Technologies Co., Ltd |
| Salman, Hanadi | Istanbul Medipol University; VESTEL |
| Sambasivan, Sam | AT&T |
| Sandhu, Shivraj | Qualcomm Incorporated |
| Sedin, Jonas | Ericsson AB |
| Seok, Yongho | MediaTek Inc. |
| Sevin, Julien | Canon Research Centre France |
| Sherlock, Ian | Texas Instruments Incorporated |
| Siyari, Peyman | Qualcomm Incorporated |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Son, Ju-Hyung | WILUS Inc. |
| Song, Taewon | LG ELECTRONICS |
| Startsev, Ivan | IITP RAS |
| Stott, Noel | Keysight Technologies |
| Su, Hang | Broadcom Corporation |
| Sumi, Takenori | Mitsubishi Electric Corporation |
| Sun, Li-Hsiang | InterDigital, Inc. |
| Sun, Yanjun | Qualcomm Incorporated |
| Takai, Mineo | Space-Time Engineering |
| Tanaka, Yusuke | Sony Corporation |
| Tomoyuki, Takada | Canon |
| Torab Jahromi, Payam | Facebook |
| Umehara, Makoto | Canon |
| Verma, Lochan | Qualcomm Incorporated |
| Verma, Sindhu | Broadcom Corporation |
| VIGER, Pascal | Canon Research Centre France |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Hao | Tencent |
| Wang, Huizhao | Quantenna Communications, Inc. |
| Wang, Lei | Huawei R&D USA |
| Wang, Qi | Apple Inc. |
| Wang, Xiaofei | InterDigital, Inc. |
| Wang, Yi-Hsiu | Zeku |
| Want, Roy | Google |
| Wilhelmsson, Leif | Ericsson AB |
| Wullert, John | Perspecta Labs |
| Xin, Liangxiao | Sony Corporation |
| Xue, Qi | Qualcomm Incorporated |
| Yan, Zhongjiang | Northwestern Polytechnical University |
| Yang, Bo | Huawei Technologies Co. Ltd |
| Yang, Jay | Nokia |
| Yang, Mao | Northwestern Polytechnical University |
| Yang, Yunsong | Futurewei Technologies |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| Yee, Peter | NSA-CSD |
| yi, yongjiang | Futurewei Technologies |
| Yin, Yue | HUAWEI |
| Yong, Su Khiong | Apple Inc. |
| Yoshikawa, Yuki | Canon |
| Yukawa, Mitsuyoshi | Canon, Inc. |
| Zhang, Meihong | Huawei Technologies Co., Ltd |
| Zhou, Yifan | Huawei Technologies Co., Ltd |
| Zou, Tristan | Qualcomm Incorporated |
| Zuo, Xin | Tencent |
| Baokun Ding | Huawei Technologies Co., Ltd |

The Chair went over the document 11-20-0997-03-00be related to spec text volunteers and status. The Chair reminds that the agenda can be found in 11-20/927r6. The agenda is modified slightly and approved.

**Submissions**

1. 357r4 **Container for advertising ML Information** Abhishek Patil [SP only]

SP 7

* **Do you agree to include a Control field in Multi-Link element to indicate the presence of certain fields?**

C: is it in common field?

A: I’m supporting more than one profile

Approved with unanimous consent

1. 396r5 MLO BSS Information Transmission and Multiple BSSID Support, Liwen Chu (NXP) **[SP only]**

SP3: **Do you agree that AP’s Beacon and probe response shall not include ML element for MLD with no affiliated APs operating on this link**?

Yes/No/Abstain/No Answer: 35/27/62/68

1. 20/503r2, BSS parameter update for Multi-link Operation, Ming Gan (Huawei) [SP only]

SP1: Do you agree to amend the SP#77 by adding the following bullet?

* The reported AP in the AP MLD is identified by a TBD field, which is used together with Change Sequence Number field
* TBD field could be either the existing field or additional field

C: can you also show SP 77?

C: which element can contain TBD field?

A: RNR element or ML element can contain it. I will provide the details of it later. Now is TBD.

SP is deferred

1. 20/0770r1, MLO: AID allocation, Yoong Hoon Kwon [SP only]

**Do you support in TGbe SFD that**

The AID assigned to a non-AP MLD shall be unique and shall be set to a value greater than or equal to 2^n where n is the maximum value of the MaxBSSID Indicator amongst the multiple BSSID set(s) operating on any link of the AP MLD.

Yes/No/Abstain/No Answer: 54/19/44/76

1. [772r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0772-01-00be-multi-link-element-format.pptx) Multi-link element format (Rojan Chitrakar)

Summary: Proposing details of multi-link element. Defining the Type field for carrying the different contents as well as Presence bitmap

Disucssion:

C: Presence bitmap indicates which fields are included or not. How does the type field help?

A: Type field indicates the format for common or per-link. I want to give more flexibility. This is similar to Trigger frame. If it’s not, we will have universial format.

C: If we have universial format, we can have several different combinations by presence bitmap.

C: Need to make simple ML element format. It seems like complex format.

C: Presence bitmap is enough. Need more disucssion.

SP is deferred.

1. [883r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0883-00-00be-multi-link-spatial-multiplexing.pptx) Multi-link Spatial Multiplexing (Yongho Seok)

Summary: Multi-link Spatial Multiplexing method with receive chain switching and transmit chain switching operation

Discussion:

C: slide 5, the switching time is larger than 80us?

A: Yes, additionally STA can indicate the switching delay to AP. Based on the information, AP can use MU-RTS with padding instead of RTS

C: You’re assuming the 1 TXOP for OM Control.

A: You can use Operating mode indication frame.

C: slide 9, 10, can we use this for enhanced single link MLD feature as well?

A: Yes

The teleconference was adjourned at 09:00pm EDT

**Wendsday 15 July 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:
     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))

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

Abdelaal, Rana Broadcom Corporation

AbidRabbu, Shaima' Vestal Company, Istanbul Medipol University;

Aboulmagd, Osama Huawei Technologies Co., Ltd

Abushattal, Abdelrahman Vestal Company, Istanbul Medipol University;

Adachi, Tomoko TOSHIBA Corporation

Adhikari, Shubhodeep Broadcom Corporation

Agarwal, Peyush Broadcom Corporation

Ahn, Woojin Korea Railroad Research Institute (KRRI)

Aio, Kosuke Sony Corporation

AKHTAR, NADEEM Arista Networks, Inc.

Alayasra, Musab Medipol University; Vestel

Alex, Sam Facebook

Asterjadhi, Alfred Qualcomm Incorporated

Avrillon, Matthieu Luceor

B, Hari Ram NXP Semiconductors

Baek, SunHee LG ELECTRONICS

Baik, Eugene Qualcomm Incorporated

Banerjea, Raja Qualcomm Incorporated

Bankov, Dmitry IITP RAS

baron, stephane Canon Research Centre France

BECHADERGUE, Bastien OLEDCOMM

Bei, Jianwei NXP Semiconductors

Ben Arie, Yaron toga networks(a huawei company)

Bhandaru, Nehru Broadcom Corporation

Bims, Harry Bims Laboratories, Inc.

Bluschke, Andreas Signify

Bober, Lennert Fraunhofer Heinrich Hertz Institute

Boldy, David Broadcom Corporation

Bredewoud, Albert Broadcom Corporation

Calcev, George Futurewei Technologies

Cao, Rui NXP Semiconductors

Cariou, Laurent Intel Corporation

Carney, William Sony Corporation

Cavalcanti, Dave Intel Corporation

Cha, Jaesun Electronics and Telecommunications Research Institute (ETRI)

CHAN, YEE Facebook

Chen, Cheng Intel Corporation

Chen, Cheng-Ming Qualcomm Incorporated

Chen, Evelyn Ericsson AB

Chen, Na MaxLinear Corp

Cheng, Paul MediaTek Inc.

CHERIAN, GEORGE Qualcomm Incorporated

Chitrakar, Rojan Panasonic Asia Pacific Pte Ltd.

Choo, Seungho Senscomm Semiconductor Co., Ltd.

Chu, Liwen NXP Semiconductors

CHUN, JINYOUNG LG ELECTRONICS

Chung, Bruce Realtek Semiconductor Corp.

Chung, Chulho SAMSUNG

Ciochina, Dana Sony Corporation

Das, Dibakar Intel Corporation

Das, Subir Perspecta Labs Inc.

Davies, Robert Signify

DeLaOlivaDelgado, Antonio InterDigital, Inc.

Derham, Thomas Broadcom Corporation

de Vegt, Rolf Qualcomm Incorporated

Ding, Baokun Huawei Technologies Co., Ltd

Dogukan, Ali Vestel

Dong, Xiandong Xiaomi Inc.

Duan, Ruchen SAMSUNG

Edgar, Richard Imagination Technologies Ltd.

ElSherif, Ahmed Qualcomm Incorporated

Erceg, Vinko Broadcom Corporation

Fang, Yonggang ZTE TX Inc

Feng, Xiang Keysight Technologies

Fischer, Matthew Broadcom Corporation

Gan, Ming Huawei Technologies Co., Ltd

Gardner, James Qualcomm Incorporated

Garg, Lalit Broadcom Corporation

Ghosh, Chittabrata Intel Corporation

Godbole, sachin Broadcom Corporation

Goto, Fumihide Self

Grandhe, Niranjan NXP Semiconductors

GUIGNARD, Romain Canon Research Centre France

Guntupalli, Lakshmikanth Ericsson AB

Guo, Yuchen Huawei Technologies Co., Ltd

Haider, Muhammad Kumail Facebook

Hamilton, Mark Ruckus/CommScope

HAN, CHONG pureLiFi

Han, Jonghun SAMSUNG

Han, Zhiqiang ZTE Corporation

Handte, Thomas Sony Corporation

Harrison, Edward Anritsu Company

Hervieu, Lili Cable Television Laboratories Inc. (CableLabs)

Hiertz, Guido Ericsson GmbH

Hirata, Ryuichi Sony Corporation

Hiroki, Shigeru Canon

Ho, Duncan Qualcomm Incorporated

Hong, Hanseul Yonsei University

Hsieh, Hung-Tao MediaTek Inc.

Hsu, Chien-Fang MediaTek Inc.

Hu, Chunyu Facebook

Hu, Glenn Tencent

Hu, Mengshi HUAWEI

Huang, Guogang Huawei

Huang, Lei Panasonic Asia Pacific Pte Ltd.

Huang, Po-Kai Intel Corporation

Huang, Xiaolong Qualcomm Incorporated

Hwang, Sung Hyun Electronics and Telecommunications Research Institute (ETRI)

Ibrahim, Mostafa SAMSUNG ELECTRONICS

IDO, Tetsuo Canon

Inohiza, Hirohiko Canon

Inoue, Yasuhiko Nippon Telegraph and Telephone Corporation (NTT)

Jang, Insun LG ELECTRONICS

Ji, Chenhe Huawei Technologies Co. Ltd

Jia, Jia Huawei Technologies Co., Ltd

Jiang, Jinjing Apple Inc.

Jones, Allan Activision

JOO, SEONG-SOON Electronics and Telecommunications Research Institute (ETRI)

JUNG, MYUNG CHEUL Pantech Inc.

Jungnickel, Volker Fraunhofer Heinrich Hertz Institute

Kandala, Srinivas SAMSUNG

Kedem, Oren Huawei Technologies Co. Ltd

Khericha, samir BRoadcom

Khorov, Evgeny IITP RAS

Khude, Nilesh NXP Semiconductors

Kim, Eunhee Electronics and Telecommunications Research Institute (ETRI)

Kim, Jeongki LG ELECTRONICS

Kim, Myeong-Jin SAMSUNG

kim, namyeong LG ELECTRONICS

Kim, Sanghyun WILUS Inc

Kim, Yongho Korea National University of Transportation

Kim, Youhan Qualcomm Incorporated

Kim, Youn-Kwan The Catholic University of Korea

Kishida, Akira Nippon Telegraph and Telephone Corporation (NTT)

Klein, Arik Huawei Technologies Co. Ltd

Klimakov, Andrey Huawei Technologies Co., Ltd

Kneckt, Jarkko Apple Inc.

Ko, Geonjung WILUS Inc.

Kondo, Yoshihisa Advanced Telecommunications Research Institute International (ATR)

Kumar, Manish Marvell Semiconductor, Inc.

Kwak, Jin-Sam WILUS Inc.

Kwon, Young Hoon NXP Semiconductors

Lalam, Massinissa SAGEMCOM BROADBAND SAS

Lan, Zhou Broadcom Corporation

Lanante, Leonardo Kyushu Institute of Technology

Lee, Il-Gu Sungshin University

Lee, Jae Seung Electronics and Telecommunications Research Institute (ETRI)

Lee, Kyeseon ETRI

Lee, Wookbong SAMSUNG

Le Houerou, Brice Canon Research Centre France

Lepp, James BlackBerry

Levitsky, Ilya IITP RAS

Levy, Joseph InterDigital, Inc.

Li, Guoqing Apple Inc.

Li, Nan ZTE Corporation

Li, Yiqing Huawei Technologies Co. Ltd

Li, Yunbo Huawei Technologies Co., Ltd

Liang, dandan Huawei Technologies Co., Ltd

Lin, Wei Huawei Technologies Co. Ltd

LIU, CHENCHEN Huawei Technologies Co., Ltd

Liu, Der-Zheng Realtek Semiconductor Corp.

Liu, Jeff Broadcom Corporation

Liu, Yong Apple Inc.

Loginov, Vyacheslav IITP RAS

Lorgeoux, Mikael Canon Research Centre France

Lou, Hanqing InterDigital, Inc.

Lou, Hui-Ling NXP Semiconductors

Lu, Liuming ZTE Corporation

Luo, Chaoming Beijing OPPO telecommunications corp., ltd.

Lv, kaiying MediaTek Inc.

Ma, Mengyao HUAWEI

Madpuwar, Girish Broadcom Corporation

Mai, Huiheng Blu Wireless Technology Ltd

Malinen, Jouni Qualcomm Incorporated

Martinez Vazquez, Marcos MaxLinear Corp

Max, Sebastian Ericsson AB

McCann, Stephen Self

Mcconnell, Ray blu wireless technology

MELZER, Ezer Toga Networks, a Huawei company

Memisoglu, Ebubekir Vestal Company, Istanbul Medipol University;

Mirfakhraei, Khashayar Cisco Systems, Inc.

Mohanty, Bibhu Qualcomm Incorporated

Monajemi, Pooya Cisco Systems, Inc.

Montemurro, Michael Self

Montreuil, Leo Broadcom Corporation

Murphy, Rick vLogic, Inc.

Murti, Wisnu SeoulTech

Nam, Junyoung Qualcomm Incorporated

Namboodiri, Vamadevan SAMSUNG ELECTRONICS

NANDAGOPALAN, SAI SHANKAR Cypress Semiconductor Corporation

Naribole, Sharan SAMSUNG

Nezou, Patrice Canon Research Centre France

Nguyen, An DHS/CISA

Nurani Krishnan, Neelakantan Qualcomm Incorporated

Ohsawa, Tomoki NICT

Omar, Hassan Huawei Technologies Co., Ltd

Ouchi, Masatomo Canon

Ozbakis, Basak VESTEL

Palm, Stephen Broadcom Corporation

Pan, Chun HUAWEI

Park, Eunsung LG ELECTRONICS

Park, Taejoon Electronics and Telecommunications Research Institute (ETRI)

Patil, Abhishek Qualcomm Incorporated

Patwardhan, Gaurav Hewlett Packard Enterprise

Perahia, Eldad Hewlett Packard Enterprise

Petranovich, James ViaSat, Inc.

Petrick, Albert InterDigital, Inc.

Petry, Brian Broadcom Corporation

Pettersson, Charlie Ericsson AB

porat, ron Broadcom Corporation

Prabhakaran, Dinakar Broadcom Corporation

Puducheri, Srinath Broadcom Corporation

QIU, WEI Huawei Technologies Co., Ltd

Rai, Kapil Qualcomm Incorporated

Raissinia, Alireza Qualcomm Incorporated

Redlich, Oded HUAWEI

Regev, Dror Toga Networks (a Huawei Company)

REICH, MOR Togan Networks, a Huawei Company

Rezk, Meriam Qualcomm Incorporated

Riegel, Maximilian Nokia

Rosdahl, Jon Qualcomm Technologies, Inc.

Roy, Sayak NXP Semiconductors

Sakoda, Kazuyuki Sony Corporation

Salem, Mohamed Huawei Technologies Co., Ltd

Salman, Hanadi Vestal Company, Istanbul Medipol University;

Sandhu, Shivraj Qualcomm Incorporated

Schiessl, Sebastian u-blox

Scott, Andy NCTA - The Internet & Television Association

Sedin, Jonas Ericsson AB

Seok, Yongho MediaTek Inc.

Sethi, Ankit NXP Semiconductors

Sevin, Julien Canon Research Centre France

Shilo, Shimi HUAWEI

Sinn, Ulrich Siemens AG

Siyari, Peyman Qualcomm Incorporated

Smith, Graham SR Technologies

Solaija, Muhammad Sohaib Vestal Company, Istanbul Medipol University;

Son, Ju-Hyung WILUS Inc.

Song, Taewon LG ELECTRONICS

Srinivasa, Sudhir NXP Semiconductors

Stacey, Robert Intel Corporation

Stahl Diskin, Nir Broadcom Corporation

Startsev, Ivan IITP RAS

Stott, Noel Keysight Technologies

Su, Hang Broadcom Corporation

SUH, JUNG HOON Huawei Technologies Co. Ltd

Sun, Li-Hsiang InterDigital, Inc.

Sun, Sheng Huawei Technologies Co., Ltd

Sun, Yanjun Qualcomm Incorporated

Tanaka, Yusuke Sony Corporation

Tomoyuki, Takada Canon

Torab Jahromi, Payam Facebook

Tsodik, Genadiy Huawei Technologies Co. Ltd

Uln, Kiran Cypress Semiconductor Corporation

Umehara, Makoto Canon

Urabe, Yoshio Panasonic Corporation

van Wageningen, Andries Signify

Van Zelst, Allert Qualcomm Incorporated

Verenzuela, Daniel Sony Corporation

Verma, Lochan Qualcomm Incorporated

Verma, Sindhu Broadcom Corporation

VIGER, Pascal Canon Research Centre France

Wang, Chao Chun MediaTek Inc.

Wang, Hao Tencent

Wang, Huizhao Quantenna Communications, Inc.

Wang, Lei Huawei R&D USA

Wang, Qi Apple Inc.

Wentink, Menzo Qualcomm

Wu, Kanke Qualcomm Incorporated

Wu, Tianyu Apple Inc.

