IEEE P802.11  
Wireless LANs

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| IEEE 802.11 TGax  May 2017 Seoul non-PHY ad hoc meeting minutes | | | | |
| Date: 2017-05-07 | | | | |
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Abstract

TGax meeting minutes from the IEEE 802.11 TGax May 2017 Seoul non-PHY ad hoc meeting, May 13rd – 5th, 2017.

**IEEE 802.11 Task Group ax**

**May 2017 Seoul Non-PHY Ad Hoc Meeting**

**Novotel, Gangnam, Korea**

**May 3rd – 5th, 2017**

**TGax Chair Osama Aboul-Magd (Huawei Technologies)**

**Vice Chair Simone Merlin (Qualcomm)**

**Vice Chair Ron Porat (Broadcom)**

**TGax Secretary Yasuhiko Inoue (NTT)**

**TGax Technical Editor Robert Stacy (Intel)**

**Wednesday, May 3rd, 2017, TGax Non-PHY ad hoc Session (AM)**

1. The meeting called to order by Osama Aboul-Magd (Huawei Technologies), the chair of the TGax, @9:05 AM (local time).
2. **Announcement**
   1. Agenda Doc.11-17/0616r0 on the server. Rev. 1 is the working document.
   2. Meeting Protocol: Chair asked to state name and affiliation when speaking for the first time.
3. **The chair reviewed the mandatory 6 slides of P&P.**
   1. Instructions for the WG Chair.
   2. Participants, Patents, and Duty to Inform.
   3. Patent Related Links.
   4. Call for potentially essential patents.
      1. Chair asked if anyone is aware of potentially essential patents.
      2. No potentially essential patents reported.
   5. Other Guidelines for IEEE WG Meetings.
   6. Participation in IEEE 802 Meetings
4. **Agenda items for the day (May 3rd)**
   1. **Call meeting to order**
   2. **Patent policy, etc.**
   3. **Announcements**
   4. **Call for submissions**
   5. **Set agenda**
   6. **Presentations and Comment Resolution**
   7. **Recess**
5. **General Flow of the meeting**
   1. **Wednesday (09:00 am – 6:00 pm)**
      1. Comment Resolution
      2. Recess
   2. **Thursday (9:00 am – 6:00 pm)**
      1. Comment Resolution
      2. Recess
   3. **Friday (9:00 am – 5:00 pm)**
      1. Comment Resolution
      2. Adjourn
6. Plans for today (May 03)
   1. Proposal
      1. 9:00 – 10:30 Start of meeting and comment resolution
      2. 10:30 – 10:45 Break
      3. 10:45 – 12:00 Comment Resolution
      4. 12:00 – 13:30 Lunch break
      5. 13:30 – 15:00 Comment Resolution
      6. 15:00 – 15:15 Break
      7. 15:15 – 18:00 Comment Resolution
      8. 18:00 Recess
   2. Chair asked if there is any objection. Agenda accepted with no objection.
7. **Call for submissions**
   1. Following submissions are ready present at the beginning of the ad hoc meeting.

|  |  |  |
| --- | --- | --- |
| 11-17/0389 | CIDs-for-27-2-1-part1 | Kaiying Lv |
| 11-17/0688 | LB225 11ax D1.0 Comment Resolution 27.10.4 - Part II | Chittabrata Ghosh |
| 11-17/0682 | MAC-CR-TWT subclause 27.7 - Block 5 | Alfred Asterjadhi |
| 11-17/0683 | LB225-MAC-CR-TWT subclause 27.7 - Block 6 | Alfred Asterjadhi |
| 11-17/0686 | LB225-MAC-CR-TWT subclause 27.7 - Block 7 | Alfred Asterjadhi |
| 11-17/0687 | LB225-MAC-CR-TWT subclause 27.7 - Block 8 | Alfred Asterjadhi |
| 11-17/362 | LB225 CR for Subclause 9.4.2.218.2 | Ming Gan |
| 11-17/0689 | LB225 CR for Subclause 27.3.3-Part 1 | Ming Gan |
| 11-17/0360 | LB225 CR for Subclause 27.3.3-Part 1 | Ming Gan |
| 11-17/0361 | BSS Load Information in 802.11ax | Ming Gan |
| 11-17/0693 | Quiet Time Period- part 1 | Chao-Chun Wang |
| 11-17/0295 | LB225-MAC-CR-TWT subclause 27.7 - Block 1 | Alfred Asterjadhi |
| 11-17/0699 | Comment Resolutions on Clause 28.3.15 (SU-MIMO and DL MU-MIMO beamforming) | Kome Oteri |
| 11-17/0702 | CR for CID 9574 | Kaiying Lv |