Wullert, John Perspecta Labs

Xia, Qing Sony Corporation

Xin, Liangxiao Sony Corporation

Xin, Yan Huawei Technologies Co., Ltd

Xue, Ruifeng Cisco Systems, Inc.

Yan, Aiguo Oppo

Yan, Zhongjiang Northwestern Polytechnical University

Yang, Bo Huawei Technologies Co. Ltd

Yang, Jay Nokia

Yang, Lin Qualcomm Incorporated

Yang, Mao Northwestern Polytechnical University

Yang, Steve TS MediaTek Inc.

Yang, Yunsong Futurewei Technologies

Yano, Kazuto Advanced Telecommunications Research Institute International (ATR)

Yee, James MediaTek Inc.

yi, yongjiang Futurewei Technologies

Yona, Yair Qualcomm Incorporated

Yong, Su Khiong Apple Inc.

Yoshikawa, Yuki Canon

Young, Christopher Broadcom Corporation

Yu, Heejung Korea University

Yu, Jian Huawei Technologies Co., Ltd

Yu, Mao NXP Semiconductors

Yukawa, Mitsuyoshi Canon, Inc.

Zhang, John GuangDong OPPO Mobile Telecommunications Corp., Ltd.

Zhang, Yan NXP Semiconductors

Zhou, Yifan Huawei Technologies Co., Ltd

Zou, Tristan Qualcomm Incorporated

Zuo, Xin Tencent

The Chair reminds that the agenda can be found in 11-20/927r8. The agenda is modified slightly and approved.

**Submissions**

* 1. [883r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0883-00-00be-multi-link-spatial-multiplexing.pptx) Multi-link Spatial Multiplexing (Yongho Seok) [Q&A and SP]

Discussion:

C: I support this. I have the similar contribution. Could you defer the SP?

A: Yes

C: In example 2, different maximum streams number per different link is not normal case. Any reason why you consider?

A: I received comments. Wants to generalize the use case.

C: I see. But not clear still.

* SP 1 of 883r1: **Do you support the multi-link operation for a non-AP MLD that is defined as follows for R1?**
  + An MLD that can: 1) transmit or receive data/management frames to another MLD on one link at a time, and 2) listening on one or more links.
    - The “listening” operation includes CCA as well as receiving initial control messages (e.g., RTS/MU-RTS)
    - The initial control message may have one or more additional limitations: spatial stream, MCS (data rate), PPDU type, frame type
    - Link switch delay may be indicated by the non-AP MLD
  + The MLD may support concurrent transmission/reception or not support.

C: SP text is unclear.

A: Any suggestion?

C: The second part can be removed.

C: The last bullet is confict with the first listening part.

A: Fine. Fine to remove second part?

C: Had better defer this SP.

SP is defered

* 1. [900r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0900-00-00be-nstr-mld-operation.pptx) NSTR MLD operation (Young Hoon Kwon)

Discussion:

C: Your protocols seems a symetric protocol. Dynamically change. More flexiblity.

A: This example is downlink. TXOP owner is AP MLD.

C: static is default mode? Operating mode indication is very straightforward.

A: But in static eSR mode, although both links are clear, they cannot use both links.

C: on the dynamic operation, this is happening on the TXOP. The gain will be .... Once that’s busy and is then clear, after that, you’ll be and get in the gain. Just considering the length of the TXOP, have you ... how much gain will be obtain.

A: Now, i don’t have number of the gain.

* 1. [908r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0908-00-00be-multilink-ts-operation.pptx) Multilink TS Operation (Harry Wang)

Discussion:

A: Non-AP STA side has more information and non-AP MLD may not have full information just have data information

C: SP2 in slide 15, why do you use only TID 8~15 for this purpose in TSPEC?

A: other contribution mentioned more than 8 TID is used for other purpose. 8~15 can be included for other mechansim.

C: TSPEC is STA level as Duncun mentioned. Not MLD level.

C: I have similar presentation. I think they are aligned. We need to think about the signaling level. I agree with the high level concept.

C: Instead 8~15, suggestion is to use > 7.

The teleconference was adjourned at 12:00 EDT

**Monday, 20 July 2020, 10:00 –13:00 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:
     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))

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

AbidRabbu, Shaima' Istanbul Medipol University; Vestel

Aboulmagd, Osama Huawei Technologies Co., Ltd

Adhikari, Shubhodeep Broadcom Corporation

AKHTAR, NADEEM Arista Networks, Inc.

Baek, SunHee LG ELECTRONICS

Boldy, David Broadcom Corporation

Carney, William Sony Corporation

CHAN, YEE Facebook

chen, jindou Huawei Technologies Co. Ltd

Cheng, Paul MediaTek Inc.

CHERIAN, GEORGE Qualcomm Incorporated

Chitrakar, Rojan Panasonic Asia Pacific Pte Ltd.

Das, Subir Perspecta Labs Inc.

Derham, Thomas Broadcom Corporation

de Vegt, Rolf Qualcomm Incorporated

Ding, Baokun Huawei Technologies Co., Ltd

Dong, Xiandong Xiaomi Inc.

Erceg, Vinko Broadcom Corporation

Fang, Yonggang ZTE TX Inc

Fischer, Matthew Broadcom Corporation

Garg, Lalit Broadcom Corporation

GUIGNARD, Romain Canon Research Centre France

Guo, Yuchen Huawei Technologies Co., Ltd

Han, Zhiqiang ZTE Corporation

Hirata, Ryuichi Sony Corporation

Ho, Duncan Qualcomm Incorporated

Hu, Chunyu Facebook

Huang, Guogang Huawei

Huang, Po-Kai Intel Corporation

Inohiza, Hirohiko Canon

Ji, Chenhe Huawei Technologies Co. Ltd

Jia, Jia Huawei Technologies Co., Ltd

Jiang, Jinjing Apple, Inc.

Kakani, Naveen Qualcomm Incorporated

Kedem, Oren Huawei Technologies Co. Ltd

Khorov, Evgeny IITP RAS

Kim, Jeongki LG ELECTRONICS

kim, namyeong LG ELECTRONICS

Kim, Sang Gook LG ELECTRONICS

Kim, Sanghyun WILUS Inc

Kim, Youn-Kwan The Catholic University of Korea

Kishida, Akira Nippon Telegraph and Telephone Corporation (NTT)

Klein, Arik Huawei Technologies Co. Ltd

Kneckt, Jarkko Apple, Inc.

Kondo, Yoshihisa Advanced Telecommunications Research Institute International (ATR)

Kumar, Manish Marvell Semiconductor, Inc.

Kwon, Young Hoon NXP Semiconductors

Lalam, Massinissa SAGEMCOM BROADBAND SAS

Li, Yiqing Huawei Technologies Co. Ltd

Li, Yunbo Huawei Technologies Co., Ltd

Lin, Wei Huawei Technologies Co. Ltd

Liu, Jeff Broadcom Corporation

Lu, Liuming ZTE Corporation

Luo, Chaoming Beijing OPPO telecommunications corp., ltd.

Lv, kaiying MediaTek Inc.

Ma, Mengyao HUAWEI

Monajemi, Pooya Cisco Systems, Inc.

Palm, Stephen Broadcom Corporation

Park, Minyoung Intel Corporation

Patil, Abhishek Qualcomm Incorporated

Patwardhan, Gaurav Hewlett Packard Enterprise

Petrick, Albert InterDigital, Inc.

Salman, Hanadi Istanbul Medipol University; VESTEL

Sedin, Jonas Ericsson AB

Seok, Yongho MediaTek Inc.

Solaija, Muhammad Sohaib Istanbul Medipol University; Vestel

Song, Taewon LG ELECTRONICS

Sun, Li-Hsiang InterDigital, Inc.

Sun, Yanjun Qualcomm Incorporated

Verma, Sindhu Broadcom Corporation

VIGER, Pascal Canon Research Centre France

Wang, Chao Chun MediaTek Inc.

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Wang, Lei Huawei R&D USA

Wang, Qi Apple, Inc.

Wang, Xiaofei InterDigital, Inc.

Wentink, Menzo Qualcomm

Wullert, John Perspecta Labs

Yang, Jay Nokia

Yano, Kazuto Advanced Telecommunications Research Institute International (ATR)

yi, yongjiang Futurewei Technologies

Young, Christopher Broadcom Corporation

Zuo, Xin Tencent

The Chair reminds that the agenda can be found in 11-20/927r10.

**Submissions**

1. [1943r9](https://mentor.ieee.org/802.11/dcn/19/11-19-1943-09-00be-multi-link-management.pptx) Multi-link Management, Taewon Song (LG Electronics) [SP only]

* SP#4: **Do you agree to revise the SP text as follows?**
  + [SP#118]
    - Single-link/radio (TBD) non-AP MLD: A non-AP MLD that supports operation on more than one link but can only receive, or transmit frames on one link at a time.

**Cf. The reason why I revised it is that the meaning of “listen” is already incorporated in “receive”, and therefore this “listen” might be redundant**

Discussion:

C: Minyoung’s SP can cover this SP. Can you merge them?

A: Both are different. My SP contains the meaning of ”listen”. We had better run each SP separately.

SP results: Yes:46, No:6, Abstain:23

1. [562r7](https://mentor.ieee.org/802.11/dcn/20/11-20-0562-07-00be-enhanced-multi-link-single-radio-operation.pptx) Enhanced multi-link single radio operation , Minyoung Park (Intel Corp.) [SP2]

**SP2: Do you support the multi-link operation for a non-AP MLD that is defined as follows to be included in R1?**

* A non-AP MLD that can: 1) transmit or receive data/management frames to another MLD on one link at a time, and 2) listening on one or more links
  + The “listening” operation includes CCA as well as receiving initial control messages (e.g., RTS/MU-RTS)
  + The initial control message may have one or more additional limitations: spatial stream, MCS (data rate), PPDU type, frame type
  + Link switch delay may be indicated by the non-AP MLD

Discussion:

C: Is this enhanced single radio or normal single radio?

A: This is about enhanced single radio MLD. A normal single radio concept is already passed by Taewon’s SP.

SP results: Yes:52, No:2, Abstain:26

1. [389r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0389-03-00be-multi-link-discovery-part-1.pptx) Multi-link discovery part 1 , laurent cariou (Intel) [SP 1 Ext]

SP1 extension:

* + Do you agree that all APs that are part of the same MLD as a non-transmitted BSSID and that are collocated with the non-transmitted BSSID shall be reported in the RNR element that is included in the beacons and the broadcast probe responses transmitted by the transmitted BSSID that is in the same Multiple BSSID set as the non-transmitted BSSID
  + Do you agree that if a reporting AP is part of an AP MLD and is in the same collocated set as APs affiliated with another AP MLD for which there are no affiliated APs operating on the same channel as the reporting AP, each AP of the other AP MLD shall be reported in the RNR element that is included in the beacons and the broadcast probe responses transmitted by the reporting AP if at least one AP of the other AP MLD is in the same multiple BSSID set as an AP affiliated with the AP MLD of the reporting AP, unless the APs of the other AP MLDs are already reported in beacons and the broadcast probe responses transmitted by an AP in the same collocated set as the reporting AP on the same channel as the reporting AP.

SP is approved by unanimous consent

1. [668r](https://mentor.ieee.org/802.11/dcn/20/11-20-0668-01-00be-320-mhz-bss-configuration-follow-up.pptx)2 320-mhz-bss-configuration-follow-up (Po-Kai Huang)

Summary: channel width indication in EHT operation element for supporting 320MHz/160+160Mhz.

Discussion:

C: bandwidth for 320, the same setting or different setting with HT/VHT/HE, For SP1.

C: What does Note mean? There is an exception.

C: Agree with what you have. Can you do this in joint?

A: These bandwidths already is in SFD. I don’t touch any PHY.

C: Channel bandwidth can support 240MHz

A: Regarding the 240, we can support by using puncturing. We can discuss about that more in join.

C: I agree with this approach which is simple extension. I have similar to contribution. Can you run your SP after my presentation.

A: Sure.

1. [684r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0684-00-00be-bss-channel-width-configuration.pptx) BSS channel width configuration (Young Hoon Kwon)

Summary:

Discussion:

C: As you mentioned, option 1 is simple extension. Option 2 is STA need to calculate it.

A: Yes. My SP is for option 1.C:

C: Rui has a contribution on non-contiguous bandwidths. We don’t need two options depending PHY decision. How can we decide option 1 and option 2?

A: If we have only contiguous bandwdith, both options can be selected. But I can wait a PHY decision.

A: Each option has each advantages. Option 1 is simple but some overhead than option 2. When I talk to others, option 1 is more supportive.

C: slide 11, PHY also consider overlapping channels.

C: Option 1 is very simple compared to option 2. Could you go to nested structure? What is impact of option 2?

A: Option 2 is up to only 160.

C: 80+80 and 160+160 we can simple run the text. If we need to modify the text according to the PHY decision, we can modify the text.

C: My preference just waits for the PHY decision.

C: you need further discussion. Let’s go to next.

1. [712r](https://mentor.ieee.org/802.11/dcn/20/11-20-0712-00-00be-bqr-for-320mhz.pptx)1 BQR for 320MHz (Yunbo Li)

Summary: BQR A control field for supporting 320MHz. Two BQR Control subfields can be included. Two reserved bits can be used for saving more overhead

Discussion:

C: Control ID is same in both? There is no other option which carries bitmap indicating 320MHz.

A: If we use long bitmap, we cannot save the bitmap overhead. And we can save the ID field.

C: In SP1, you want to reuse the same Control ID?..

A: At most there are two. It is for 320.

C: Today, how does AP know the same control ID with different contents?

* SP 1: **Do you support to indicate the channel availability of 320MHz channel by carrying two BQR Control subfields in A-control subfield?**

Discussion:

C: Generally I agree with new indication for 320MHz. How about making general SP for BQR for 320? This is too specific.

C: Similar. First of all, general concept. We can investigate pros and cons of options.

A: Got it.

* SP 1: **Do you support to indicate the channel availability up to 320MHz in A-control subfield?**
  + Note: detailed solution is TBD

Approved with unanimous consent

1. [736r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0736-01-00be-eht-sst-operation.pptx) EHT SST Operation (Yongho Seok)

Summary:

Discussion:

C: That is in R2. It mean optional

A: Optional/mandatory will be discussed later.

C: For packet detection channel. AP know this puncturing. STA just picks?

A: several rules. AP can provide it.

A: AP will not puncture your packet detection channel.

C: Dynamic?

A: Yes.

C: Do you want to run SP 2?

A: I have to defer SP 2, just willing to run SP1.

C: Just extend the bandwidth indication? Not changing the current rule.

A: Yes. I don’t know what is new thing.

C: This is simple extension of 11ax SST

A: Yes

**SP1: Do you support to extend SST mechanism so that an 80MHz/160 MHz (20MHz TBD) operating STA can operate in the secondary 160 MHz channel in R2?**

40/2/25/36

1. [866r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0866-00-00be-gcmp-for-11be.pptx) GCMP for 11be (Laurent Cariou)

**an EHT RSNA STA shall support GCMP-256**

Discussion:

C: This is optional or mandatory?

A: 11ax will support GCMP. EHT STA always support this.

C: What are you asking? Support or use?

A: Just supporting.

C: Generally fine with extension of this. we still need detailed discussion.

C: GCMP-256 is mandatory currently?

C: Not use GCMP-256 for every packet.

A: just support GCMP-256. Using it is implementation.

* **SP: Do you agree to add to the 11be SFD the following:**
  + an EHT RSNA STA shall support GCMP-256?

34/2/32/34

1. [895r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0895-00-00be-preamble-puncturing-support-for-eht-transmission.pptx) Preamble Puncturing Support for EHT transmission (Kaiying Lu)

Discussion:

C: do you expect this mechanism is used for timely manner mechanism like TWT?

C: similar to Yongho’s SP2.

A: some difference, dynamic preamble puncturing.

C: UL operation, is based on Trigger based ?

A: In case of non-Primary, Trigger based can be used. Primary, same rule as legacy.

C: AP indicates the candidate PD channel.

C: slide 9, for CCARESET, is there any difference from primary channel?

C: AP indicate the candidate PD set, STA chooses one.

A: AP and STA negotiate the PD channel based on the channel condition.

C: PD channel candidates, how does AP select PD channel candidates? Is it related to preamle puncturing?

A: AFC or disallowed channel can be used for configuring pattern. Secondary, STA can choose one among pattern bits based on AID.

The teleconference was adjourned at 12:55 EDT

**Wendsday 22 July 2020, 10:00 –13:00 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.
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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:**

AbidRabbu, Shaima' Istanbul Medipol University; Vestel

Aboulmagd, Osama Huawei Technologies Co., Ltd

Alayasra, Musab Medipol University; Vestel

Andersdotter, Amelia None - Self-funded

Asterjadhi, Alfred Qualcomm Incorporated

Baek, SunHee LG ELECTRONICS

Bankov, Dmitry IITP RAS

Bredewoud, Albert Broadcom Corporation

Carney, William Sony Corporation

chen, jindou Huawei Technologies Co. Ltd

Cheng, Paul MediaTek Inc.

Chitrakar, Rojan Panasonic Asia Pacific Pte Ltd.

Choi, Jinsoo LG ELECTRONICS

Chu, Liwen NXP Semiconductors

Das, Dibakar Intel Corporation

Das, Subir Perspecta Labs Inc.

Derham, Thomas Broadcom Corporation

de Vegt, Rolf Qualcomm Incorporated

Ding, Baokun Huawei Technologies Co., Ltd

Dong, Xiandong Xiaomi Inc.

Fang, Yonggang ZTE TX Inc

Fischer, Matthew Broadcom Corporation

Han, Jonghun SAMSUNG

Han, Zhiqiang ZTE Corporation

Handte, Thomas Sony Corporation

Hsu, Chien-Fang MediaTek Inc.

Hu, Chunyu Facebook

Hu, Glenn Tencent

Hu, Mengshi HUAWEI

Huang, Guogang Huawei

Huang, Lei Panasonic Asia Pacific Pte Ltd.

Huang, Po-Kai Intel Corporation

Hwang, Sung Hyun Electronics and Telecommunications Research Institute (ETRI)

Jang, Insun LG ELECTRONICS

Ji, Chenhe Huawei Technologies Co. Ltd

Jia, Jia Huawei Technologies Co., Ltd

Jiang, Jinjing Apple, Inc.

Kain, Carl USDoT

Kakani, Naveen Qualcomm Incorporated

Kamel, Mahmoud InterDigital, Inc.

Kandala, Srinivas SAMSUNG

Kedem, Oren Huawei Technologies Co. Ltd

kim, namyeong LG ELECTRONICS

Kim, Jeongki LG ELECTRONICS

Kim, Youhan Qualcomm Incorporated

Kim, Youn-Kwan The Catholic University of Korea

Kishida, Akira Nippon Telegraph and Telephone Corporation (NTT)

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Lansford, James Qualcomm Incorporated

Levitsky, Ilya IITP RAS

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Li, Yunbo Huawei Technologies Co., Ltd

Liang, dandan Huawei Technologies Co., Ltd

Lin, Wei Huawei Technologies Co. Ltd

Liu, Jianfei HUAWEI

Lou, Hanqing InterDigital, Inc.

Lu, Liuming ZTE Corporation

Luo, Chaoming Beijing OPPO telecommunications corp., ltd.

Lv, kaiying MediaTek Inc.

Ma, Mengyao HUAWEI

Monajemi, Pooya Cisco Systems, Inc.

Ozbakis, Basak VESTEL

Park, Minyoung Intel Corporation

Patil, Abhishek Qualcomm Incorporated

Patwardhan, Gaurav Hewlett Packard Enterprise

Raissinia, Alireza Qualcomm Incorporated

Rosdahl, Jon Qualcomm Technologies, Inc.

Salman, Hanadi Istanbul Medipol University; VESTEL

Sedin, Jonas Ericsson AB

Solaija, Muhammad Sohaib Istanbul Medipol University; Vestel

Song, Taewon LG ELECTRONICS

Stacey, Robert Intel Corporation

Startsev, Ivan IITP RAS

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Wentink, Menzo Qualcomm

Wullert, John Perspecta Labs

yi, yongjiang Futurewei Technologies

Yu, Jian Huawei Technologies Co., Ltd

Yu, Mao NXP Semiconductors

Yukawa, Mitsuyoshi Canon, Inc.

Zhou, Yifan Huawei Technologies Co., Ltd

Zuo, Xin Tencent

The Chair reminds that the agenda can be found in 11-20/927r11.

**Submissions**

1. [899r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0899-00-00be-tim-follow-up.pptx) TIM follow up (Young Hoon Kwon)

Summary: TIM operation considering U-APSD(U-APSD flag). MLD level approach is prefered. Listen interval and WNM sleep interval of the non-AP MLD is applied at MLD level

Discussion:

C: Option 1 in slide 6, how does this work for TID-to-link mapping considering different links and different TIDs?

A: We have TIM element.

C: TIM indication is common.

A: We have TIM indication. AP needs to tell where you go to.

C: Do you propose the same U-APSD flag for just U-APSD Flag? How about Max SP Length?

A: I just want to focus the first four bits for U-APSD flag

C: Generally, I’m aligned with what you have.

C: For TIM element, how the links are mapped? We need more discussion for some parts.

A: Yes.

C: Per-MLD indication for Listen interval and WNM sleep interval is a little complicated. Are you proposing the same value for MLD level in WNM sleep message exchange?

C: I have the similar comments with Yong for WNM sleep interval. Why do you want to make it MLD level? Need more discussion for that. Maybe side-effect.

C: I have the similar contribution and have the same opinion.

C: In slide 10, the second option, how is multiple Listen Interval for different links included in the association request?

* SP 1: **Do you agree to add the following to 11be SFD:**
  + A non-AP MLD shall have the same U-APSD Flag value for each AC across all links that multi-link is setup.

C: Regarding the SP1, default mode is ok but for the TID-to-link mapping we need to think more.

A: I’ll defer SP1

* SP2: **Do you agree to add the following to 11be SFD:**
  + Listen interval ~~and WNM sleep interval~~ of a non-AP MLD is applied at the MLD level and not at the STA level.

C: Regarding the SP text, what does the MLD level mean? Do you want to include one value in the frame?

A: There are several signaling mechanisms in slides. Just want to focus the concept of MLD level.

Deferred

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

Summary: ML SM Power save mode (e.g., multi-link multi-RF chain)

* AP can tell the non-AP STA which links to turn on

Disucssion:

C: seems like all the STA’s power saving mode + SM power save mode.

C: Can we combine this with existing power saving operation?

C: Is this operation applied to only STR MLD ? or non-STR MLD as well?

A: It doesn’t matter. Both can be possible

C: after RTS/CTS on one link, both links are on. But for the link2, AP can be busy. That is not used.

A: Yes right.

C: Per link SM power saving is more preferable. It should be per link power saving mode.

1. [615r](https://mentor.ieee.org/802.11/dcn/20/11-20-0615-00-00be-discovery-mechanism-for-mld.pptx)1 Discovery mechanism for MLD (Ming Gan)

Discussion:

C: Slide 7, 11ax already has the mandatory requirement, RNR can provide the information of nontransmitted BSSID. 11be will not be compatible with 11ax.

C: Mandatory for 6GHz AP. MLO is still operated in 6GHz, 5GHz , 2.4GHz.

C: SP2, 3, you have Multi-BSSID set index and MLD index. ...

C: what is the benefit of the Multi-BSSID set index?

C: Nontransmitted BSSID and Transmitted BSSID are included in the Beacon. It’s simple.

1. [669r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0669-00-00be-mld-transition.pptx) MLD transition (Po-Kai Huang)

Discussion:

C: slide 5, transition to single AP case. Are you also about the link address case? MAC SAP is MLD address. Right?

C: existing BSS transition, Are you suggesting the BSS transition concept? I’m not sure MLD transition

A: BSS definition we dont have MAC SAP.

C: MLD level MAC address and Link MAC address, MLD association uses the MLD level MAC address?

A: Yes, MLD association uses MLD address

C: If MLD transition goes to AP3, MLD association /MAC address is used

SP1: **Do you support the following definition:**

* **Define AP MLD in an ESS as follows:**
  + An AP MLD is in one ESS if the SSID of the AP MLD is the same as the SSID of the ESS.
* **Define MLD transition as follows:**
  + A non-AP MLD movement from having multi-link setup with one AP MLD in one ESS to having multi-link resetup with another AP MLD within the same ESS.
  + A non-AP MLD movement from having multi-link setup with one AP MLD in one ESS to become a non-AP STA having reassociation with another AP within the same ESS.
  + A non-AP STA movement from a non-AP STA having association with one AP in one ESS to become a non-AP MLD having multi-link resetup with another AP MLD with the same ESS.
* **Define fast MLD transition as follows:**
  + A MLD transition that establishes the state necessary for data connectivity before the multi-link resetup or reassociation rather than after the multi-link resetup or reassociation.

NOTE - \*Name can be changed

C: I have conern on the wording and terminologies. First of all we need to decide them.

A: Basically, several terminologies are in the SFD.

C: Suggestion whether it’s in R1 or R2.

A: Do we need R1 or R2 for definition? But, I’m fine with it. It will be R1

C: I have the similar concen with Ming. Do we need the first part at this time? Duncun has the similar contribution.

A: I’m ok with removing it.

The SP is changed as follows:

**SP: Do you support the following definition in R1:**Define MLD transition\* as follows:A non-AP MLD movement from having multi-link setup with one AP MLD in one ESS to having multi-link resetup with another AP MLD within the same ESS. A non-AP MLD movement from having multi-link setup with one AP MLD in one ESS to become a non-AP STA having reassociation with another AP within the same ESS. A non-AP STA movement from a non-AP STA having association with one AP in one ESS to become a non-AP MLD having multi-link resetup with another AP MLD with the same ESS.Define fast MLD transition\* as follows:A MLD transition that establishes the state necessary for data connectivity before the multi-link resetup or reassociation rather than after the multi-link resetup or reassociation. NOTE - \*Name can be changed

Y/N/A: 31/19/33

1. [741r](https://mentor.ieee.org/802.11/dcn/20/11-20-0741-00-00be-indication-of-multi-link-information-follow-up.pptx)1 Indication of Multi-link Information: Follow-up (Insun Jang)

Discussion:

C: slide 4, terminologies, setup links, why do we need Setup links in addition to Enabled links?

A: enabled links are operating links, Some links can be setup but not operaing because of the number of links the non-AP has.

C: SP #1, who does not non-AP MLD

A: part or all that is my intention.

C: slide 9, why does the AP send the complete information of setup links which is not operating?

C: Can the AP reject some of setup links that STA can request?

A: At this time, Yes

C: slide 4, I’m confusing supported links and not capable. And setup but not operating means not TID-to-link mapping?

C: SP#1 and SP#2 texts are already allowed in SFD. What is difference?

A: Do we allow them? Those are new things.

C: Ok, Just clarification?

A: Yes

C: I don’t think we have one STA has two setup links. Basically, one STA is setup with one link. If you have three links, you have three STAs.

The teleconference was adjourned at 13:00 EDT

**Thursday 23 July 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 19:05am 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))

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

|  |  |
| --- | --- |
| AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| Alayasra, Musab | Medipol University; Vestel |
| Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| Baek, SunHee | LG ELECTRONICS |
| Bajko, Gabor | MediaTek Inc. |
| Cariou, Laurent | Intel Corporation |
| Carney, William | Sony Corporation |
| chen, jindou | Huawei Technologies Co. Ltd |
| Cheng, Paul | MediaTek Inc. |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Das, Dibakar | Intel Corporation |
| Das, Subir | Perspecta Labs Inc. |
| Ding, Baokun | Huawei Technologies Co., Ltd |
| Dong, Xiandong | Xiaomi Inc. |
| ElSherif, Ahmed | Qualcomm Incorporated |
| Fang, Yonggang | ZTE TX Inc |
| Fischer, Matthew | Broadcom Corporation |
| Gan, Ming | Huawei Technologies Co., Ltd |
| Ghosh, Chittabrata | Intel Corporation |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Han, Jonghun | SAMSUNG |
| Han, Zhiqiang | ZTE Corporation |
| Ho, Duncan | Qualcomm Incorporated |
| Hu, Chunyu | Facebook |
| Huang, Guogang | Huawei |
| Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| Jang, Insun | LG ELECTRONICS |
| Ji, Chenhe | Huawei Technologies Co. Ltd |
| Jiang, Jinjing | Apple, Inc. |
| Kain, Carl | USDoT |
| Kakani, Naveen | Qualcomm Incorporated |
| Kandala, Srinivas | SAMSUNG |
| Kim, Jeongki | LG ELECTRONICS |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sang Gook | LG ELECTRONICS |
| Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| Kneckt, Jarkko | Apple, Inc. |
| Kwon, Young Hoon | NXP Semiconductors |
| Levy, Joseph | InterDigital, Inc. |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Lindskog, Erik | SAMSUNG |
| Liu, Jianfei | HUAWEI |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Lv, kaiying | MediaTek Inc. |
| Ma, Mengyao | HUAWEI |
| Monajemi, Pooya | Cisco Systems, Inc. |
| Patil, Abhishek | Qualcomm Incorporated |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Petrick, Albert | InterDigital, Inc. |
| QIU, WEI | Huawei Technologies Co., Ltd |
| Raissinia, Alireza | Qualcomm Incorporated |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Song, Taewon | LG ELECTRONICS |
| Sun, Li-Hsiang | InterDigital, Inc. |
| Sun, Yanjun | Qualcomm Incorporated |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Hao | Tencent |
| Wang, Lei | Huawei R&D USA |
| Wang, Qi | Apple, Inc. |
| Wang, Xiaofei | InterDigital, Inc. |
| Wullert, John | Perspecta Labs |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| Yukawa, Mitsuyoshi | Canon, Inc. |
| Zeng, Yan | Huawei Technologies Co.,  Ltd |
| Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r12.

**Submissions**

1. [741r](https://mentor.ieee.org/802.11/dcn/20/11-20-0741-00-00be-indication-of-multi-link-information-follow-up.pptx)1 Indication of Multi-link Information: Follow-up (Insun Jang) [SPs]

Discussion:

* **Do you support that a non-AP MLD may not be setup with all APs of AP MLD during ML setup?**

C: Instead of ”may not have”, ”does not need to setup ...” is better.

A: OK

C: It means subset of APs.

The SP text is modified as follows:

**Do you support that a non-AP MLD may request multi-link setup with an AP MLD to setup links with subset of APs?**

C: non-AP MLD does not need to connect all APs?

A: Yes

C: may request 🡪 may perform, po-kai?

A: how about initiate instead of request?

Text is changed.

C: setup links means one or more links? Or more than one link?

A: more than one link

C: then clarify it in the text

**SP1 of r1: Do you support to add to the 11be SFD in R1 that a non-AP MLD may initiate multi-link setup with an AP MLD to setup more than one link with subset of APs affiliated with the AP MLD?**

Yes/No/Abstain: 48/7/15

I’ll defer SP2

1. [751r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0751-00-00be-multi-link-setup-clarifications.pptx) Multi-link Setup clarifications (Rojan Chitrakar)

Discussion:

C: you assume that multi-link setup reqest/response are used instead of association request/response

A: Association request/response will be used

C: Two questions, first transmission links,

A: non-transmitted links can be setup during MLD setup.

C: only one transmitted link is available?

A: No restriction. One or more can be possible. This is just example.

C: Association request/response are used for this ?

A: Yes.

C: what is difference between setup and resetup? Just type or frames?

C:Link quality. What does non-AP provide AP with?

A: Non-AP only has knowlege of quality of links by non-AP. Non-AP can provide it with AP

A: AP MLD can choose certain links with the link quality.

C: For resetup, tear down and setup or incremental procedures?

A: My point is second. Don’t need to tear down. Just incremental.

C: Regarding Re-setup, there is security issue for GTK and so on.

A: Yes, that should be considered. Mine doesn’t cover it. I need to think about.

C: slide 6, Second bullet, all request reject and all reuqest accept?

A: Yes that’s my intention.

C: You don’t have SP for this?

A: Yes, I have only high level.

C: As another method, you simply accept all links and disallow some of links if AP wants.

A: Yes, it could be possible. I just use legacy method and AP can reject some request of non-AP

C: for link quality, before doing multi-link setup, non-AP needs to collect links quality of other links? Why are we doing that? Need more think about it.

C: For SP, implicitly and explicit, the element can be included in associate procedure. .. I think option 2 also makes sense.

A: For explicit signaling, just use Requst bitmap or Request bit, Option 1 based on the included link ID

C: Yes right I prefer option 1

C: SP 1, you prefer option 1. If non-AP does not include all information of all links, then how does AP know that information?

A: If non-AP includes all information which is not used, the overhead will increase. I prefer option 1 although option 2 has some benefit.

C: page 10, link id, what does it mean? Do you have something?

A: I’m proposing the specific thing. Just differentiate links. I don’t propose the specific format.

C: Ok, Link ID is included only in reposen?

A: Laurent mentioned, this can be included in request?

C: what is the benefit of link quality in non-AP sides?

A: If non-AP MLD provides the information, AP can choose its operation like which link is better to non-AP or whether the AP disallow some links or not.

C: what does the re-setup mean? For addition or deletion, we don’t need the resetup.

A: Your resetup means tear down rather than managing links?

C:AP can do link quality measurement, DL and UL are symentric. Non-AP doesn’t need to do this.

C: I have similar comment with Young Hoon for re-setup.

C: Infrastrucuture cannot trust clients always.

C: slide 8, motivation, try to reduce the overhead? Is that only motivation? Information is capability?

A: For signaling, i wasn’t think about that.

C: Resetup is re-association?

A: I think young hoon had SP.

A: Yes, re-association is used for re-setup

I’ll defer it.

1. [810r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0810-00-00be-dynamic-link-set.pptx) Dynamic Link Set (Pooya Monajemi)

SP1: **Do you agree to define mechanisms to add links to, and remove links from, an MLD setup without disruption in traffic, initiated by any one of AP or non-AP STA?**

**Note: This SP is not meant for spec text.**

Yes/No/Abstain:

C: Could you defer? Wording is not clear

A: Not for SFD.

C: what is diruption in traffic?

C: broadcast case. This already is mentioned in SFD?

C: Maybe good to have offline discussion.

A: This is not for SFD. Want to hear other peoples opinion.

Yes/No/Abstain: 32/18/22

1. [834r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0834-06-00be-tentative-re-association-for-non-ap-mld.pptx) Tentative (Re)Association for Non-AP MLD (Guogang Huang)

Discussion:

C: current SFD we define multi-link reference model. AP MLD and non-AP MLD in MLD level. You need to make more consensus on framework level.

A: My contribution is not the AP MLD. AP MLD 1 and AP MLD 2 are separate. Not logical. This is not the new MLD.

C: slide 10, non-AP MLD has two links for two different MLDs.

A: I think that this is already allowed.

C:Do you really care this in MLO ?

A: A single radio MLD does not have benenfit.

C: Your intention is non-AP MLD to move to another MLD before breaking the current AP MLD?

A: Yes

C: Why is this context in multi-link? Seems like the power saving mechanism.

C: I think this is different from existing roaming scenario.

A: I’ll defer my SPs.

1. [843r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0843-00-00be-mlo-bss-information-transmission-with-and-without-multiple-bssid.pptx) MLO BSS Info. TX with & without Multiple BSSID Support (Liwen Chu)

Discussion:

C: why do we need multiple BSSID Index?