1. **Presentations**
   1. **Osama Aboul-magd (Huawei Technologies) presented “Proposed Resolutions to CID 6901 and 7690,” based on the submission 11-17-0665-00.**
      1. Summary
         1. Proposed resolutions to CID 6901 and CID 7690.
         2. Both CIDs are related to the dominance issue in 11ax discussed at the 802.11 WG and the 802 EC and the the related remedy.
      2. Discussion
      3. Next Step
         1. Osama to present this document in the TGax full session next week..
   2. **Alfred Asterjadhi (Qualcomm) presented “Comment resolutions for miscellaneous OM Control,” based on the submission 11-17-0601-00.**
      1. Summary
      2. Discussion
         1. A member asked for the case that STA’s transmit bandwidth and receive bandwidth is not balanced. 🡪 E.g. for a STA that can receive 80 MHz PPDU but can transmit only in 20 MHz, AP can consider it in the UL scheduling.
         2. A member suggested channel bandwidth information.
      3. Next Step
         1. Will have more discussion on CID #5851.
   3. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.2 (Block 1),” based on the submission 11-17-0295-00.**
      1. Summary
         1. Resolutions for 47 CIDs on clause 27.7.2 were proposed.
2. **Recess @ 10:30 AM.**

**<15 min break>**

1. **Meeting reconvened @ 10:47 AM.**
2. **Presentations**
   1. **Alfred Asterjadhi (Qualcomm) continued his presentation “Comment resolution for 27.7.2 (Block 1),” based on the submission 11-17-0295-00.**
      1. Discussion
         1. A member commented on the proposed text (re: CID #7171).
         2. A member suggested IEEE 802.11-2016 rather than 802.11REVmc D6.0 or D8.0 as the baseline.
         3. A member commented on the proposed text of TWT service period.
         4. A member asked for deferral of CID #9574: This is about TWT related information in Beacon. There is BSS Color related issue. The member is proposing a different resolution. 🡪 CID #9574 is removed from the document.
3. **AoB – None.**
4. **Recess for lunch until 13:30.**

**Wednesday, May 3rd, 2017, TGax Non-PHY ad hoc Session (PM)**

1. **The meeting called to order by Osama Aboul-Magd (Huawei Technologies), the chair of the TGax, @13:33**
2. **Reminder**
   1. We are still operating under the IEEE 802 and 802.11 Policy and Procedures.
3. **Announcement**
   1. Agenda Doc.11-17/0616r0 on the server. Rev. 1 is the working document.
   2. Meeting Protocol: Chair asked to state name and affiliation when speaking for the first time.
4. **Presentations**
   1. **Kaiying Lv (ZTE) presented “BSS color updated for TWT STAs,” based on the submission 11-17-0702-00.**
      1. Summary
         1. Related CID: #9574.
         2. Discussed a ways for TWT STAs to get the updated information about BSS color Disabled/Change.
         3. Propose to indicate the BSS Color related update information for both TWT scheduled and TWT requesting STAs in the TWT SP.
      2. Discussion
         1. Chair asked to use template for the slides.
         2. A member asked for the advantage of the proposed scheme as well as the importance of BSS Color change. Commenter may have a better idea.
         3. A member commented on the use of BSS Color disable bit.
         4. A member asked whether the proposal is for individual TWT or broadcast TWT 🡪 The intention is both. Necessary procedures are also proposed.
      3. **Straw Poll** 
         1. **Straw Poll #1: Do you agree that the AP can inform the BSS color updated information in the TWT SP?**
            1. **Discussion**

**A member mentioned that it is already allowed and this SP is not necessary.**

**People discussed the meaning of BSS Color value 0.**

**As a result of discussion, the SP text was modified.**

* + - 1. **Straw Poll #1 (modified): Do you agree that the BSS color updated information in the TWT SP?**
         1. **Further discussion**
      2. **Straw Poll: Not voted.**
  1. **Ming Gan (Huawei Technologies) presented “LB225 CR for Subclause 9.4.2.218.2,” based on the submission 11-17-0362-00.**
     1. Summary
        1. The submission contains the proposed resolutions for the 13 CIDs:
           1. 4575, 4581, 5134, 5135, 5837, 6368, 6369, 6370, 6371, 7759, 7760, 8159, and 9371.
     2. Discussion
        1. Comment on CID #3671: The commenter seems to be asking the definition which already exists. Therefore the comment should be rejected. 🡪 There are modifications based on this comment.
           1. Another member also suggested rejection of this commnet (CID #3671).
           2. Resolution for the CID #3671 is updated.
     3. Next Step
        1. Ming will update the document.
  2. **Ming Gan (Huawei Technologies) presented “LB225 CR for Subclause 27.3.3-Part 1,” based on the submission 11-17-0689-00.**
     1. Summary
        1. The submission contains the proposed resolutions for the 12 CIDs:
           1. CIDs: 5928, 3302, 8158, 8535, 8544, 7539, 8545, 9118, 8546, 8160, 7544, and 5802.
     2. Discussion
        1. C (CID #8544): A member commented that the resolution for this CID shall be “Revised”. The resolution is updated.
        2. A member commented there is mismatching of CID in the proposed text. 🡪 The text was updated.
        3. A member discussed about the negotiation procedure of level 3 fragmentation.
     3. Next Step
        1. Chair asked if there is any objection to the resolutions. No objection.

1. **Recess @ 15:04 until 15:20.**

**<15 minutes break>**

1. **Meeting reconvened @ 15:20.**
2. **Presentations**
   1. **Frank Hsu (MediaTek) presented “BSS Load Information Element for 11ax,” based on the submission 11-17-0308-01.**
      1. Summary
         1. Relevant CIDs: #5917 and #8165.
         2. Current BSS Load IE does not provide enough information and additional information should be provided.
            1. 11ax MU capable STA count and active STA counts
            2. TXOP/Idle time percentages over an observation period
            3. Load Report: Underutilization rate of MU TXOP to reflect potential capacity of an 11ax BSS
      2. Discussion
         1. A member asked how the proposed information can be utilized from the view point of AP and STA. 🡪 The main purpose for the STA is to choose the proper AP.
         2. Another member asked for the expected behavior of STA by using the proposed information, as well as the AP perspectives. There was a similar comment from another participant.
         3. There was a question on the use case that this feature is effective. 🡪 No simulation results. This is an extension of the spec from the previous version.
         4. There were some questions how to fill the gap between current spec and the proposed modification.
         5. A member commented that there is overlap between the proposed information and existing information.
      3. **Straw Polls**
         1. **Straw Poll #1: Do you support to define an 11ax BSS load information element?**
            1. **Discussion:**

**There is BSS load element which is extensible. New element is not necessary. 🡪 Current BSS Load element is not enough. Prefer to have a new one.**

**Another point will be the backward compatibility. If we extend the existing element, it can be compatible with VHT and HE.**

**As a result of the discussion, straw poll text was modified.**

* + - * 1. **Straw Poll #1 (modified): Do you support to define an 11ax BSS load information in either new element or extension of current element?**
        2. **Result: No objection.**
  1. **Kaiying Lv (ZTE) presented “Proposed resolution for CID 4928,” based on the submission 11-17-0669-00.**
     1. Summary
        1. Spatial reuse shall be disallowed during sounding procedure.
        2. In the case where an HE NDP and HE PPDU that carries NDP Announcement frame, both SRG/ NON SRG OBSS-PD based and SRP based spatial reuse shall also be prevented.
     2. Discussion
        1. It is not the issue of PHY format.
        2. Another member discussed about the case for beamforming feedback.
        3. There was a request more clarification on the proposal. There will be offline discussion.
  2. **Ming Gan (Huawei Technologies) presented “BSS Load Information in 11ax,” based on the submission 11-17-0361-00.**
     1. Summary
        1. While STAs normally prefer to access best AP with strongest received power, there will be a large number of STAs and traffic in dense scenarios. Some AP may be associated with too many STAs and/or over-loaded.
        2. Load unbalancing problem is getting more serious in 802.11ax dense scenarios.
        3. Proposed to consider resource utilization of each 20 MHz channel and Frequency and spatial stream underutilization of OFDMA and SU/MU-MIMO on each 20 MHz channel for load balancing in 802.11ax.
     2. Discussion
        1. Q (slide 7): A member asked how to consider the effect of center 26 tones when operating in 80 MHz channel in the equation.
        2. Q (slide 7): “Total number of OFDMA/MU-MIMO capable STAs associated with this BSS” - A member asked how to consider the power saving STAs.
        3. Q (slide 8): This kind of information could mislead the STA’s action. 🡪 This is only reference.
        4. C: A member commented that it is very difficult to understand what is required as a action of the STA and AP. 🡪 There is a document containing the proposed text (17/360).
        5. C: A member mentioned that this is the load balancing issue and commented that there is information missing for the STA to understand the current BSS.
        6. Another member also commented that normalization factor is good, but there shall be other information.
  3. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.3.1 (Block 2),” based on the submission 11-17-0296-00.**
     1. Summary
        1. Resolutions for the following CIDs (19 CIDs) on clause 27.7 are proposed:
           1. 4843, 4844, 5065, 5662, 5964, 6954, 7397, 7401, 7402, 7627, 7628, 8108, 8143, 8153, 8225, 8226, 8594, 9659, and 6748.
     2. Discussion
        1. There was a comment that PS-Poll can be aggregated in an A-MPDU or should be sent in an S-MPDU.
     3. Next Step
        1. Alfred’s presentation interrupted due to the time. 5 CIDs are left for tomorrow.