A: BSSID index is different from MAC address,

C: In the bullets, you want to carry the transmitted BSSID and MaxBSSID Indicator

A: Yes, but, the signaling is TBD

The teleconference was adjourned at 22:00 EDT

**Thursday 27 July 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 19:05am 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))

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

|  |  |  |
| --- | --- | --- |
| 7/27 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| 7/27 | Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| 7/27 | Adachi, Tomoko | TOSHIBA Corporation |
| 7/27 | Alayasra, Musab | Medipol University; Vestel |
| 7/27 | Asterjadhi, Alfred | Qualcomm Incorporated |
| 7/27 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| 7/27 | Baek, SunHee | LG ELECTRONICS |
| 7/27 | Bhandaru, Nehru | Broadcom Corporation |
| 7/27 | Boldy, David | Broadcom Corporation |
| 7/27 | Carney, William | Sony Corporation |
| 7/27 | chen, jindou | Huawei Technologies Co. Ltd |
| 7/27 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 7/27 | Coffey, John | Realtek Semiconductor Corp. |
| 7/27 | Das, Dibakar | Intel Corporation |
| 7/27 | Das, Subir | Perspecta Labs Inc. |
| 7/27 | Ding, Baokun | Huawei Technologies Co., Ltd |
| 7/27 | Dong, Xiandong | Xiaomi Inc. |
| 7/27 | Erceg, Vinko | Broadcom Corporation |
| 7/27 | Fang, Yonggang | ZTE TX Inc |
| 7/27 | Fischer, Matthew | Broadcom Corporation |
| 7/27 | Gan, Ming | Huawei Technologies Co., Ltd |
| 7/27 | Garg, Lalit | Broadcom Corporation |
| 7/27 | Ghosh, Chittabrata | Intel Corporation |
| 7/27 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 7/27 | Hamilton, Mark | Ruckus/CommScope |
| 7/27 | Han, Jonghun | SAMSUNG |
| 7/27 | Han, Zhiqiang | ZTE Corporation |
| 7/27 | Ho, Duncan | Qualcomm Incorporated |
| 7/27 | Hu, Chunyu | Facebook |
| 7/27 | Huang, Guogang | Huawei |
| 7/27 | Huang, Po-Kai | Intel Corporation |
| 7/27 | Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| 7/27 | Inohiza, Hirohiko | Canon |
| 7/27 | Jang, Insun | LG ELECTRONICS |
| 7/27 | Ji, Chenhe | Huawei Technologies Co. Ltd |
| 7/27 | Jiang, Jinjing | Apple, Inc. |
| 7/27 | Jung, hyojin | Hyundai Motor Company |
| 7/27 | Kakani, Naveen | Qualcomm Incorporated |
| 7/27 | Kandala, Srinivas | SAMSUNG |
| 7/27 | Kedem, Oren | Huawei Technologies Co. Ltd |
| 7/27 | Kim, Jeongki | LG ELECTRONICS |
| 7/27 | Kim, Sang Gook | LG ELECTRONICS |
| 7/27 | Kim, Sanghyun | WILUS Inc |
| 7/27 | Kim, Yongho | Korea National University of Transportation |
| 7/27 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 7/27 | Kneckt, Jarkko | Apple, Inc. |
| 7/27 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 7/27 | Kwon, Young Hoon | NXP Semiconductors |
| 7/27 | Levy, Joseph | InterDigital, Inc. |
| 7/27 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 7/27 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 7/27 | Lin, Wei | Huawei Technologies Co. Ltd |
| 7/27 | Liu, Jianfei | HUAWEI |
| 7/27 | Lu, Liuming | ZTE Corporation |
| 7/27 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 7/27 | Ma, Mengyao | HUAWEI |
| 7/27 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| 7/27 | Naribole, Sharan | SAMSUNG |
| 7/27 | Ouchi, Masatomo | Canon |
| 7/27 | Palm, Stephen | Broadcom Corporation |
| 7/27 | Park, Minyoung | Intel Corporation |
| 7/27 | Patil, Abhishek | Qualcomm Incorporated |
| 7/27 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 7/27 | Petrick, Albert | InterDigital, Inc. |
| 7/27 | QIU, WEI | Huawei Technologies Co., Ltd |
| 7/27 | Raissinia, Alireza | Qualcomm Incorporated |
| 7/27 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 7/27 | Seok, Yongho | MediaTek Inc. |
| 7/27 | Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| 7/27 | Song, Taewon | LG ELECTRONICS |
| 7/27 | Sun, Li-Hsiang | InterDigital, Inc. |
| 7/27 | Sun, Yanjun | Qualcomm Incorporated |
| 7/27 | Tanaka, Yusuke | Sony Corporation |
| 7/27 | Torab Jahromi, Payam | Facebook |
| 7/27 | Wang, Chao Chun | MediaTek Inc. |
| 7/27 | Wang, Huizhao | Quantenna Communications, Inc. |
| 7/27 | Wang, Lei | Huawei R&D USA |
| 7/27 | Yang, Jay | Nokia |
| 7/27 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 7/27 | Yee, James | MediaTek Inc. |
| 7/27 | Yukawa, Mitsuyoshi | Canon, Inc. |
| 7/27 | Zou, Tristan | Qualcomm Incorporated |
| 7/27 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r13.

The Chair went over the 997r7 for spec text volunteers (R1/R2 discussion each topic).

C: Default mapping is R1 but TID-to-link mapping should be R2.

C: Maybe it may be in R1. If we have different opinions, we can go through it later.

C: How many topics can be covered by one person? Some people have many POCs?

A: No strict rule of it.

C: You can say default mapping is in R1 and the other is in R2.

A: We already have it.

C: What is the difference between Multi-BSSID discovery and operation?

**Submissions**

1. [843r](https://mentor.ieee.org/802.11/dcn/20/11-20-0843-00-00be-mlo-bss-information-transmission-with-and-without-multiple-bssid.pptx)1 MLO BSS Info. TX with & without Multiple BSSID Support (Liwen Chu) [SPs]

Discussion:

C: we need to cover this in discovery part.

C: RNR can include those information(non-transmitted BSSID).

SP1 of 843r2: Do you support to add the following text in R1?- the reported AP’s profile in the ML element in Association Response frame shall carry the following information if the reported AP is a non-transmitted BSSID: the non-transmitted BSSID index, the MaxBSSID Indicator?Signaling TBD

Yes/No/Abstain: 29/12/26

1. [865r](https://mentor.ieee.org/802.11/dcn/20/11-20-0865-00-00be-ap-mld-beaconing-and-discovery.pptx)1 AP MLD Beaconing and Discovery (Jarkko Knekt)

Discussion:

C:slide 9, local bits are generated in locally?

C:PMF PTK, in SP1, basically, we can have PTK after four-way handshake. This is different.

A: after four-way handshake, we can obtain PTK.

C: Are you talking about integrity or encryption? PMF seems like encryption.

A: Encryption is non-AP STA parameter.

C: I’m fine

C: addressing , you’re optional or mandatory.

A: Need to be mandatory.

C: If we are mandatory, some problems may happen.

C: secure MLD query, how we can control the traffic in congested?

C: Security probe request, the first AP how does it associate with? Passive scanning?

C: Prior to that, how does it associate on the first link?

A: Passive scanning?

C: For link ID, how can you manage link ID in address field? Uniqueness?

1. [577r](https://mentor.ieee.org/802.11/dcn/20/11-20-0577-00-00be-rts-and-cts-procedure-in-synchronous-multi-link-operation.pptx)1 RTS and CTS Procedure in Synchronous Multi-link Op. (Yongho Seok)

Discussion:

C: slide 5, ending might be aligned in 6GHz and 5GHz. How about starting time which is different?

A: At this time, each AP accesses each channel independently.

C: The delay between 6GHz and 5GHz may be. How does the AP measure the exact padding length?

A: It’s implementations.

C: In 11ax, the starting time is aligned.

A: In 11be, there are several contributions that the starting times are different.

C: How does it know the padding length? How to get the information if the 5GHz AP firstly transmits RTS?

C: If MU-RTS in 6GHz starts after 5GHz MU-RTS, what happen?

A: Just follow the baseline rule. If you receives CTS, AP tries to retransmit RTS. Just implementation issue. Several appraches may be possible.

A: I just focus on non-HT PPDU padding.

1. [613r](https://mentor.ieee.org/802.11/dcn/20/11-20-0613-00-00be-ap-assisted-non-str-behavior.pptx)1 AP assisted Non-STR behavior (Ming Gan)

Discussion:

C: Seems like AP’s implementation issue. Complication in AP side.

C: Although STA1 requests it, it may fail to send or the AP may not send a short frame due to its channel status.

C: slide 6, why AP sends short frame instead that STA access the channel?

C: 11ah sync frame transmsion is similar to this.

A: That is similar. That’s a single link.

C: Short frame can be Trigger frame?

A: Trigger frame can be good candidate

C: Short frame initiates TXOP? Or independent?

A: It coud be in a TXOP. But it’s still TBD.

C: Cross link signaling does not look good.

C: We have similiar contribution (1009).

C: If data 1 frame missed, that information could not be used.

The teleconference was adjourned at 21:50 EDT

**Wendsday 29 July 2020, 10:00 –13:00 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 10:04am 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))

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

|  |  |
| --- | --- |
| Name | Affiliation |
| AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| Adhikari, Shubhodeep | Broadcom Corporation |
| AKHTAR, NADEEM | Arista Networks, Inc. |
| An, Song-Haur | INDEPENDENT |
| Ansley, Carol | CommScope |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Baek, SunHee | LG ELECTRONICS |
| Bankov, Dmitry | IITP RAS |
| Bredewoud, Albert | Broadcom Corporation |
| Carney, William | Sony Corporation |
| chen, jindou | Huawei Technologies Co. Ltd |
| Cheng, Paul | MediaTek Inc. |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Das, Dibakar | Intel Corporation |
| Das, Subir | Perspecta Labs Inc. |
| Dong, Xiandong | Xiaomi Inc. |
| ElArabawy, Ahmed | Google |
| Fang, Yonggang | ZTE TX Inc |
| Fischer, Matthew | Broadcom Corporation |
| Gan, Ming | Huawei Technologies Co., Ltd |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Han, Jonghun | SAMSUNG |
| Han, Zhiqiang | ZTE Corporation |
| Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| Ho, Duncan | Qualcomm Incorporated |
| Hu, Chunyu | Facebook |
| Hu, Mengshi | HUAWEI |
| Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| Huang, Po-Kai | Intel Corporation |
| Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| Inohiza, Hirohiko | Canon |
| Jang, Insun | LG ELECTRONICS |
| Ji, Chenhe | Huawei Technologies Co. Ltd |
| Jia, Jia | Huawei Technologies Co., Ltd |
| Jiang, Jinjing | Apple, Inc. |
| Kamel, Mahmoud | InterDigital, Inc. |
| Kedem, Oren | Huawei Technologies Co. Ltd |
| Khorov, Evgeny | IITP RAS |
| Kim, Jeongki | LG ELECTRONICS |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sanghyun | WILUS Inc |
| Kim, Youhan | Qualcomm Incorporated |
| Kim, Youn-Kwan | The Catholic University of Korea |
| Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| Klein, Arik | Huawei Technologies Co. Ltd |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple, Inc. |
| Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| Kwon, Young Hoon | NXP Semiconductors |
| Lalam, Massinissa | SAGEMCOM BROADBAND SAS |
| Levy, Joseph | InterDigital, Inc. |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Liu, Jianfei | HUAWEI |
| Lopez, Miguel | Ericsson AB |
| Lou, Hanqing | InterDigital, Inc. |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Lv, kaiying | MediaTek Inc. |
| Max, Sebastian | Ericsson AB |
| Monajemi, Pooya | Cisco Systems, Inc. |
| NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| Ozbakis, Basak | VESTEL |
| Park, Minyoung | Intel Corporation |
| Patil, Abhishek | Qualcomm Incorporated |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Petrick, Albert | InterDigital, Inc. |
| Raissinia, Alireza | Qualcomm Incorporated |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Salman, Hanadi | Istanbul Medipol University; VESTEL |
| Sedin, Jonas | Ericsson AB |
| Seok, Yongho | MediaTek Inc. |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Song, Taewon | LG ELECTRONICS |
| Startsev, Ivan | IITP RAS |
| SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| Sun, Bo | ZTE Corporation |
| Sun, Li-Hsiang | InterDigital, Inc. |
| Sun, Yanjun | Qualcomm Incorporated |
| Torab Jahromi, Payam | Facebook |
| Verenzuela, Daniel | Sony Corporation |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Lei | Huawei R&D USA |
| Xin, Liangxiao | Sony Corporation |
| Xin, Yan | Huawei Technologies Co., Ltd |
| Yang, Jay | Nokia |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| yi, yongjiang | Futurewei Technologies |
| Yu, Jian | Huawei Technologies Co., Ltd |
| Yu, Mao | NXP Semiconductors |
| ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| Zein, Nader | NEC Laboratories Europe |
| Zeng, Yan | Huawei Technologies Co.,  Ltd |
| Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r15.

**Submissions**

1. [670r](https://mentor.ieee.org/802.11/dcn/20/11-20-0670-00-00be-synchronous-multi-link-operation-follow-up.pptx)1 Synchronous Multi-link Operation Follow-up (Yongho Seok)

**SP1: Do you support to amend the SFD texts as the following?**

* 1. 802.11be supports the following PPDU transmission restriction for the constrained multi-link operation:
     1. If an AP MLD intends to align the ending time of DL PPDUs carrying a frame soliciting an immediate response simultaneously sent to the same non-STR non-AP MLD on multiple links, the AP MLD shall ensure that the difference between the ending times of transmitting DL PPDUs is less than or equal to TBD (< SIFS) 8 μs ((aSIFSTime + aSignalExtension)/2).
        1. Where the reference of the ending time of the PPDU is TBD not including the Signal Extension field.

SP is approved with unanimous consent

1. [834r](https://mentor.ieee.org/802.11/dcn/20/11-20-0834-06-00be-tentative-re-association-for-non-ap-mld.pptx)7 Tentative Re(Association) for Non-AP MLD Guogang Huang (Huawei) [1 SP]

**SP1: Do you support Tentative Reassociation operation for multi-radio non-AP MLD?**

* 1. NOTE. For the tentative reassociation operation, the multi-radio non-AP MLD needs to send a defined frame to trigger AP sending DS-STA-NOTIFY.request primitive to the DS, rather than AP automatically sending DS-STA-NOTIFY.request primitive to the DS after successfully exchange Association Request/Response frames with Status Code SUCCESS.

Discussion:

C: I don’t know whether this multi-link association is useful.

A: This is to reduce the delay of time sensitive traffic.

C: we can have offline discussion.

Yes/No/Abstain: 25/21/43

1. [671r](https://mentor.ieee.org/802.11/dcn/20/11-20-0671-00-00be-multi-link-triggered-uplink-access-follow-up.pptx) Multi-link Triggered Uplink Access Follow-up (Yongho Seok)

Discussion:

C: slide 12, 11be, m=0 is mandatory

A: I just follow the baseline spec.

C: do we consider NAV?

A: Receiver side or transmitter side?

C: In 11ax, if CS required subfield is set to 1, STA needs to consider NAV.

A: We don’t need to think about NAV issue. That is fundamental issue. Just follow the 11ax rule.

A: It is still checking the NAV. STA behaviour is the same as legacy.

C: Is there any problem if we choose only one of the UL length sets?

A: Ok, let me think about it.

A: if the condition is met, the CS required is set 1, otherwise, the subfield is set to 0

C: there is two option in that case. One is sending Trigger frame with CS required set to 0 , the other is not sending the Trigger frame.

A: Yes. Both are possible. AP can choose one and that’s implementation issue.

C: This will cause the unfairness issue.

Chair: Add the Note – the STA follows the CS Required rule defined in 802.11ax spec.

C: slide 12, 3 means 4us. ...

SP1: Do you support the following Trigger frame transmission rule in the MLO?- An AP in the AP MLD shall not send a Trigger frame with the CS Required subfield set to 1 to a STA in a non-STR non-AP MLD, when at least one PPDU from other STAs affiliated to the same non-STR non-AP MLD is scheduled for transmission before (aSIFSTime + aSignalExtention – aRxTxTurnaroundTime) has expired after the PPDU containing the Trigger frame. - Note– In the above, aRxTxTurnaroundTime is 4 μs. - Note– The ending time of a first PPDU that carrying a frame soliciting an immediate response frame cannot be earlier more than aRxTxTurnaroundTime of the ending time of a second PPDU containing a Trigger frame with the CS Required subfield set to 1. - Note– The AP STA still follows the CS Required rule defined in 802.11ax spec.

Yes/No/Abstain: 42/11/39

* **SP2: Do you support the following Trigger frame transmission rule in the MLO in R1?**
  + When an AP MLD triggers simultaneously TB PPDUs from more than one STAs affiliated to the same non-STR non-AP MLD and allows the frames in the TB PPDUs to solicit control response frames from the AP MLD, then the UL Length subfield values in the soliciting Trigger frames shall be set to the same value.

A: more sets can give AP the flexibility

C: Not having the flexibility. One value can make easy implementation.

C: I don’t think so.

A: Firstly, I will run this with one value.

Yes/No/Abstain: 43/11 /31

1. [689r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0689-01-00be-single-sta-trigger.pptx) Single STA trigger (Young Hoon Kwon)

Discussion:

C: You mentioned you preferred to A-Control field . In the SP2, do you want to allow both Trigger and A-Control field?

A: SP1 is just concept. SP 2 covers the details of it.

C: Trigger frame is more wastage than other? I don’t think Trigger frame has much overhead. Trigger frame is more flexible.

A: Having several issues on overhead issue.

C: For the control response frames, is there anything?

C: Use case is really coner case. Tiny protection is very low gain.

A: I understand you issue.

C: This is not for R1.

C: SU PPDU, control response in SU PPDU means HE PPDU or VHT PPDU. Or you consider non-HT PPDU.

A: That’s the next step.

C: In case of non-HT PPDU, you don’t need to consider duration of non-HT PPDU.

C: Is this STA , AP, non-AP?

A: Both AP and non-AP.

* **Do you support in R1 of TGbe SFD that**
  + A STA can include an indication in a PPDU that enables a peer STA to transmit a control response frame in an SU PPDU whose duration is indicated by the indication.

25/25/33

1. [672r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0672-00-00be-group-addressed-frame-transmission-in-constrained-multi-link-operation-follow-up.pptx) Group addr. frame TX in constrained multi-link op. follow-up (Yongho Seok)

Discussion:

C: Why does the AP send a group addressed frame to STAs in the same MLD? In that case, AP should not transmit that frame to the same MLD.

A: Yes, if AP is smart and uses the DMS, it will not transmit the frame.

C: SP 1, the first bullet seems to make sense. But the second is several ways for it. Why not split two bullets?

A: Ok, let me listen other’s opinion.

C: Slide 12, if STA 2 knows STA1 MAC address, STA2 can filter out. Why do we need MLD address?

A: Yes, it’s possible. But, regarding the source address is provided by upper layer, LLC just look at the single MAC address, so I decided this opition.

C: Slide 12, in left side, is there already in the baseline?

A: Yes.

C: I want to clarify the SA translation. Is it applied to unicast?

A: Yes.

**SP1 of r1 : Do you support the following group addressed frames delivery mechanism? An AP MLD should not cause a STA affiliated to a non-STR non-AP MLD to transmit an MPDU that overlaps with group addressed frames in a constrained link if another STA affiliated to the same non-STR non-AP MLD is expected to be receiving group addressed frames.**

Yes/No/Abstain: 39/1/26

* **SP2: Do you support the following loopback prevention mechanism of the group address frame in the MLO?** 
  + An AP MLD that broadcasts the group addressed MPDU received from a non-AP MLD with which it has done multi-link setup shall set the SA field of the broadcast group addressed MPDU to the MLD MAC address of the non-AP MLD.
  + A non-AP MLD filters out the group addressed MPDU with the SA field set to the MLD MAC address of the non-AP MLD.

Yes/No/Abstain: 23/19/27

1. [761r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0761-00-00be-multi-link-group-addressed-frame-delivery-for-non-str-mld.pptx) Multi Link Group Addr. Frame delivery for non-STR MLD (Jason Yuchen Guo)

Discussion:

C: aligned the TBTT, you assumed that TSF of both APs are same. we don’t have that assumption For the all APs have the same TSF,

A: I don’t think that both are related. I’ll check it.