1. Recess @ 18:00 until tomorrow morning 9:00 AM (local time).

**Thursday, May 4th, 2017, TGax Non-PHY ad hoc Session (AM)**

1. **The meeting called to order by Osama Aboul-Magd (Huawei Technologies), the chair of the TGax, @9:0x AM (local time).**
   1. **Agenda: 11-17-0616-01**
2. **Reminder**
   1. Chair reminded that we are still operating under the IEEE 802 and 802.11 Policy and Procedure.
3. **Agenda for the day**
   1. Proposed plans for the day:
      1. 9:00 – 10:30 comment resolution
      2. 10:30 – 10:45 break
      3. 10:45 – 12:00 comment resolution
      4. 12:00 – 13:30 lunch break
      5. 13:30 – 15:00 comment resolution
      6. 15:00 – 15:15 break
      7. 15:15 – 18:00 comment resolution
   2. Chair asked if there is any comment or suggestion. – No response. The agenda was accepted.
4. **Summary from yesterday**
   1. 17/0665
      1. CIDs: 6901 and 7690.
      2. The author will present the material again in the TGax full session next week.
   2. 17/0601r1
      1. CIDs: 5851, 7249, 9495, 9803, 6260, 7051, 7192, 7193 (ED)
      2. More discussion is needed for CID 5851.
      3. No objection on the resolutions of the other CIDs.
   3. 17/0295r1
      1. CIDs: 4839, 4840, 4841, 4842, 5033, 5657, 5658, 5659, 5660, 5661, 5907, 5966, 5967, 6033, 6745, 6747, 7171, 7188, 7620, 7621, 7622, 7623, 7624, 7625, 7626, 7820, 7821, 8097, 8224, 8285, 9574, 9743, 9931, 9932, 9933, 9934, 5890, 6739, 6740, 6741, 6742, 6743, 6744, 7112, 7113, 10278, 10279 (ED)
   4. 17/0702r0
      1. CID: 9574
      2. Changes are needed and then discuss the updated resolution
   5. 11-17/0362r1
      1. CIDs: 4575 4581 5134 5135 5837 6368 6369 6370 6371 7759 7760 8159 9371.
      2. No objection to any of the proposed resolutions
   6. 11-17/0689r2
      1. CIDs: 5928 3302 8158 8535 8544 7539 8545 9118 8546 8160 7544 5802
      2. No objection to any of the resolutions
   7. 11-17/0308r1
      1. CID 5917 and CID 8165
      2. Adding MU BSS load element – ***to be discussed next week.***
   8. 11-17/0669r1
      1. CID 4928 – more discussion is needed
   9. 11-17/0361
      1. Related to BSS Load element – to be discussed next week.
   10. 11-17/0296
       1. 4843, 4844, 5065, 5662, 5964, 6954, 7397, 7401, 7402, 7627, 7628, 8108, 8143, 8153, 8225, 8226, 8594, 9659, 6748 (ED)
       2. To be continued on Thursday
5. **Presentations**
   1. **Alfred Asterjadhi (Qualcomm) continued his presentation of “title,” based on the submission 11-17-0296-00.**
      1. Summary
         1. Resolutions for the following CIDs (19 CIDs) on clause 27.7 are proposed:
            1. CIDs: 4843, 4844, 5065, 5662, 5964, 6954, 7397, 7401, 7402, 7627, 7628, 8108, 8143, 8153, 8225, 8226, 8594, 9659, and 6748.
      2. Discussion
         1. Chair confirmed that CID 8153 is deferred and excluded from the resolutions.
      3. Next Step
         1. **Chair asked if there is any comment, suggestion, or objection. – No objection.**
         2. To be voted on next week.
   2. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.1 (Block 4),” based on the submission 11-17-0298-00.**
      1. Summary
         1. Resolutions for comments related to TGax D1.0 clause 27.7.1 with the following CIDs (11 CIDs) are proposed:
            1. CIDs: 5656, 5963, 7395, 7396, 7400, 7618, 7619, 8067, 10277, 8322, and 9978.
      2. Discussion
         1. No discussion.
      3. Next Step
         1. Chair asked if there is any objection to the resolutions. – No objection.
         2. The resolutions to be voted on next week.
   3. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7,” based on the submission 11-17-0682-00.**
      1. Summary
         1. Resolutions for the two CIDs (#5957 and #8223) related to TGax D1.0 clause 27.7 are proposed.
         2. Resolutions are rejected since those comments fail to identify the technical issue.
      2. Discussion
         1. No discussion.
      3. Next Step
         1. Chair asked if there is any objection to the resolutions. – No objection.
         2. The resolutions to be voted on next week.
   4. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.3.2,” based on the submission 11-17-0683-00.**
      1. Summary
         1. Resolutions for comments related to TGax D1.0 clause 27.7.3.2 with the following CIDs (25 CIDs) are proposed:
         2. CIDs: 4845, 4848, 4849, 4850, 4851, 5663, 5665, 6044, 7189, 7398, 7399, 7629, 7630, 7631, 7632, 8132, 8595, 9313, 9979, 5084, 5664, 9576, 10280, 7635, 4847
      2. Discussion
         1. C (CID #4850): People discussed behavior of active STA during the TWT SP.
      3. Next Step
         1. **Chair asked if there is any objection to the resolutions. – No objection.**
         2. The resolutions to be voted on next week.
   5. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.3.3,” based on the submission 11-17-0686-00.**
      1. Summary
         1. Resolutions for comments related to TGax D1.0 clause 27.7.3.3 with the following CIDs are proposed:
            1. CIDs: 5670, 5852, 6751, 7633, 7634, 7822, 8086, 8089, 8090, 8229, 8286, 8287, 9314, 9744, 9745, 9746, 9935, 9936, 9980, 5666, 5667, 5669, 6749, 6750, 6752, and 7114 (26 CIDs).
      2. Discussion
         1. A member commented CID #5852 is valid since a TWT scheduled STA should not initiate transmission of frames to the TWT scheduling STA outside of broadcast TWT SPs. 🡪 Considering the dependency of EDCA parameters, those procedures cannot be tied.
         2. Based on a commented from a member, Alfred modified the Note 2 (Re: #8090).
   6. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.3.4,” based on the submission 11-17-0687-00.**
      1. Summary
         1. Resolutions for comments related to TGax D1.0 clause 27.7.3.4 with the following CIDs are proposed:
            1. CIDs: 3076, 5671, 5672, 8125, 8126, 8145, 8154, 9577, 9981, 4846, and 8130 (11 CIDs).
      2. Discussion
         1. No discussion.
      3. Next Step
         1. Chair asked if there is any objection to the resolutions. – No objection.
         2. The resolutions to be voted on next week.
   7. **Chao-Chun Wang (MediaTek) presented “11ax D1.0 MAC Comment Resolution for,” based on the submission 11-17-0693-02.**
      1. Summary
         1. Resolutions for comments of TGax Draft 1.2 proposed:
            1. CIDs: 3048, 3049, 5349, 5351, 3038, and 4472.
         2. Those comments relate to the Quiet Time element.
      2. Discussion
         1. C (CID #3038): Chair requested to change the resolution from “Accepted” to “Revised”.
         2. C (CID $4472): A member asked for clarification of the resolution for this comment. This comment is similar to CIDs #3048 and #3049. Resolutions for those comments are “Revised” (initially they were “Accepted” but changed to “Revised”).
         3. Chair discussed how to incorporate the proposed text into the draft.
      3. Next Step
         1. **Chair asked if there is any objection to the resolutions. – No objection.**
         2. The resolutions to be voted on next week.
6. **AoB – none.**
7. **Recess for lunch @ 11:50 until 13:30.**

**Thursday, May 4th, 2017, TGax Non-PHY ad hoc Session (PM)**

1. **Meeting reconvened @ 13:3x.**
2. **Reminder**
   1. We are still operating under the IEEE 802 and 802.11 Policy and Procedure.
3. **Presentations**
   1. **Laurent Cariou (Intel) presented “CR for Opportunistic power save – 27.14.3,” based on the submission 11-17-0325-04.**
      1. Summary
         1. Resolutions for multiple comments related to TGax D1.0 clause 27.14.3 with the following CIDs are proposed:
            1. CIDs: 3028, 3029, 4452, 4460, 4686, 4697, 7918, 7919, 9660, 9841, 9842, 3093, 5509, 5510, 5674, 5675, 5782, 6041, 6045, 6046, 7593, 7594, 7595, 7596, 7597, 9753, 9959, 9960, 3046, and 8316 (30 CIDs).
      2. Discussion
         1. C (CID #8316): After discussion with a member the resolution for this comment was changed from “Rejected” to “Revised”.
         2. Another member suggested editorial changes.
      3. Next Step
         1. **Chair asked if there is any objection to the resolutions. – No objection.**
         2. The resolutions to be voted on next week.
   2. **Laurent Caruou (Intel) presented “CR for 27.9.2.2 spatial reuse,” based on the submission 11-17-0267-05.**
      1. Summary
         1. Resolutions for CIDs related to OBSS\_PD based SR are proposed:
            1. 3198, 3199, 3200, 5204, 5205, 5207, 5208, 5484, 5489, 5494, 5496, 5497, 5499, 5500, 5501, 5502, 5503, 5690, 5691, 5870, 7122, 7123, 7129, 7406, 7612, 8073, 8104, 8232, 8239, 9315, 9540, 9944, 9946, 9947, 10031, 10032, 7125, 3197, 5689, 9541, 3196, 6025, 7823, and 8233 (44 CIDs).
         2. A previous version of this document was presented in the past meeting and Laurent updated some part of the document after that.
      2. Discussion
         1. Some members asked offline discussion to harmonize with the proposals for other CIDs.
         2. A member commented on the backoff procedure during the SR operation. The commenter is concerned about the NDP procedure in a high interference environment which could be inaccurate.
      3. Next Step
         1. Chair asked if there is any objection. – A member expressed a concern on the text.
         2. Straw poll is deferred until tomorrow.
   3. **Jeongki Kim (LG Electronics) presented “CR on 27.5.2.6.2,” based on the submission 11-17-0643-00.**
      1. Summary
         1. Resolutions for multiple comments related to TGax D1.0 clause 27.5.2.6.2 with the following CIDs:
            1. CIDs: 5411, 9406, 6188, 9405, 7417, 7418, 9404, 9408, 9448, 3238, 7652, 8301, 9105, 9326, 9493, 9581, and 10175 (17 CIDs).
         2. Clause 27.5.2.6.2 OFDMA Random Access
      2. Discussion
         1. C (CID #9326): A member suggested double check with resolutions for other CIDs for consistency.
         2. A member requested change to the proposed text.
      3. Next Step
         1. Chair asked if there is any objection. – A member asked for a clarification of the behavior to decrement the OBO counter - If a STA happened to choose 0 as the backoff value, how does it decrement the counter? Another member suggested another modification to the proposed text.
         2. Chair asked if there is any objection to the document. No objection.
         3. Will have a motion next week.
         4. A member asked for deferral of CID #9448. CID #9448 excluded from the document.
4. **Recess for 15 minutes @ 15:02**