C: Proposal 1 is the same DTIM interval, right?

A: Yes, right the DTIM intervals are the exact same.

C: DTIM of both links are aligned?

C: APs have the same TSFs. If APs don’t have the same TSFs, it cannot work.

A: I’ll consider it at next version.

C: Beacon alignment, if the medium states of two links are different, the beacon will be delayed. How do you garantee it?

The teleconference was adjourned at 12:59 EDT

**Monday, 03 August 2020, 10:00 –13:00 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 10:04am 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:
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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:**

|  |  |
| --- | --- |
| AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| Akhmetov, Dmitry | Intel Corporation |
| AKHTAR, NADEEM | Arista Networks, Inc. |
| Alayasra, Musab | Medipol University; Vestel |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| Baek, SunHee | LG ELECTRONICS |
| Bajko, Gabor | MediaTek Inc. |
| Bankov, Dmitry | IITP RAS |
| Bredewoud, Albert | Broadcom Corporation |
| Carney, William | Sony Corporation |
| chen, jindou | Huawei Technologies Co. Ltd |
| Cheng, Paul | MediaTek Inc. |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Coffey, John | Realtek Semiconductor Corp. |
| Das, Dibakar | Intel Corporation |
| Das, Subir | Perspecta Labs Inc. |
| Derham, Thomas | Broadcom Corporation |
| Fang, Yonggang | ZTE TX Inc |
| Fischer, Matthew | Broadcom Corporation |
| Gan, Ming | Huawei Technologies Co., Ltd |
| Ghosh, Chittabrata | Intel Corporation |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Han, Jonghun | SAMSUNG |
| Han, Zhiqiang | ZTE Corporation |
| Hu, Chunyu | Facebook |
| Huang, Guogang | Huawei |
| Huang, Po-Kai | Intel Corporation |
| Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| Inohiza, Hirohiko | Canon |
| Jang, Insun | LG ELECTRONICS |
| Kain, Carl | USDoT |
| Kakani, Naveen | Qualcomm Incorporated |
| Kedem, Oren | Huawei Technologies Co. Ltd |
| Kim, Jeongki | LG ELECTRONICS |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sang Gook | LG ELECTRONICS |
| Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| Klein, Arik | Huawei Technologies Co. Ltd |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple, Inc. |
| Ko, Geonjung | WILUS Inc. |
| Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| Kwon, Young Hoon | NXP Semiconductors |
| Levitsky, Ilya | IITP RAS |
| Levy, Joseph | InterDigital, Inc. |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Liu, Jianfei | HUAWEI |
| Liu, Yong | Apple, Inc. |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Lv, kaiying | MediaTek Inc. |
| Ma, Mengyao | HUAWEI |
| Max, Sebastian | Ericsson AB |
| Monajemi, Pooya | Cisco Systems, Inc. |
| Park, Minyoung | Intel Corporation |
| Patil, Abhishek | Qualcomm Incorporated |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Petrick, Albert | InterDigital, Inc. |
| Raissinia, Alireza | Qualcomm Incorporated |
| RISON, Mark | Samsung Cambridge Solution Centre |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Salman, Hanadi | Istanbul Medipol University; VESTEL |
| Sedin, Jonas | Ericsson AB |
| Seok, Yongho | MediaTek Inc. |
| Song, Taewon | LG ELECTRONICS |
| Startsev, Ivan | IITP RAS |
| Sun, Li-Hsiang | InterDigital, Inc. |
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| Trainin, Solomon | Qualcomm Incorporated |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Lei | Huawei R&D USA |
| Wang, Xiaofei | InterDigital, Inc. |
| Wullert, John | Perspecta Labs |
| Yang, Jay | Nokia |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| yi, yongjiang | Futurewei Technologies |
| Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r16.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [899r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0899-00-00be-tim-follow-up.pptx) TIM follow up, Young Hoon Kwon (NXP)

* SP1: **Do you agree to add the following to R1 of 11be SFD:**
  + A non-AP MLD shall have the same U-APSD Flag value for each AC across all links that multi-link is setup.

Discussion

C: Is this STA side operation ? Not AP operation?

A: Yes. U-APSD flag is from the non-AP. AP determines how the AP sets the TIM bitmap.

C: How does the AP set the TIM at that time?

A: That’s baseline operation. slide 3 was explained.

SP is approved with unanimous consent

1. [688r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0688-00-00be-multi-link-individual-addressed-data-delivery-without-ba.pptx) Multi-link individual addressed data delivery without BA, Po-Kai Huang (Intel)

**SP1: After multi-link setup, do you support the following to enable delivery of individual addressed QoS traffic without BA negotiation across links?**

* 1. For Transmitter:
     1. Expand Table 10-5—Transmitter sequence number spaces to have a new entry Indexed by <destined MLD Address, TID>
     2. Continue to transmit the failed QoS Data frame until retry counter is met
     3. Cannot transmit other QoS Data frame from the same TID in any link until the current frame finish transmission or dropped
  2. For Receiver:
     1. Maintain at least the most recent record of <peer MLD address, TID, sequence number>.
     2. Drop the frame with retry bit set and record match

Discussion:

C: MLD address is Link address?

A: By MLD address, you can

C: there is no link address?

C: is it better than explicit?

C: why not applying the Rojan’s comment?

SP text is changed.

**SP1 of r1: After multi-link setup, do you support the following to enable delivery of individual addressed QoS traffic of a TID without BA negotiation across links, where the TID is mapped, in R1? For Transmitter:Expand Table 10-5—Transmitter sequence number spaces to have a new entry Indexed by <destined MLD Address, TID>Continue to transmit the failed QoS Data frame until retry counter is metCannot transmit other QoS Data frame from the same TID in any link until the current frame finish transmission or dropped For Receiver:Maintain at least the most recent record of <peer MLD address, TID, sequence number>.Drop the frame with retry bit set and record match**

SP is approved with unanimous consent

Technical Submissions: **ML Constrained Ops**

1. [505r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0505-00-00be-sync-transmission-for-non-str-mld.pptx) Sync transmission for non-STR MLD (Ming Gan)

Summary:

Discussion:

C: I can support the SP. I have a similar contribution.

A: Yes, you have the same SP.

C: slide 7, you’re suggesting the method that MLD STA invokes using lower ED level.

A:

C: slide 6, case 3, what does this do synchoronziation? Only end time alignment? Not start time?

A: Yes. There is no blind issue?

C: What is the difference between this and yongho’s SP?

C: This is mandatory? We can use the compability.

C: slide 7,

SP1 of 505r1: Do you agree that an AP MLD shall align the end of DL PPDUs (that contain QoS data soliciting an immediate UL response) that are sent simultaneously on multiple links to the same non-STR non-AP MLD, in such a way that the response to any of the PPDUs will not overlap with any of the DL PPDUs in R1Exception: a high priority DL PPDU sent on one link may not be aligned with another DL PPDU sent on the other link

Yes/No/Abstain: 53/4/24

1. [739r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0739-00-00be-non-ap-mld-initiated-aggregation-opportunity-in-txop.pptx) Non-AP MLD Initiated Aggr.: Opportunity in TXOP (Insun Jang)

Discussion:

C: slide 8, During BA duration, BC is 0 and then STA holds the BC until either TXOP end or during the last BA duration before TXOP

A:

C: I have similar contribution. We can discuss them togther.

C: If BC is not 0 and hold BC, then your

C: For the option2, your concept should be on top of the blind issue.

C: Can Option 2-1 and option 2-2 both be allowed? Or need to choose one among them?

A: both are possbile.

C: I don’t think. We need to choose one.

A: Yes. I understand. Got it.

C: You prefer option 2-2?

A: Yes

C: several comments on blindness.

C: option 2-3, if BC became 0, then you don’t do back off, just monitor channel sensing during specific duration. Is it your intention?

1. [740r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0740-00-00be-non-ap-mld-initiated-aggregation-truncation-of-back-off-count.pptx) Non-AP MLD Initiated Aggr.: Truncation of Back-off Count (Insun Jang)

Discussion:

C: Only after the STA check the fixed duration like PIFS, the STA transmits the frame without any backoff? Is it possbile?

A: we prefer

C: slide 9, do you explain ”the EDCA parameters of previsouly used AC are used..”?

C: If previous AC is AC\_VO and the following AC is AC\_BE, then which AC is used ? AC\_VO still? Or new AC\_BE is used?

C: how can STA1 and STA2 communicate each other? There is no relation between lower MACs of both STAs.

A: We assume that both STAs can communicate each other.

1. [762r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0762-00-00be-sta-id-indication-for-constrained-multi-link-operation.pptx) STA ID Indication for Constrained Multi-Link Operation (Yongho Seok)

C: Can we reuse the 11ax approach?

A: If we decide 11bits STA\_ID, we can reuse it. Phy did not decided it yet.

C: I have similar comments. I prefer AID field. If we use small size ID, then it’s not useful.

C: Slide 6, non-AP MLD behavior. Here, if the STA detects STA ID, then STA pause the EDCA.

* **SP1: Do you support that the STA ID field in a downlink EHT SU PPDU sent from an EHT AP to an EHT STA identifies the recipient EHT STA?**
  + NOTE- The size and encoding of the STA ID field in the downlink EHT SU PPDU is TBD.

The SP is approved with unanimous consent

* SP2: **Do you support that the STA ID field in an uplink EHT SU PPDU sent from an EHT STA to an EHT AP identifies the transmitter EHT STA?**
  + NOTE- The size and encoding of the STA ID field in the uplink EHT SU PPDU is TBD.
* The SP is approved with unanimous consent

1. [809r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0809-00-00be-str-capability-report.pptx) STR capability report (Pooya Monajemi)

C: What is the impact of slide 7 parameters?

A: AP’s BSS channel selection.

C: slide 4, TX PSD is for transmitted BW, RX PSD is for receiving BW.

C: we have similar contribution. Those are internal parameters. This reference parameters can done by measurement between STAs.

C: How can the parameters consider BW?

C: PPDU BW may have different BW.

C: we have the definition of STR or non-STR clearly. No leakeage or not.

A: Proposal is optional.

1. [909r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0909-00-00be-enhanced-non-str-mld-operation.pptx) Enhanced Non-STR MLD Operation (Jeongki Kim)

Discussion

C: Motivation is switching back and forth between STR and non-STR? How often do you expect it? Mobility is the reason of switching of STR and non-STR?

A: I don’t consider mobility of the STA. Not switching between STR and non-STR. STA just consider the distance between two links. If the distance between two links is very close, all bandwidth combinations are non-STR and in this case the non-AP MLD does not need to send the information and if the distance is very far, then non-AP MLD does not also need to send the information. The proposed approach can be used in the remaining cases.

C: Instead of monitoring the trigger frame, STA2 can transmit the UL frame with reduced power while AP1 transmits DL frame?

A: Based on the reported information, STA2 can choose the BWs and the reduced TX power for transmitting UL frame.

C: How can the AP decide the MCS level of DL frame at the begining? When AP1 sends DL frames, it doesn’t know how much bandwidth STA sets for UL frame later.

A: Before STA2 sends UL frame, the STA2 already knows the MCS and BW of DL frame from AP1 and based on the information the STA2 can decide whether it sends UL frame or not. If the STA decides to send it, the STA properly chooses UL BW and Power of UL frame.

C: slide 5, you’re not proposing the mode change between STR and non-STR. You just define the STR capabilities depending on the operating bandwidths on each links. It’s not changing STR and non-STR mode.

A: Yes, you’re right.

The teleconference was adjourned at 12:59 EDT

**Monday, 05 August 2020, 10:00 –13:00 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 10:04am 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))

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

|  |  |
| --- | --- |
| AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| Alayasra, Musab | Medipol University; Vestel |
| Andersdotter, Amelia | None - Self-funded |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Baek, SunHee | LG ELECTRONICS |
| Bankov, Dmitry | IITP RAS |
| Bredewoud, Albert | Broadcom Corporation |
| Carney, William | Sony Corporation |
| chen, jindou | Huawei Technologies Co. Ltd |
| Cheng, Paul | MediaTek Inc. |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Choi, Jinsoo | LG ELECTRONICS |
| Coffey, John | Realtek Semiconductor Corp. |
| Das, Dibakar | Intel Corporation |
| Ding, Baokun | Huawei Technologies Co., Ltd |
| Dong, Xiandong | Xiaomi Inc. |
| Fang, Yonggang | ZTE TX Inc |
| Ghosh, Chittabrata | Intel Corporation |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Han, Jonghun | SAMSUNG |
| Han, Zhiqiang | ZTE Corporation |
| Ho, Duncan | Qualcomm Incorporated |
| Hu, Chunyu | Facebook |
| Hu, Mengshi | HUAWEI |
| Huang, Guogang | Huawei |
| Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| Huang, Po-Kai | Intel Corporation |
| Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| Ji, Chenhe | Huawei Technologies Co. Ltd |
| Jiang, Jinjing | Apple, Inc. |
| Kain, Carl | USDoT |
| Kamel, Mahmoud | InterDigital, Inc. |
| Khorov, Evgeny | IITP RAS |
| Kim, Jeongki | LG ELECTRONICS |
| Kim, Myeong-Jin | SAMSUNG |
| kim, namyeong | LG ELECTRONICS |
| Kim, Youn-Kwan | The Catholic University of Korea |
| Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| Klein, Arik | Huawei Technologies Co. Ltd |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple, Inc. |
| Ko, Geonjung | WILUS Inc. |
| Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| Kwon, Young Hoon | NXP Semiconductors |
| Lan, Zhou | Broadcom Corporation |
| Lansford, James | Qualcomm Incorporated |
| Levitsky, Ilya | IITP RAS |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Liu, Jianfei | HUAWEI |
| Liu, Yong | Apple, Inc. |
| Lou, Hanqing | InterDigital, Inc. |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Lv, kaiying | MediaTek Inc. |
| Ma, Mengyao | HUAWEI |
| Max, Sebastian | Ericsson AB |
| Monajemi, Pooya | Cisco Systems, Inc. |
| NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| Naribole, Sharan | SAMSUNG |
| Ozbakis, Basak | VESTEL |
| Park, Minyoung | Intel Corporation |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Petrick, Albert | InterDigital, Inc. |
| Raissinia, Alireza | Qualcomm Incorporated |
| RISON, Mark | Samsung Cambridge Solution Centre |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Salman, Hanadi | Istanbul Medipol University; VESTEL |
| Seok, Yongho | MediaTek Inc. |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Song, Taewon | LG ELECTRONICS |
| Startsev, Ivan | IITP RAS |
| SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| Sun, Bo | ZTE Corporation |
| Sun, Li-Hsiang | InterDigital, Inc. |
| Torab Jahromi, Payam | Facebook |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Huizhao | Quantenna Communications, Inc. |
| Wang, Lei | Huawei R&D USA |
| Wu, Tianyu | Apple, Inc. |
| Wullert, John | Perspecta Labs |
| Yang, Jay | Nokia |
| yi, yongjiang | Futurewei Technologies |
| Yu, Jian | Huawei Technologies Co., Ltd |
| Yukawa, Mitsuyoshi | Canon, Inc. |
| Zeng, Yan | Huawei Technologies Co.,  Ltd |
| Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r18.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [865r](https://mentor.ieee.org/802.11/dcn/20/11-20-0865-02-00be-ap-mld-beaconing-and-discovery.pptx)2 AP MLD Beaconing and Discovery, Jarkko Kneckt (Apple)

Discussion:

SP1: Do you support the following?

TGbe SFD already has the following passed motion. This SP requests to remove "NOTE" and "is TBD" in the motion 115.802.11be supports the following:  •             Existing frames are reused for discovering APs that are affiliated with AP MLD. •             Association Request and Association Response frames are reused for multi-link setup. •             ~~NOTE:~~ After association, 802.11be supports new signaling to query AP link specific parameters or AP MLD parameters by using Protected Management Frames (PMF) encrypted Management frames if PMF is enabled by AP  ~~is TBD~~ .[Motion 115, #SP76, [7] and [94]]

Yes/No/Abstain: 19/16/38

SP2: **802.11be shall have means to provide information of an AP in AP MLD that is silencing its associated STAs by:**

**- Signaling to EHT STAs the Quiet Element, Channel Switch Element and identifier of the silencing AP in Beacons of all APs in AP MLD**

**- If an AP in AP MLD is silencing its associated STAs, then other APs in the AP MLD do not include the AP in the Reduced Neighbor Report element they transmit**

SP2 is differed

1. [427r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0427-03-00be-synchronous-multi-link-operation.pptx) Synchronous multi link operation, Young Hoon Kwon (NXP)

**SP1: Do you support the following transmission sequence for the constrained multi-link operation in R1:**

* + When an AP MLD obtains TXOPs on multiple links and transmits frames to a non STR non-AP MLD soliciting immediate response on the multiple links, and intends to align the ending time of DL PPDUs during the obtained TXOPs:
    - If the AP MLD does not receive an immediate response successfully on a link that is not a first frame exchange within the obtained TXOP of the link, and if the AP MLD receives an immediate response on at least one another link, the AP MLD can continue its transmission on the link within the obtained TXOP TBD (e.g., SIFS or PIFS) time after the failed reception of the immediate response if the channel is idle.
    - CCA mechanism on the link is TBD.

Yes/No/Abstain:24/11/47

Technical Submissions: **ML Constrained Ops**

1. [921r](https://mentor.ieee.org/802.11/dcn/20/11-20-0921-01-00be-discussion-about-str-capabilities-indication.pptx)1 Discussion about STR capabilities indication (Yunbo Li)

Discussion:

C: two links are same band or different?

A: it’s possible when one link is 5G and the other link is 6G

C: slide 8, there are two options, option 2 also needs to be updated?

C: CLI is function of TX power?

A: I consider the MAX TX power.

* **Do you agree that if a MLD can support transmission on link 1 concurrent with reception on link2, but can not support transmit on link2 concurrent with reception on link1, this pair of links will be non-STR?**

Yes/No/Abstain: 36/10/27

1. [974r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0974-00-00be-channel-access-for-str-ap-mld-with-non-str-non-ap-mld.pptx) Channel access of STR AP MLD with non-STR non-AP MLD (Liangxiao Xin)

Discussion:

C: the same backoff counter, if one link is successful and the other link is failed, then what happen to the backoff counter?

C: did you estimate how often this approaches work?

C: I had a contribution 577. It has a simulation result. It works only when the channel utilization is low. Please check it.

C: We already agree with end time alignment. ...

C: Do you assume the same MLD or different MLD?

A: The same MLD, STR AP MLD and non-STR non-AP MLD.

C: Dimitry has a related contribution.