**<Break>**

1. **Meeting reconvened @ 15:17.**
2. **Presentations**
   1. **Jeongki Kim (LG Electronics) presented “CR on 27.14.1,” based on the submission 11-17-0644-00.**
      1. Summary
         1. Resolution for the CID #6052 w.r.t. Intra-PPDU Power Save is proposed.
      2. Discussion
         1. A member asked for clarification on the proposed text – doze state and transmission of a response frame.
         2. A member suggested modification to the proposed text. So is modified.
      3. Next Step
         1. **Chair asked if there is any objection to the document. No objection.**
   2. **Abhishek Patil (Qualcomm) presented “Proposed resolution for comments related to CIDs in in 27.5.2.6 (Random Access),” based on the submission 11-17-0708-01.**
      1. Summary
         1. Resolutions for multiple comments received for TGax D1.0 clause 27.5.2.6 (OFDMA Random Access) during LB225:
            1. CIDs: 8220, 7411, 5399, 6181, 9417, 8278, 9919, 5395, 5396, 6180, 9416, and 8527 (12 CIDs).
      2. Discussion
         1. A member commented that a STA usually try to associate only one AP. 🡪 It could be more.
         2. A member suggested editorial chages.
         3. C (CID #7411): Editorial correction suggested for the proposed text.
      3. Next Step
         1. .
   3. **Abhishek Patil (Qualcomm) presented “Proposed resolution for comments related to CIDs in 27.5.2,” based on the submission 11-17-0249-01.**
      1. Summary
         1. Resolutions for multiple comments received for TGax D1.0 clause 27.5.2 during the LB225 were proposed:
            1. CIDs: 8700, 8057, 8274, 8298, 7645, 5913, 9294, 7180, 7646, 9899, 9478, 10266, 3226, 3225, 7094, 8553, 9527, 9900, 9903, 3227, 7227, 8172, 6101, 7973, 9296, 4826, 4827, 8704, 8277, 3233, 5718, 5989, 9096, 9097, 3234, 9590, 5719, 5192, 8218, 8345, 5995, 8219, 5996, 7974, 10015, 6699, 5017, 9915 (48 CIDs).
            2. 27.5.2: UL MU operation
      2. Discussion
         1. C (CID #7130): A member asked for clarification of value 0 of the Multi-TID Aggregation Support subfield. 🡪 Offline discussion suggested. CID #7130, 7646 and 9899 are excluded from the document.
         2. Some CIDs such as 4806, 7106, and 8704 excluded from the document, and resolutions and proposed text for some CIDs such as 8345 and 9294 are modified
         3. Another member requested further modifications on the proposed text.
      3. Next Step
         1. Straw poll for this document is deferred until tomorrow.
   4. **Abhishek Patil (Qualcomm) presented “Proposed resolution for comments related to Various CIDs in clause 6 & clause 9,” based on the submission 11-17-0140-00.**
      1. Summary
         1. Resolutions for multiple comments received for TGax D1.0 clause 6 and 9 during the LB225 are proposed:
            1. CIDs: 8194, 5426, 7469, 7704, 7470, 5427, 7294, 8366, 7706, 3021, 8515, 8516, 8517, 8518, 9368, 5827, 7914, 7915, 7916, 7754, 7277, 9369, 5828, 7332, 6001, 6003, 9649, 7333, 5758, 8521, 8522, 3026, 4741, 7009, and 3128 (35 CIDs).
      2. Discussion
         1. No discussion.
      3. Next Step
         1. **Chair asked if there is any objection to this document. No objection.**
   5. **Frank Hsu (MediaTek) presented “11ax D1.0 MAC Comment Resolution for 9.4.2.139,” based on the submission 11-17-0631-01.**
      1. Summary
         1. Resolutions for comments of TGax Draft 1.0 with the following CIDs are proposed:
            1. CIDs: 3030, 3122, 5326, 5919, 6088, 6347, 6348, 7357, 7381, and 8541 (10 CIDs).
         2. Clause 9.4.2.139: ADDBA Extension element.
      2. Discussion
         1. No discussion.
      3. Next Step
         1. **Chair asked if there is any objection. – No objection.**
   6. **Patrice NEZOU (Canon Research) presented “Comment resolution for UL OFDMA-based random access (UORA),” based on the submission 11-17-0646-01.**
      1. Summary
         1. Resolutions for multiple comments for TGax D1.0 corrected during LB225 and modifications to the associated text of clauses 27.5.2.6 and 27.10.4 are proposed.
            1. CIDs are: 3237, 6005, 6007, 6106, 7104, 7105, 7106, 7415, 7416, 7426, 7545, 8152, 8221, 9533, 9571, 9918, 10173, and 10176 (18 CIDs).
      2. Discussion
         1. A member mentioned that the CID 7106, 8152, 9533 and one more CID have already been resolved during the last meeting.
         2. C (p.7): A member commented on the proposed text for preferred AC in the multi-TID aggregation. 🡪 Offline discussion suggested.
         3. C: Some member mentioned that we should keep the original text for 27.10.4 A-MPDU with multiple TIDs. Proposed text could have different meaning. 🡪 As a result, proposed text for 27.10.4 was deleted.
         4. C: Duplicate is not a resolution.
      3. Next Step
         1. CID #6106, 9571, and 10173 are deferred for offline discussions.
         2. **Chair asked if there is any objection for the resolutions except for the ones deferred and ones that have already resolved. – No objection.**
3. **AoB**
   1. **PHY people will join us tomorrow.**
4. **Recess @ 17:57 (local time) until 9:00 AM tomorrow morning.**

**Friday, May 5th, 2017, TGax Non-PHY ad hoc Session (AM)**

1. **The meeting called to order by Osama Aboul-Magd (Huawei Technologies), the chair of the TGax, @9:02 AM (local time).**
   1. **Agenda: 11-17/0616r2.**
2. **Reminder**
   1. Chair reminded that we are still operating under the IEEE 802 and 802.11 Policy and Procedure.
3. **Agenda for the day**
   1. Proposed plan
      1. Meeting call to order
      2. IEEE 802 and 802.11 P&P
      3. 9:00 – 10:30 Comment resolution
      4. 10:30 – 10:45 Break
      5. 10:45 – 12:00 Comment resolution
      6. 12:00 – 13:30 Lunch break
      7. 13:30 – 15:00 Comment resolution
      8. 15:00 – 15:15 Break
      9. 15:15 – 17:00 Comment resolution
   2. Chair asked if there is any comment on the agenda. No response.
   3. The agenda is accepted.
4. **Summary from yesterday**
   1. **11-17/0296r1 – revisited**
      1. Continue the discussion of submission 11-17/0296
      2. CID 8153 is deferred
      3. No objection to the resolutions of the other CIDs
   2. **11-17/0298r0**
      1. 5656, 5963, 7395, 7396, 7400, 7618, 7619, 8067, 10277, 8322, 9978 (ED)
      2. No objection to any of the resolutions.
   3. **11-17/0682r0**
      1. 5957, 8223
      2. No objection
   4. **11-17/0683r1**
      1. 4845, 4848, 4849, 4850, 4851, 5663, 5665, 6044, 7189, 7398, 7399, 7629, 7630, 7631, 7632, 8132, 8595, 9313, 9979, 5084, 5664, 9576, 10280, 7635, 4847
      2. CID 4850 is deferred
      3. No objection to resolutions of the rest of the CIDs
   5. **11-17/0686r1**
      1. 5670, 5852, 6751, 7633, 7634, 7822, 8086, 8089, 8090, 8229, 8286, 8287, 9314, 9744, 9745, 9746, 9935, 9936, 9980, 5666, 5667, 5669, 6749, 6750, 6752, 7114
      2. No objection
   6. **11-17/0687r0**
      1. 3076, 5671, 5672, 8125, 8126, 8145, 8154, 9577, 9981, 4846, 8130
      2. No objection to resolutions
   7. **11-17/0693r3**
      1. CID 3048, 3049, 5349, 5351, 3038, and 4472
      2. No objection to proposed resolutions.
   8. **11-17/0325r4**
      1. 3028, 3029, 4452, 4460, 4686, 4697, 7918, 7919, 9660, 9841, 9842, 3093, 5509, 5510, 5674, 5675, 5782, 6041, 6045, 6046, 7593, 7594, 7595, 7596, 7597, 9753, 9959, 9960, 3046, 8316
      2. No objection.
   9. **11-17/0267r5**
      1. 3198, 3199, 3200, 5204, 5205, 5207, 5208, 5484, 5489, 5494, , 5496, 5497, 5499, 5500, 5501, 5502, 5503, 5690, 5691, 5870, 7122, 7123, 7129, 7406, 7612, 8073, 8104, 8232, 8239, 9315,9540, 9944, 9946, 9947, 10031, 10032, 7125, 3197, 5689, 9541, , 3196, 6025, 7823, 8233
      2. **SP is deferred for tomorrow.**
      3. Do you agree to resolutions to those CIDS in DOC 11-17/0267r5?
      4. SP: Y/N/A:13/1/14
   10. **11-17/0634r0**
       1. 5411, 9406, 6188, 9405, 7417, 7418, 9404, 9408, 9448, 3238, 7652, 8301, 9105, 9326, 9493, 9581, 10175
       2. No objection to any of the resolutions.
   11. **11-17/0644r1**
       1. CID 6052 – no objection
   12. **11-17/0708r3**
       1. 8220, 7411, 5399, 6181, 9417, 8278, 9919, 5395, 5396, 6180, 9416, 8527
       2. No objection to the resolutions.
   13. **11-17/0249r2**
       1. 8700, 8057, 8274, 8298, 7645, 5913, 9294, 7180, 7646, 9899, 9478, 10266, 3226, 3225, 7094, 8553, 9527, 9900, 9903, 3227, 7227, 8172, 6101, 7973, 9296, 4826, 4827, 8704, 8277, 3233, 5718, 5989, 9096, 9097, 3234, 9590, 5719, 5192, 8218, 8345, 5995, 8219, 5996, 7974, 10015, 6699, 5017, 9915