A: I didn’t check it yet. After checking that, we can compare them.

C: For the second problem. Here you use the same random backoff, how about the CW situation?

A: It’s TBD.

1. [993r](https://mentor.ieee.org/802.11/dcn/20/11-20-0993-02-00be-sync-ml-operations-of-non-str-device.pptx)2 Sync ML operations for non-STR device (Dmitry Akhmetov)

Discussion:

C: I agree with the high level messages. Slide 8, you mention flexible. In your simulation, what do you consider?

A: STA might have intelligency. STA may wait or not depending on the BO values of two links.

C: In this figure, STA may hold BO 1 (not 0). Is it typo? You said only zero in your options.

A: Not typo. General concept is STA may hold BO with some value. It could be any value. But, my intention is zero.

C: I need offline discussion. Pls defer the SP.

C: If the 6GHz is congested, the STA does not have any opportunity to transmit.

C: I have similar contribution. We already allow the waited slot concept by current EDCA mechanism. I can support it. Similar view.

C: SP text is exactly matched with the figure. BO values are different in both sides.

C: Option 3, when link 2 becomes busy and link 1 picks up BO in BO value =zero, is there any problem?

1. [1053r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1053-00-00be-synchronous-multi-link-transmission-of-non-str-mld.pptx) Synchronous Multi-link Transmission of Non-STR MLD (Yongho Seok)

Summary: Very similar to 993r2

Discussion: No disussion

The teleconference was adjourned at 13:02 EDT

**Thursday, 06 August 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 19:04am 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))

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

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 8/6 | Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| 8/6 | Akhmetov, Dmitry | Intel Corporation |
| 8/6 | Alayasra, Musab | Medipol University; Vestel |
| 8/6 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| 8/6 | Baek, SunHee | LG ELECTRONICS |
| 8/6 | Carney, William | Sony Corporation |
| 8/6 | chen, jindou | Huawei Technologies Co. Ltd |
| 8/6 | Cheng, Paul | MediaTek Inc. |
| 8/6 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 8/6 | CHUN, JINYOUNG | LG ELECTRONICS |
| 8/6 | Coffey, John | Realtek Semiconductor Corp. |
| 8/6 | Das, Dibakar | Intel Corporation |
| 8/6 | Das, Subir | Perspecta Labs Inc. |
| 8/6 | Derham, Thomas | Broadcom Corporation |
| 8/6 | Ding, Baokun | Huawei Technologies Co., Ltd |
| 8/6 | Dong, Xiandong | Xiaomi Inc. |
| 8/6 | Fang, Yonggang | ZTE TX Inc |
| 8/6 | Fischer, Matthew | Broadcom Corporation |
| 8/6 | Ghosh, Chittabrata | Intel Corporation |
| 8/6 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 8/6 | Hamilton, Mark | Ruckus/CommScope |
| 8/6 | Han, Zhiqiang | ZTE Corporation |
| 8/6 | Ho, Duncan | Qualcomm Incorporated |
| 8/6 | Hu, Chunyu | Facebook |
| 8/6 | Huang, Guogang | Huawei |
| 8/6 | Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| 8/6 | Inohiza, Hirohiko | Canon |
| 8/6 | Jang, Insun | LG ELECTRONICS |
| 8/6 | Kain, Carl | USDoT |
| 8/6 | Kakani, Naveen | Qualcomm Incorporated |
| 8/6 | Kandala, Srinivas | SAMSUNG |
| 8/6 | Kim, Jeongki | LG ELECTRONICS |
| 8/6 | kim, namyeong | LG ELECTRONICS |
| 8/6 | Kim, Sang Gook | LG ELECTRONICS |
| 8/6 | Kim, Sanghyun | WILUS Inc |
| 8/6 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 8/6 | Ko, Geonjung | WILUS Inc. |
| 8/6 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 8/6 | Kwon, Young Hoon | NXP Semiconductors |
| 8/6 | Lan, Zhou | Broadcom Corporation |
| 8/6 | Levy, Joseph | InterDigital, Inc. |
| 8/6 | Li, Nan | ZTE Corporation |
| 8/6 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 8/6 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 8/6 | Lin, Wei | Huawei Technologies Co. Ltd |
| 8/6 | Liu, Jianfei | HUAWEI |
| 8/6 | Liu, Yong | Apple, Inc. |
| 8/6 | Lu, Liuming | ZTE Corporation |
| 8/6 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 8/6 | Ma, Mengyao | HUAWEI |
| 8/6 | Monajemi, Pooya | Cisco Systems, Inc. |
| 8/6 | NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| 8/6 | Naribole, Sharan | SAMSUNG |
| 8/6 | Ouchi, Masatomo | Canon |
| 8/6 | Patil, Abhishek | Qualcomm Incorporated |
| 8/6 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 8/6 | Petrick, Albert | InterDigital, Inc. |
| 8/6 | QIU, WEI | Huawei Technologies Co., Ltd |
| 8/6 | Raissinia, Alireza | Qualcomm Incorporated |
| 8/6 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 8/6 | Seok, Yongho | MediaTek Inc. |
| 8/6 | Song, Taewon | LG ELECTRONICS |
| 8/6 | Stanley, Dorothy | Hewlett Packard Enterprise |
| 8/6 | Sun, Li-Hsiang | InterDigital, Inc. |
| 8/6 | Sun, Yanjun | Qualcomm Incorporated |
| 8/6 | SURACI, FRANK | U.S. Department of Homeland Security |
| 8/6 | Tanaka, Yusuke | Sony Corporation |
| 8/6 | Torab Jahromi, Payam | Facebook |
| 8/6 | Wang, Chao Chun | MediaTek Inc. |
| 8/6 | Wang, Huizhao | Quantenna Communications, Inc. |
| 8/6 | Wang, Lei | Huawei R&D USA |
| 8/6 | Wang, Qi | Apple, Inc. |
| 8/6 | Wang, Yi-Hsiu | Zeku |
| 8/6 | Want, Roy | Google |
| 8/6 | Wullert, John | Perspecta Labs |
| 8/6 | Yang, Jay | Nokia |
| 8/6 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 8/6 | Yee, James | MediaTek Inc. |
| 8/6 | yi, yongjiang | Futurewei Technologies |
| 8/6 | Yukawa, Mitsuyoshi | Canon, Inc. |
| 8/6 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r20.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [761r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0761-01-00be-multi-link-group-addressed-frame-delivery-for-non-str-mld.pptx) Multi Link Group Addressed Frame delivery for non-STR MLD, Jason Yuchen Guo [SP 2]

Discussion:

C: You need to align the TBTTs of Beacon frames on other links. What is the motivation?

A: It does not matter whether the beacons are aligned or not.

C: I think it’s non-AP STA’s internal issue/implementation. STA can already do it.

* + SP2 of 761: Do you support the following rule?
    - When a non-STR MLD intends to receive Beacon frames on more than one link, if it successfully contends the channel on one link before the TBTT of the other link, then it should end its TXOP before the TBTT of the other link

Yes/No/Abstain: 25/18/31

1. [411r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0411-04-00be-mlo-information-exchange-for-link-switching.pptx) MLO: Information Exchange for Link Switching, Namyeong Kim (LG Electronics) [SP 1]

**SP1: Do you agree to define the following mechanism:**

A STA of a non-AP MLD can request a peer AP of AP MLD a part of complete information of other APs of the same AP MLD.

The signaling for requesting the part of complete information is TBD.

NOTE: As an example, the part of complete information may be information that is not included on the beacon frame sent from the peer AP.

Discussion:

C: What is the a part of complete information? Specific information

C: C: Protection frame or not?

C: what does it mean the a peer AP?

Yes/No/Abstain: 30/12/38

1. [586r5](https://mentor.ieee.org/802.11/dcn/20/11-20-0586-05-00be-mlo-signaling-of-critical-updates.pptx), MLO: Signaling of critical updates, Abhishek Patil (Qualcomm) [SP 2],

C: A lot of capability information? Which specific capability? Is it mandatory of AP or non-AP?

A: It is useful.

C: This behavior is mandatory in non-AP side.

C: CSN for other AP. Not need the CSN for transmitting AP.

* **Do you agree to update the text in Motion #115, #SP77 as following:**
  + Do you support that an AP within an AP MLD shall include in the Beacon and Probe Response frames it transmits the Change Sequence fields that indicate changes of system information for the transmitting AP and other APs within the same AP MLD, where the change sequence field value for ~~the reported~~ each AP is initialized to 0, and is ~~that increments~~ incremented when there is a as the critical update to the operational parameters for that of the reported AP is occurred?
    - The EHT Operation element shall include field(s) to carry the change sequence(s) of the transmitting AP and of non-transmitted BSSIDs (if any)
    - The change sequence information for another AP of the MLD shall be carried in a field in the TBTT Information field of the Reduced Neighbor Report element corresponding to that AP.
    - A TBD subfield in the Capability Information field of the Beacon frame shall provide an early indication of an update to change sequence information in the RNR for any AP of the reporting AP’s MLD.
      * NOTE: For an AP corresponding to nontransmitted BSSID in a multiple BSSID set, the early indication is carried in the Nontransmitted BSSID Capability field (which has the same structure as the Capability Information field) and signals the update to change sequence information in RNR for APs corresponding to the MLD to which the nontransmitted BSSID is affiliated with.
      * ~~The signaling of the Change Sequence field is TBD.~~
    - The critical updates are defined in 11.2.3.15 (TIM Broadcast) and the additional update can be added if needed.
    - The field is at most 1 octet in length and the value carried in the field is modulo of the maximum value

Yes/No/Abstain: 29/17/28

1. [577r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0577-02-00be-rts-and-cts-procedure-in-synchronous-multi-link-operation.pptx) RTS and CTS Procedure in Synchronous Multi-link Operation Yongho Seok (MediaTek) [SP 1]

SP: Do you support that the padding procedures of 11ax can be used when transmitting a Trigger frame to extend the frame length to meet the ending time requirement of the PPDU carrying the Trigger frame in the MLO?NOTE- The Padding field in the Trigger frame is also included in the padding procedure.

Approved with unanimous conset.

1. [1053r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1053-00-00be-synchronous-multi-link-transmission-of-non-str-mld.pptx) Synchronous Multi-link Transmission of Non-STR MLD (Yongho Seok) [Q&A]

C: slide 9, when STA1 hold off backoff couter, if the channel is busy, the STA1 picks up new BO. At that time, other STA on the same MLD is already transmitting a frame on the other link when BO is not zero. And, other STA on the same link may transmit a frame. At that time, the STA1 will not have the opportunity for transmitting the frame. Other method can be possbible.

C: I don’t interpret the spec as what you mentioned. Do nothing may not mean holding BO and may have different meaning (increasing or decreasing, etc.)

C: I have a similar opinion with previsou comment. I have different opinion that you mentioned the spec.

C: I think a good approach. We are aligned each other. Dmitry will prepare new SP text for both us.

1. [1009r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1009-01-00be-multi-link-hidden-terminal-followup.pptx) Blindness issue for non-STR operations-followup (Dibakar Das)

C: slide 8, greay area is about blindness by self interference of STA1 on link1. I have a similar contribution to resolve the blindness. My question is how can the blindness be resolved in this contribution?

C: STA needs to wait for NAVSyncDelaly if there is blind issue. But, STA sends RTS frame without it.

A: RTS is small frame. This is useful for latency traffic.

C: I have a similar contribution. Need further discussion.

1. [523r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0523-00-00be-discussion-on-channels-for-multi-link-operation.pptx) Discussion on Channels for Multi-link Operation (Geonjung Ko)

Discussion:

C: What is the channel in this SP? PPDU channel or BSS operating channel?

A: BSS channel.

C: slide 4, why would AP MLD overlap two links? AP can just select other operating channel which is not overlapped.

A: But it could be possible.

C: If we aligned with overlapped link 1 and link2, what is the benefit of this?

A: I don’t see any benefit. I don’t just want to restrict it.

C: slide 5, do we allow this overlapped channels? Each channel seperates each other?

A: According to this SFD text, I think it’s possible.

C: I’ll check it.

* **SP2: Do you support that an AP MLD shall configure a multi-link using channels that are not overlapped each other?**

C: We don’t need this SP because we may consider the overlapped channel later (R2). But we don’t consider it in R1. I don’t see problem on what you described.

C: BSS operating channel makes sense. I will support it.

27/19/21

1. [[757r](https://mentor.ieee.org/802.11/dcn/20/11-20-0757-00-00be-ml-fragmentation.pptx)1](https://mentor.ieee.org/802.11/dcn/20/11-20-0757-01-00be-ml-fragmentation.pptx) ML fragmentation (Po-Kai Huang)

Discussion:

C: PPDU alignment the frame is needed. If you don’t allow this in R1, how can the alignment do?

A: Padding can be used.

C: Padding can waste resource. I wanna fragment.

C: Jay’s comment is valid. Need fragment.

C: For common MPDU length, is there any strong motivation?

C:no fragmentation in R2?

C: I have the same opinion on fragment. I think it’s a capability. What does it mean R1 or R2?

A: I’m not touching the detailed capability design. Abhi will provide it.

I’ll have defer this SP

**Adjuourn at 21:45 EDT.**

**Monday, 17 August 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 19:04am 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))

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

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 8/17 | Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| 8/17 | Adachi, Tomoko | TOSHIBA Corporation |
| 8/17 | Akhmetov, Dmitry | Intel Corporation |
| 8/17 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| 8/17 | Baek, SunHee | LG ELECTRONICS |
| 8/17 | Bankov, Dmitry | IITP RAS |
| 8/17 | baron, stephane | Canon Research Centre France |
| 8/17 | Bhandaru, Nehru | Broadcom Corporation |
| 8/17 | Carney, William | Sony Corporation |
| 8/17 | Cavalcanti, Dave | Intel Corporation |
| 8/17 | chen, jindou | Huawei Technologies Co. Ltd |
| 8/17 | Chen, Na | MaxLinear Corp |
| 8/17 | Cheng, Paul | MediaTek Inc. |
| 8/17 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 8/17 | Coffey, John | Realtek Semiconductor Corp. |
| 8/17 | Das, Dibakar | Intel Corporation |
| 8/17 | Das, Subir | Perspecta Labs Inc. |
| 8/17 | Derham, Thomas | Broadcom Corporation |
| 8/17 | Ding, Baokun | Huawei Technologies Co., Ltd |
| 8/17 | Dong, Xiandong | Xiaomi Inc. |
| 8/17 | Erceg, Vinko | Broadcom Corporation |
| 8/17 | Fang, Yonggang | ZTE TX Inc |
| 8/17 | Fischer, Matthew | Broadcom Corporation |
| 8/17 | Gan, Ming | Huawei Technologies Co., Ltd |
| 8/17 | Garg, Lalit | Broadcom Corporation |
| 8/17 | Ghosh, Chittabrata | Intel Corporation |
| 8/17 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 8/17 | Hamilton, Mark | Ruckus/CommScope |
| 8/17 | Ho, Duncan | Qualcomm Incorporated |
| 8/17 | Hu, Chunyu | Facebook |
| 8/17 | Huang, Guogang | Huawei |
| 8/17 | Huang, Po-Kai | Intel Corporation |
| 8/17 | Inohiza, Hirohiko | Canon |
| 8/17 | Jang, Insun | LG ELECTRONICS |
| 8/17 | Jiang, Jinjing | Apple, Inc. |
| 8/17 | Jung, hyojin | Hyundai Motor Company |
| 8/17 | Kain, Carl | USDoT |
| 8/17 | Kedem, Oren | Huawei Technologies Co. Ltd |
| 8/17 | kim, namyeong | LG ELECTRONICS |
| 8/17 | Kim, Sang Gook | LG ELECTRONICS |
| 8/17 | Kim, Sanghyun | WILUS Inc |
| 8/17 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 8/17 | Kneckt, Jarkko | Apple, Inc. |
| 8/17 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 8/17 | Kwon, Young Hoon | NXP Semiconductors |
| 8/17 | Levy, Joseph | InterDigital, Inc. |
| 8/17 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 8/17 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 8/17 | Lin, Wei | Huawei Technologies Co. Ltd |
| 8/17 | Liu, Jianfei | HUAWEI |
| 8/17 | Liu, Yong | Apple, Inc. |
| 8/17 | Lu, Liuming | ZTE Corporation |
| 8/17 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 8/17 | Ma, Mengyao | HUAWEI |
| 8/17 | Monajemi, Pooya | Cisco Systems, Inc. |
| 8/17 | Naribole, Sharan | SAMSUNG |
| 8/17 | Ouchi, Masatomo | Canon |
| 8/17 | Palm, Stephen | Broadcom Corporation |
| 8/17 | Park, Minyoung | Intel Corporation |
| 8/17 | Patil, Abhishek | Qualcomm Incorporated |
| 8/17 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 8/17 | Petrick, Albert | InterDigital, Inc. |
| 8/17 | Petry, Brian | Broadcom Corporation |
| 8/17 | QIU, WEI | Huawei Technologies Co., Ltd |
| 8/17 | Raissinia, Alireza | Qualcomm Incorporated |
| 8/17 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 8/17 | Seok, Yongho | MediaTek Inc. |
| 8/17 | Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| 8/17 | Song, Taewon | LG ELECTRONICS |
| 8/17 | Sun, Li-Hsiang | InterDigital, Inc. |
| 8/17 | Sun, Yanbin | Huawei Technologies Co., Ltd |
| 8/17 | Sun, Yanjun | Qualcomm Incorporated |
| 8/17 | Tanaka, Yusuke | Sony Corporation |
| 8/17 | Torab Jahromi, Payam | Facebook |
| 8/17 | Wang, Chao Chun | MediaTek Inc. |
| 8/17 | Wang, Lei | Huawei R&D USA |
| 8/17 | Wang, Qi | Apple, Inc. |
| 8/17 | Yang, Jay | Nokia |
| 8/17 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 8/17 | Yee, James | MediaTek Inc. |
| 8/17 | yi, yongjiang | Futurewei Technologies |
| 8/17 | Yukawa, Mitsuyoshi | Canon, Inc. |

The Chair reminds that the agenda can be found in 11-20/927r21.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [712r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0712-02-00be-bqr-for-320mhz.pptx) BQR for 320MHz, Yunbo Li (Huawei) [3 SPs]

* SP2: **Do you support to indicate the channel availability of 320MHz channel by carrying two BQR Control subfields in A-control subfield in R2?**

Discussion

C: Not define new control ID and new format for BQR. This benefit is only using one control ID. Is it right? Just clarify.

A: Yes right.

C: You need to define to new control field?

A: No, just reuse control ID.

C: Is this for R1 or R2?

A: Not strong opinion.

C: 320MHz is for R1, so now for R1

C: 320MHz is opional for R1?

A: I’m fine with R2.

Yes/No/Abstan: 34/8/45

1. [883r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0883-04-00be-multi-link-spatial-multiplexing.pptx) Multi-link Spatial Multiplexing, Yongho Seok (MediaTek) (1 SP)

* **SP1: Do you support that in R1 a non-AP MLD shall be able to indicate maximum number of spatial streams that it is capable of transmitting and receiving at a time, while operating in any of the links within the specified set of links in which the enhanced multi-link operation mode is applied?**
  + Each STA in the non-AP MLD operating in any of the links within the specified set of links shall support the indicated maximum number of spatial streams.

Note- The name of the enhanced multi-link operation mode can be changed.

Discussion:

C: The first bullet, it (indicating the max number of SS) seems like implementation.

A: You want to have it in heterogeneous environment. Right? Any suggestion on the text?

C: we have different number of Nss for TX and RX. The field uses

C: Is that optional or mandatory?

A: Minyoung’s motion may be optional. It could be optional.

A: Any suggestion on the text?

C: Do you support that the spec shall define a mechanism that non-AP MLD may indicate ...

A: I disagree with this modified text. We have a condition for this already. Remove may.

May is deleted.

New text is as follows:

**SP1: Do you support the TGbe spec shall define a mechanism that in R1 a non-AP MLD indicates maximum number of spatial streams that it is capable of transmitting or receiving at a time, while operating in any of the links within the specified set of links in which the enhanced multi-link operation mode is applied?- Each STA in the non-AP MLD operating in any of the links within the specified set of links shall support the indicated maximum number of spatial streams.- The enhanced multi-link operation mode is optional. Note- The name of the enhanced multi-link operation mode can be changed.**

**36/13/29**

1. [993r](https://mentor.ieee.org/802.11/dcn/20/11-20-0993-04-00be-sync-ml-operations-of-non-str-device.pptx)4 Sync ML operations of non-STR device, Dmitry Akhmetov (Intel) (1 SP)

* SP: **A STA MLD that intends to align the start time of the PPDUs sent on more than one link shall ensure that EDCA count down procedure is completed on all the links**
  + Note: STA MLD is the sole originator of an intended sync transmission

Discussion:

C: STA MLD is both AP MLD and non-AP MLD?

A: Primary goal is non-AP MLD. But, both are possible.

C: You mean Non-STR STA MLD?

A: For STR, you don’t need to synchronize for this?C:

C: MLD instead of a STA MLD.

C: Non-STR?

A: STR case, it could be beneficial for some cases.

New text:

**SP: An MLD that intends to align the start time of the PPDUs sent on more than one link shall ensure that EDCA count down procedure is completed on all the linksNote: An MLD is the sole originator of an intended sync transmission**

**Yes/No/Abstain: 35/16/26**

Technical Submissions: **ML Operation [10 mins if SP only, 30 mins otherwise]**

1. [328r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0328-00-00be-msdu-fragmentation-and-aggregation-in-multi-link-operation.pptx) MSDU Fragmentation and Aggregation in Multi-link Op. Yongho Seok

Discussion:

C: In conclusion, MPDU length following similar consideration.

C: SP2, there is capability indication in receiver side?

C: R1 or R2

A: Po-kai has a similar proposal. Ihe fragmentation should be in R2 there.

C: why do we need the maximum MPDU length? Is it aligned with the maximum A-MSDU length?

C: all STAs in a MLD have common capability? Or some STAs?

A: Do you want to change to all STA?

C: Do you think all STAs in 2.4 and 5 G have common capability?

C: We don’t need to put 60GHz.

C: I think maximum MPDU length is enough. The maximum A-MSDU length is for HT or VHT.

A: I’m fine with it.

C: could you hold on it. I’ll double check.

1. [702r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0702-00-00be-fragmentation-in-mlo.pptx) Fragmentation in MLO Abhishek Patil

Discussion:

C: I support this.

C: 11ax does not choose dynamic fragments. ..

C: MLD level fragementation can be considered in R2. How about in link level?

A: Fragmentation in MLO should be in R2.

C: Do you mean MLD fragmentation is the fragment of the same MSDU in multiple links? Not on one link?

* SP1: **Do you support to have a capability bit “Fragmentation At MLD Support” in EHT Capabilities element?**
  + If the bit is set to 0 by a STA affiliated with an MLD, the MLD does not support reception of a fragment from a peer MLD
  + A STA affiliated with an MLD shall not fragment frames and send fragment to another STA affiliated with another MLD that has set the Fragmentation at MLD Support bit to 0.

Note 1: Name of field can be changed

Note 2: the bit is set to 0 for R1

26/20/31

1. [924r](https://mentor.ieee.org/802.11/dcn/20/11-20-0924-03-00be-all-tids-mapped-to-all-links.pptx)3 All tids mapped to all links Yong Liu

Discussion:

C: we need group key handshake? We don’t need to define new handshake?

C: Primary STAs means the primary link or anchor link in other contributions?

A: Yes.

C: I agree with the concept.

C: I want to discuss more.

C: when STA3 enters the doze state and AP2 buffers the data, there is no issue.

C: why do we need to define link transition?

C: slide 3, are you proposing the new power saving mode? It’s very similar to WNM sleep mode. Define new mode? Or just enhanced WNM mode?

C: You still need handshake?

* Technical Submissions: **Low Latency [10 mins if SP only, 30 mins otherwise]**

1. [1006r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1006-00-00be-new-methods-to-meet-low-latency-requirements.pptx) New Methods to Meet Low Latency Requirements Jinjing Jiang

C: If the channel is idle, STA can occupy the TXOP.

C: TWT can have similar opportunity with yours.

A: TWT is for Power saving.

A: For periodic traffic, I have the similar opinion.

C: 11ax can help what you want to do.

C: after receiving action frame, is there any requirement in AP side? AP can ignore this information?

C: what is the difference between u-apsd trigger and this Trigger?

A: u-apsd trigger is for DL, this Trigger is for sending UL frame.

Adjuourn at 22:00 EDT.

**Wendsday, 19 August 2020, 10:00 –13:00 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 10:04am 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))

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

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 8/19 | Aboulmagd, Osama | Huawei Technologies Co.,  Ltd |
| 8/19 | Akhmetov, Dmitry | Intel Corporation |
| 8/19 | Ansley, Carol | CommScope |
| 8/19 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| 8/19 | Baek, SunHee | LG ELECTRONICS |
| 8/19 | Bankov, Dmitry | IITP RAS |
| 8/19 | baron, stephane | Canon Research Centre France |
| 8/19 | Carney, William | Sony Corporation |
| 8/19 | CHAN, YEE | Facebook |
| 8/19 | chen, jindou | Huawei Technologies Co. Ltd |
| 8/19 | Chen, Na | MaxLinear Corp |
| 8/19 | Cheng, Paul | MediaTek Inc. |
| 8/19 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 8/19 | Choi, Jinsoo | LG ELECTRONICS |
| 8/19 | Coffey, John | Realtek Semiconductor Corp. |
| 8/19 | Das, Dibakar | Intel Corporation |
| 8/19 | Das, Subir | Perspecta Labs Inc. |
| 8/19 | de Vegt, Rolf | Qualcomm Incorporated |
| 8/19 | Ding, Baokun | Huawei Technologies Co., Ltd |
| 8/19 | Dogukan, Ali | Vestel |
| 8/19 | Dong, Xiandong | Xiaomi Inc. |
| 8/19 | Fang, Yonggang | ZTE TX Inc |
| 8/19 | Fischer, Matthew | Broadcom Corporation |
| 8/19 | Gan, Ming | Huawei Technologies Co., Ltd |
| 8/19 | Gong, Bo | Huawei Technologies Co. Ltd |
| 8/19 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 8/19 | Han, Jonghun | SAMSUNG |
| 8/19 | Han, Zhiqiang | ZTE Corporation |
| 8/19 | Handte, Thomas | Sony Corporation |
| 8/19 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| 8/19 | Ho, Duncan | Qualcomm Incorporated |
| 8/19 | Hu, Chunyu | Facebook |
| 8/19 | Huang, Guogang | Huawei |
| 8/19 | Huang, Po-Kai | Intel Corporation |
| 8/19 | Jang, Insun | LG ELECTRONICS |
| 8/19 | Jiang, Jinjing | Apple, Inc. |
| 8/19 | Kain, Carl | USDoT |
| 8/19 | Kamel, Mahmoud | InterDigital, Inc. |
| 8/19 | Kim, Jeongki | LG ELECTRONICS |
| 8/19 | Kim, Sang Gook | LG ELECTRONICS |
| 8/19 | Kim, Sanghyun | WILUS Inc |
| 8/19 | Kim, Youn-Kwan | The Catholic University of Korea |
| 8/19 | Klein, Arik | Huawei Technologies Co. Ltd |
| 8/19 | Klimakov, Andrey | Huawei Technologies Co., Ltd |
| 8/19 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 8/19 | Levitsky, Ilya | IITP RAS |
| 8/19 | Levy, Joseph | InterDigital, Inc. |
| 8/19 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 8/19 | Li, Yunbo | Huawei Technologies Co., Ltd |
| 8/19 | Lim, Dong Guk | LG ELECTRONICS |
| 8/19 | Lin, Wei | Huawei Technologies Co. Ltd |
| 8/19 | Liu, Yong | Apple, Inc. |
| 8/19 | Lorgeoux, Mikael | Canon Research Centre France |
| 8/19 | Lou, Hanqing | InterDigital, Inc. |
| 8/19 | Lu, Liuming | ZTE Corporation |
| 8/19 | Lv, kaiying | MediaTek Inc. |
| 8/19 | Ma, Mengyao | HUAWEI |
| 8/19 | Martinez Vazquez, Marcos | MaxLinear Corp |
| 8/19 | Max, Sebastian | Ericsson AB |
| 8/19 | Monajemi, Pooya | Cisco Systems, Inc. |
| 8/19 | Naribole, Sharan | SAMSUNG |
| 8/19 | Nezou, Patrice | Canon Research Centre France |
| 8/19 | Ouchi, Masatomo | Canon |
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| 8/19 | Patil, Abhishek | Qualcomm Incorporated |
| 8/19 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 8/19 | Rai, Kapil | Qualcomm Incorporated |
| 8/19 | Raissinia, Alireza | Qualcomm Incorporated |
| 8/19 | Redlich, Oded | HUAWEI |
| 8/19 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 8/19 | Salman, Hanadi | Istanbul Medipol University; VESTEL |
| 8/19 | Sedin, Jonas | Ericsson AB |
| 8/19 | Sevin, Julien | Canon Research Centre France |
| 8/19 | Singh, Gurdev | SAMSUNG ELECTRONICS |
| 8/19 | Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| 8/19 | Song, Taewon | LG ELECTRONICS |
| 8/19 | Sosack, Robert | Molex Incorporated |
| 8/19 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| 8/19 | Sun, Li-Hsiang | InterDigital, Inc. |
| 8/19 | Sun, Yanjun | Qualcomm Incorporated |
| 8/19 | THOUMY, Francois | Canon Research Centre France |
| 8/19 | Torab Jahromi, Payam | Facebook |
| 8/19 | Verenzuela, Daniel | Sony Corporation |
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| 8/19 | Wang, Qi | Apple, Inc. |
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| 8/19 | Xin, Yan | Huawei Technologies Co., Ltd |
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| 8/19 | Yee, James | MediaTek Inc. |
| 8/19 | yi, yongjiang | Futurewei Technologies |
| 8/19 | Yu, Jian | Huawei Technologies Co., Ltd |
| 8/19 | Yu, Mao | NXP Semiconductors |
| 8/19 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r22.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [615r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0615-03-00be-discovery-mechanism-for-mld.pptx) Discovery mechanism for MLD, Ming Gan (Huawei) [3 SPs]

* SP1: **Do you agree to add MLD-index to the TBTT Information field of the RNR element, which is used to indicate the ID of the AP MLD in which the reported AP is if the reported AP in an AP MLD?** 
  + MLD-Index is set to BSSID Index of a non transmitted BSSID if the reported AP is the in the same MLD as the non-transmitted BSSID and the reporting AP is the same Multiple BSSID set as the non-transmitted BSSID
  + MLD-Index is set to zero if the reported AP is in the same MLD as the reporting AP
  + MLD-Index of the AP MLD in which the reported AP is shall be unique in the frame sent by the reporting AP

SP is approved by unanimous consent

* SP2: **Do you agree to carry Link ID in the TBTT Information field of the RNR element, which is used to indicate the identifier of the reported AP if the reported AP is in an AP MLD?- the link identifier (Link ID) uniquely identifies a link (tuple consisting of Operational Class, Channel, BSSID) within an MLD**

Discussion:

C: what is your intention of link ID here? It could be BSSID? Add it’s TBD.

A: It cannot be MAC address.

SP is approved by unanimous consent

1. [883r5](https://mentor.ieee.org/802.11/dcn/20/11-20-0883-05-00be-multi-link-spatial-multiplexing.pptx) Multi-link Spatial Multiplexing Yongho Seok, (MediaTek) (SP 1)

* **SP: Do you support the TGbe spec shall define a mechanism that in R1 a non-AP MLD indicates maximum number of spatial streams that it is capable of transmitting or receiving at a time, while operating in any of the links within the specified set of links in which the enhanced multi-link operation mode is applied?**
  + Each STA in the non-AP MLD operating in any of the links within the specified set of links shall support the indicated maximum number of spatial streams.
  + The enhanced multi-link operation mode is optional mechanism.

Note- The name of the enhanced multi-link operation mode can be changed.

C: Is this used for single radio or multi-radio?

A: Multi-radio.

C: why do you define the capability for this purpose? Why not operating mode?

A: we can define new field for it.

Yes/No/Abstain: 43/8/39

1. [328r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0328-02-00be-msdu-fragmentation-and-aggregation-in-multi-link-operation.pptx) MSDU Fragmentation and Aggregation in Multi-link Operation, Yongho Seok (MediaTek) (SP1-3)

**SP1: In the MLO, which option is preferred to determine the common capabilities for the maximum MPDU length and the maximum number of MSDUs in an A-MSDU?**

Option 1) A recipient MLD declares the MLD-level common capability.

Option 2) A originator MLD chooses the minimum of the maximum MPDU length values and the minimum of the max number of MSDUs in A-MSDU values of all STAs affiliated to the recipient MLD.

***Not for SFD. Just information***

Discussion:

C: Do we need MLD level common capability intead of link level? Each STA can declares it?

Option 1/Option 2/Need more discussion : 22/15/53

1. [993r5](https://mentor.ieee.org/802.11/dcn/20/11-20-0993-05-00be-sync-ml-operations-of-non-str-device.pptx) Sync ML operations of non-STR device Dmitry Akhmetov (Intel) (1 SP)

* **SP: A non-STR MLD that intends to align the start time of the PPDUs sent on more than one link shall ensure that EDCA count down procedure is completed on all the links**
  + Note: An MLD is the sole originator of an intended sync transmission
  + Note: Whether to extend this mechanism to STR MLD is TBD

Discussion:

C: STR case is also important for this operation.

C: We need more time.

54/19/26

1. 712r2,

**SP3: Do you support below indication when two BQR Control subfields are carried in A-Control subfield?**

The 1st BQR Control is used to indicate the lower 160MHz, the 2nd BQR Control is used to indicate the higher 160MHz

Discussion:

C: Is this for R2?

A: I will update the letters.

C: Your intention is that STA cannot not indicate only higher 160MHz? You don’t need the additional bits for indicating which one is lower or higher?

C: why not using primary or secondary instead of lower or higher? Any reason?

C: Need to check PHY guys which one is better? I think primary 160 secondary 160 is better in terms of interpretation.

A: I don’t have strong opinion.

C: Same as previous. Primary 160 and secondary 160 are reasonable.

SP is deferred.

1. [1028r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1028-00-00be-backup-link-for-low-latency-communication.pptx) Backup link for low latency communication Qi Wang

Discussion:

C: what can you differentiate the backup link from other links?

C: STA can do it. Implementations.

C: RX only case, AP can switch the backup link …

C: what is the condition of link switching to backup link?

C: what does it mean link available?

C: TID to link mapping can be used for lower latency traffic which can be transmitted in multiple links that is available.

1. [977r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0977-01-00be-mld-spatial-multiplexing-considerations.pptx) MLD Spatial Multiplexing Considerations Sharan Naribole

Discussion:

C: slide 8, second one. Immediately switching to maximum streams? Why would you do that?

A: It is following previous figure. ...

C: slide 11, why do you pick up this particular problem? Is there any relation with enhanced single radio?

1. [992r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0992-00-00be-mlo-optional-mandatory.pptx) MLO mandatory/optional Laurent Cariou

Discussion:

C: Do you mean operating in at least 2 bands simultaneously transmission?

A: No there is no such restriction. Not mean concurrent transmission on multiple link. A single radio device can support 2.4, 5, 6GHz. That device can be MLD.

C: That already supports?

C: how about the device operating in multiple channel in a band?

A: It could be possible.

Adjuourn at 13:00 EDT.

**Monday, 24 August 2020, 10:00 –13:00 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 10:04am 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))

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

|  |  |  |
| --- | --- | --- |
| Timestamp | Name | Affiliation |
| 8/24 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| 8/24 | Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| 8/24 | Akhmetov, Dmitry | Intel Corporation |
| 8/24 | Alayasra, Musab | Medipol University; Vestel |
| 8/24 | Aldana, Carlos | Facebook |
| 8/24 | Baek, SunHee | LG ELECTRONICS |
| 8/24 | Bankov, Dmitry | IITP RAS |
| 8/24 | baron, stephane | Canon Research Centre France |
| 8/24 | CHAN, YEE | Facebook |
| 8/24 | chen, jindou | Huawei Technologies Co. Ltd |
| 8/24 | Chen, Na | MaxLinear Corp |
| 8/24 | Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| 8/24 | Coffey, John | Realtek Semiconductor Corp. |
| 8/24 | Das, Dibakar | Intel Corporation |
| 8/24 | Das, Subir | Perspecta Labs Inc. |
| 8/24 | Derham, Thomas | Broadcom Corporation |
| 8/24 | de Vegt, Rolf | Qualcomm Incorporated |
| 8/24 | Ding, Baokun | Huawei Technologies Co., Ltd |
| 8/24 | Dong, Xiandong | Xiaomi Inc. |
| 8/24 | Erceg, Vinko | Broadcom Corporation |
| 8/24 | Fang, Yonggang | ZTE TX Inc |
| 8/24 | Fischer, Matthew | Broadcom Corporation |
| 8/24 | Ghosh, Chittabrata | Intel Corporation |
| 8/24 | Guo, Yuchen | Huawei Technologies Co., Ltd |
| 8/24 | Han, Jonghun | SAMSUNG |
| 8/24 | Han, Zhiqiang | ZTE Corporation |
| 8/24 | Ho, Duncan | Qualcomm Incorporated |
| 8/24 | Hsu, Chien-Fang | MediaTek Inc. |
| 8/24 | Hu, Chunyu | Facebook |
| 8/24 | Huang, Guogang | Huawei |
| 8/24 | Huang, Po-Kai | Intel Corporation |
| 8/24 | Hwang, Sung Hyun | Electronics and Telecommunications Research Institute (ETRI) |
| 8/24 | Jang, Insun | LG ELECTRONICS |
| 8/24 | Jiang, Jinjing | Apple, Inc. |
| 8/24 | Kain, Carl | USDoT |
| 8/24 | Kedem, Oren | Huawei Technologies Co. Ltd |
| 8/24 | Kim, Jeongki | LG ELECTRONICS |
| 8/24 | kim, namyeong | LG ELECTRONICS |
| 8/24 | Kim, Sang Gook | LG ELECTRONICS |
| 8/24 | Kim, Sanghyun | WILUS Inc |
| 8/24 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| 8/24 | Klein, Arik | Huawei Technologies Co. Ltd |
| 8/24 | Kondo, Yoshihisa | Advanced Telecommunications Research Institute International (ATR) |
| 8/24 | Kumar, Manish | Marvell Semiconductor, Inc. |
| 8/24 | Kwon, Young Hoon | NXP Semiconductors |
| 8/24 | Lalam, Massinissa | SAGEMCOM BROADBAND SAS |
| 8/24 | Lan, Zhou | Broadcom Corporation |
| 8/24 | Levitsky, Ilya | IITP RAS |
| 8/24 | Levy, Joseph | InterDigital, Inc. |
| 8/24 | Li, Yiqing | Huawei Technologies Co. Ltd |
| 8/24 | Lin, Wei | Huawei Technologies Co. Ltd |
| 8/24 | Liu, Jianfei | HUAWEI |
| 8/24 | Lu, Liuming | ZTE Corporation |
| 8/24 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| 8/24 | Ma, Mengyao | HUAWEI |
| 8/24 | Max, Sebastian | Ericsson AB |
| 8/24 | Monajemi, Pooya | Cisco Systems, Inc. |
| 8/24 | Nezou, Patrice | Canon Research Centre France |
| 8/24 | Nguyen, An | DHS/CISA |
| 8/24 | Patil, Abhishek | Qualcomm Incorporated |
| 8/24 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| 8/24 | Petrick, Albert | InterDigital, Inc. |
| 8/24 | Raissinia, Alireza | Qualcomm Incorporated |
| 8/24 | RISON, Mark | Samsung Cambridge Solution Centre |
| 8/24 | Rosdahl, Jon | Qualcomm Technologies, Inc. |
| 8/24 | Salman, Hanadi | Istanbul Medipol University; VESTEL |
| 8/24 | Sedin, Jonas | Ericsson AB |
| 8/24 | Seok, Yongho | MediaTek Inc. |
| 8/24 | Sevin, Julien | Canon Research Centre France |
| 8/24 | Song, Taewon | LG ELECTRONICS |
| 8/24 | Startsev, Ivan | IITP RAS |
| 8/24 | Sun, Li-Hsiang | InterDigital, Inc. |
| 8/24 | Sun, Yanjun | Qualcomm Incorporated |
| 8/24 | Wang, Huizhao | Quantenna Communications, Inc. |
| 8/24 | Wang, Lei | Huawei R&D USA |
| 8/24 | Wang, Qi | Apple, Inc. |
| 8/24 | Wullert, John | Perspecta Labs |
| 8/24 | Yang, Jay | Nokia |
| 8/24 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| 8/24 | Yee, James | MediaTek Inc. |
| 8/24 | Yukawa, Mitsuyoshi | Canon, Inc. |
| 8/24 | Zein, Nader | NEC Laboratories Europe |
| 8/24 | Zuo, Xin | Tencent |

The Chair reminds that the agenda can be found in 11-20/927r24.

**Submissions**

Technical Submissions-**Run SPs from Previous Topics**

1. [411r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0411-04-00be-mlo-information-exchange-for-link-switching.pptx) MLO: Information Exchange for Link Switching , Namyeong Kim (LG Electronics) [1 SP]

**SP1: Do you agree to define the following mechanism:**

* 1. A STA of a non-AP MLD can request a peer AP of AP MLD a part of complete information of other APs of the same AP MLD.
  2. The signaling for requesting the part of complete information is TBD.

NOTE: As an example, the part of complete information may be information that is not included on the beacon frame sent from the peer AP

SP is approved with unanimous consent

1. [586r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0586-06-00be-mlo-signaling-of-critical-updates.pptx): MLO: Signaling of critical updates, Abhishek Patil (Qualcomm) [1SP]

**SP2: Do you agree to update the text in SFD (Motion #115, #SP77) as following:**

* 1. Do you support that an AP within an AP MLD shall include in the Beacon and Probe Response frames it transmits the Change Sequence fields that indicate changes of system information for the transmitting AP and other APs within the same AP MLD, where the change sequence field value for the reported each AP is initialized to 0, and is that increments incremented when there is a as the critical update to the operational parameters for that of the reported AP is occurred?
     1. TBD field(s) to carry the change sequence(s) of the transmitting AP and of non-transmitted BSSIDs (if any)
     2. The change sequence information for another AP of the MLD shall be carried in a field in the TBTT Information field of the Reduced Neighbor Report element corresponding to that AP.
     3. A TBD subfield in the Capability Information field of the Beacon frame shall provide an early indication of an update to change sequence information in the RNR for any AP of the reporting AP’s MLD.
        1. NOTE: For an AP corresponding to nontransmitted BSSID in a multiple BSSID set, the early indication is carried in the Nontransmitted BSSID Capability field (which has the same structure as the Capability Information field) and signals the update to change sequence information in RNR for APs corresponding to the MLD to which the nontransmitted BSSID is affiliated with.
     4. The signaling of the Change Sequence field is TBD.
     5. The critical updates are defined in 11.2.3.15 (TIM Broadcast) and the additional update can be added if needed.
     6. The field is at most 1 octet in length and the value carried in the field is modulo of the maximum value
     7. NOTE: It is optional for non-AP MLD to decode the subfield in the Capability Information field carrying the early indication

SP is approved with unanimous consent

1. [669r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0669-01-00be-mld-transition.pptx) MLD transition, Po-Kai Huang (Intel) [2SPs]

**SP1: Do you support the following?**

* 1. After a successful multi-link (re)setup between a non-AP MLD and an AP MLD, the non-AP MLD is in associated state and is (re)associated with the AP MLD, and the non-AP MLD to the AP MLD mapping is provided to the DS by the AP MLD
     1. For each setup link, the corresponding non-AP STA affiliated with the non-AP MLD is in the same associated state as the non-AP MLD and is associated with the corresponding AP affiliated with the AP MLD, without providing the corresponding non-AP STA to the corresponding AP mapping to the DS, and enables the functionalities between a non-AP STA and its associated AP unless the functionalities have been extended to MLD level and specified otherwise.
  2. After a successful multi-link tear down between a non-AP MLD and an AP MLD, the non-AP MLD is in unassociated state and is disassociated with the AP MLD
     1. All the non-AP STAs affiliated with the non-AP MLD are in the unassociated state
  3. NOTE - A non-AP MLD needs to perform successful multi-link (re)setup with AP MLD before the non-AP MLD is allowed to send/receive MSDU(s) via the AP MLD to the DS

Discussion:

C: Why is the mapping provided to the DS?

C: I think the mapping makes me confusing. Like link mapping.

A: The current spec uses the non-AP to AP mapping.

Yes/No/Abstain: 48/2/31

1. 615r3, Discovery mechanism for MLD, Ming Gan (Huawei)

**SP3: Do you agree that a nontransmitted BSSID profile in the Multiple BSSID element shall carry the MLD related parameters, such as Link ID, if the nontransmitted BSSID is in an AP MLD?**

* 1. The container for Link ID is TBD

Discussion:

C: Link ID can be carried in a common part of ML element.

A: I did not mention exact format. MLD common could be for it.

C: why do you use this here? Link ID is included in RNR of Beacon already.

A: This Link ID could be for other AP MLD.

A: Multiple link Ids may not be contiguous.

27/23/35

* Technical Submissions: **Backlogged Submissions-Remaining [30 mins otherwise]**

1. [898r](https://mentor.ieee.org/802.11/dcn/20/11-20-0898-02-00be-mld-discovery-follow-up.pptx)2 MLD discovery follow up Young Hoon Kwon

Discussion:

C: RNR can be included in MLD element?

C: If STA wants to request information of MLD 12, why is the information of other APs included?

A: In this case, STA just requests the whole information of AP MLD, not specific AP.

C: I support this. It makes sense.

* **SP1: Do you agree to add the following to R1 of 11be SFD:**
  + An AP shall not include a RNR element in a STA profile subelement of a Multi-Link (ML) element.
  + An AP shall not include a MBSSID element in a STA profile subelement of a Multi-Link (ML) element.
  + An ML element shall not be included in a STA profile subelement of another ML element.

Yes/No/Abstain: 46/5/25

* **SP2: Do you agree to add the following to R1 of 11be SFD:**
  + A non-AP MLD shall not operate on the link until it retrieved the most recent parameters for the AP operating on that link
    - The non-AP STA may retrieve the most recent parameters by receiving a Beacon frame from the AP or sending a Probe Request frame to the AP
    - The non-AP STA may determine that it does not have the most recent parameters by receiving a change sequence for that AP that is different than the change sequence it stored for that AP

**Discussion:**

**C: sending probe request is ML probe request or just probe request?**

A: It’s

C: non-AP STA can make a lot of probe request to retrieve.

A: Do you want non-AP STA to send the probe request to retrieve the information?

C: Non-AP STA can try to receive the Beacon frame for it. It will make overload.

C: Do you want that STA 1 sends the probe request on link 1 to get the information on the link 2?

A: Several requesting methods. That could be one option. Non-AP can switch to link2 and send the reqest on link 2.

C: The first method can make the overload on link 1 for link 2 information. I want to have more discussion.

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

1. [914r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0914-00-00be-multi-tid-ml-ba-negotiation.pptx) Multi-TID ML BA Negotiation Abhishek Patil

Discussion:

C: If you add this in association procedure, we may loose the flexibility of the procedure. May I understand correctly?

A: It could be optional feature. You can integrete BA setup with ML setup.

C: Is there any problem that the association request/response is not protected?

C: 17/1724r0, do you have any comparison between this and that?

A: I haven’t check it. I will.

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

1. [972r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0972-02-00be-multi-link-operation-for-constrained-mld.pptx) Multi-link Operation for Constrained MLD Liuming Lu

Discussion:

C: Go to SPs. You proposes the special frames for this. In the note, the special frames need lower MCS (limited MCSs). Maybe, they are not aligned each other. Which one do you prefer?

C: I think note should be normative rather than note.

C: How do you choose the proper lower order QAM and how does it know it doesn’t harm the other link?

C: RTS/CTS and Data/Ack exchanges can be useful for that the recipient can be ready to receive before TXOP. How can the NTS frame solve it?

1. [1045r2](https://mentor.ieee.org/802.11/dcn/20/11-20-1045-02-00be-prioritized-edca-channel-access.pptx) Prioritized EDCA channel access Chunyu Hu

Discussion: No discussion due to time out

Adjuourn at 13:00 EDT.

**Wendsday, 26 August 2020, 10:00 –13:00 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 10:04am 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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   * 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))

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

**Submissions**

* Technical Submissions: **Proposed Draft Text (PDTs) [Discussions and SPs]**
  1. [1271r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1271-01-00be-pdt-mac-mlo-multi-link-channel-access-end-ppdu-alignment.docx) ML Channel Access: PPDU Ending Time Alignment Yongho Seok

Summary: Providing the spec texts for PPDU ending time alignment based on the several SFD motion texts

Discussion:

C: Note 2, the difference is less than SIFS- timing margin (<16). The timing margin is set to a half of 16us. Where does it come from?

C: For the simulataneous trigger, is it the trigger frame TX or TB PPDU?

A: It’s TB PPDU. I’ll correct it.

C: If there are two DL PPDUs and only one solicits the immediate response, the PPDUs should be aligned?

A: Yes.

C: The example is just informative text. According to Edward’s guideline, the example should be in Note. So, remove the example or make it Note.

A: I’ll check it with Edward.

C: The diagram a little bit make me confusing.

C: The text, AP shall not set CS required to 1... why ?

A: That is originated from motion text. I modified it slightly. But someone likes the motion text. I’ll fix it with the motion text.

* 1. [1255r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1255-00-00be-pdt-mac-mlo-discovery-discovery-procedures-including-probing-and-rnr.docx) ML Discovery: Procedures including probing and rnr Laurent Cariou

Summary: discovery of AP MLD (using RNR) MLD Probing.

Discussion:

C: RNR TBTT information, is this 16 otect? That means MLD parameters are always present or other parameters are always present?

C: MLD Request, do we need AP MLD MAC address?

C: we haven’t discussed this.

C: Probe request carries ML element.

C: Naming, I prefer AP ID instead of Link ID.

C: 20MHz PSD only is for 6GHz.

A: It makes sense. I can make 15 octects without 10MHz PSD.

C: MLD ID shall be unique .... That’s not in Note. Should be normative text.

C: In some texts, you uses Link ID element. There is no agreement. That’s TBD.

A: Maybe Abhi will provide it.

C: Need offline discussion

* 1. [1256r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1256-00-00be-pdt-mac-mlo-tid-mapping-link-management-default-mode-and-enablement.docx) TID-mapping: Link mgmt-default mode and enablement Laurent Cariou

Summary: TID-to-link mapping.

C: Default TID to link mapping. In this default mode, you cannot

C: Some texts are covered in my document. MLD BSS Max Idle period management. No power state also need more discussion.

C: Do we require the negotiation for default mapping mode?

A: No

C: Then second bullet makes confusing. Is this for tear down?

A: I’ll remove them for sim.

C: For Power state, is this in SFD?

C: You need to highlight that.

C:On Page 2, the last paragraph, for default mapping, we don’t need DL or UL mapping.

A: This is generic.

C: This is for all TID to link mapping?

A: This is just originated from your motion text.

C: That motion is not for default mode.

A: This is general.

C: For negotiation, I’m working.

* Technical Submissions-**Run SPs from Previous Topics [nominally 10 mins total]**
  1. [1045r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1045-03-00be-prioritized-edca-channel-access.pptx) Prioritized EDCA channel access Chunyu Hu (Facebook Inc.) [Q&A+SP],

Discussion

C: we agree that that can improve the lower latency.

C: Are you running the SP today? I have concern on wording. I want to defer this SP.

C: What is the benefit of this on top of broadcast TWT?

C: Does this time slot mechanism consider multiple AP like OBSS?

C: Slide 3, does this use CCA or EDCA?

C: what is the traffic model in simulation?

A: we have priority traffic model. Period 16 Tus, DL 80Mbps, UL 20Mbps. And we have some non-AP STAs, with regular traffic?

C: Is this CBR or PBR?

SP is defered

* 1. [669r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0669-02-00be-mld-transition.pptx) MLD transition Po-Kai Huang (Intel) [2 SPs],

**SP2: Do you support to add the following in 11be SFD in R1:**

* Define ML transition\* as follows:
  + A non-AP MLD movement from being associated with one AP MLD in one ESS to be reassociated with another AP MLD within the same ESS.
  + A non-AP MLD movement from being associated with one AP MLD in one ESS to become a non-AP STA that is reassociated with an AP within the same ESS.
  + A non-AP STA movement from being associated with one AP in one ESS to become a non-AP MLD that is reassociated with an AP MLD with the same ESS.
* Define fast ML transition\* as follows:
  + A ML transition\* that establishes the state necessary for data connectivity before the reassociation rather than after the reassociation.
* Note\* – the name can be changed

SP is approved with unanimous consent.

* **SP3: Do you support to reuse existing frame exchange of over-the-air fast BSS transition (FT) for fast ML transition in R1?**

C: Over the air?

A: Yes

C: resuse exsiting frame? Is this the same frame is used?

A: Container is itself. Authentication or association.

C: we need to additional text in FT.

C: Guoagang’s proposal is another solution.

A: don’t change the procedure. Just put the additional element. New element in existing frame.

C: How is this fast? How fast is this transition?

A: It depends on the scenarios. I don’t change.

C: we don’t have to measure?

41/8/46

* 1. [427r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0427-04-00be-synchronous-multi-link-operation.pptx) Synchronous multi link operation Young Hoon Kwon (NXP) [1 SP]
* **Do you support the following transmission sequence for the constrained multi-link operation in R1:**
  + When an AP MLD obtains TXOPs on multiple links and transmits frames to a non STR non-AP MLD soliciting immediate response on the multiple links, and intends to align the ending time of DL PPDUs during the obtained TXOPs:
    - If the AP MLD does not receive an immediate response successfully on a link that is not a first frame exchange within the obtained TXOP of the link, and if the AP MLD receives an immediate response on at least one another link, the AP MLD can continue its transmission on the link within the obtained TXOP TBD (e.g., SIFS or PIFS) time after the failed reception of the immediate response if the channel is idle.
    - CCA mechanism on the link is TBD.
    - If needed, conditions on the duration of the immediate response is TBD.

C: according to the EU regulatory, the text seems like fairness issue.

A: I don’t think so.

C: I’ll double check.

40/16/32

* Technical Submissions: **ML-Mgmt [10 mins if SP only, 30 mins otherwise]**
  1. [824r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0824-00-00be-management-signaling-in-mlo.pptx) Management signaling in MLO Abhishek Patil

Discussion:

C: MLD or specific STA address, there is motion for we can negotiate TWTs for two links. You have three links but two links can be negotiated. This is not MLD level. Not all links. how are you going to address that?

A: you can send a management frame. AP can point out that one is link 1 and the other is link 2. That still works. SP is aligned or not aligned?

C: Just you can negotiate the TWTs for two links. Your slides cover that case?

A: I don’t cover that

C: According to the passed motion, MLD MAC address is different from STA MAC address. In this slides, MLD address is same as STA address?

A: I don’t think so. MLD address could be same as one of STA addresses. But not all STAs.

C: I’ll double check.

A: power related cross link signaling is in R2. Yours seems to be generic solution.

C: In summary, i have a little bit concern on link identifier. It should be the intended recipient. SP, you use that term. Address field is intended recipient rather than link identifier.

A: Got it.

Adjuourn at 13:00 EDT.