       2. **SP is deferred till tomorrow**
       3. No objection for the SP on all CIDs
   14. **11-17/0140r0**
       1. 8194, 5426, 7469, 7704, 7470, 5427, 7294, 8366, 7706, 3021, 8515, 8516, 8517, 8518, 9368, 5827, 7914, 7915, 7916, 7754, 7277, 9369, 5828, 7332, 6001, 6003, 9649, 7333, 5758, 8521, 8522, 3026, 4741, 7009, 3128
       2. No objection to the resolutions.
   15. **11-17/0631r2**
       1. 3030, 3122, 5326, 5919, 6088, 6347, 6348, 7357, 7381, 8541
       2. No objection to the resolutions.
   16. **11-17/0646r4**
       1. 3237, 6005, 6007, 6106, 7104, 7105, 7106, 7415, 7416, 7426, 7545, 8152, 8221, 9533, 9571, 9918, 10173, 10176
       2. CIDs 6106, 9571 and 10173 need more discussion.
       3. No objection for the rest of the CIDs.
5. **Presentations**
   1. **Abhishek Patil (Qualcomm) presented “Proposed resolution for comments related to CIDs in 27.5.2.6 (Random Access),” based on the submission 11-17-0708-03.**
      1. Summary
         1. Two changes after the straw poll tomorrow.
      2. Discussion
         1. No discussion.
      3. Next Step
         1. .
   2. **Abhishek Patil (Qualcomm) presented “title,” based on the submission 11-17-0249-02.**
      1. Summary
         1. Resolutions for the CIDs 7180, 4826 and 8345 are updated.
      2. Discussion
         1. No discussion.
      3. Next Step
         1. **Chair asked if there is any objection for the three CIDs. No objection.**
   3. **Kaiying Lv (ZTE) presented “Proposed resolution to CID 9947,” based on the submission 11-17-0722-00.**
      1. Summary
         1. Proposed resolution to CID 9947 is proposed.
         2. The point is to terminate the OBSS\_PD SR transmit power restriction period before OBSS TXOPs have terminated. The OBSS\_PD SR power restriction period should be terminated if there is no ongoing OBSS transmission at the start of the transmission.
      2. Discussion
         1. A member expressed objection due to the potential fairness issue.
         2. Another member expressed concern of increased complexity of packet processing, MCS selection, etc.
         3. There was a comment that this can introduce unfairness that an SR transmission could happen more often than a legacy transmission. 🡪 It is not the power restriction period that causes the unfairness.
      3. Straw Poll on the proposed text:
         1. **Result: Y/N/A = 5/10/15. Need more discussion.**
6. **Recess for 15 min until 10:30.**

**<Break>**

1. **Meeting reconvened @ 10:30 AM..**
   1. **Laurent Cariou (Intel) presented “CR for 27.9.2.2 spatial reuse,” based on the submission 11-17-0267-05.**
      1. Summary
         1. CR for CIDs related to OBSS\_PD SR provided.
            1. CIDs: 3198, 3199, 3200, 5204, 5205, 5207, 5208, 5484, 5489, 5494, 5496, 5497, 5499, 5500, 5501, 5502, 5503, 5690, 5691, 5870, 7122, 7123, 7129, 7406, 7612, 8073, 8104, 8232, 8239, 9315,9540, 9944, 9946, 9947, 10031, 10032, 7125, 3197, 5689, 9541, 3196, 6025, 7823, 8233
         2. CID 9947 is still there.
      2. Discussion
         1. No discussion.
      3. **Straw Poll: Do you agree with resolutions to those CIDs in doc.11-17/267?**
         1. **Result: Y/N/A = 13/1/14. To be converted to a motion.**
   2. **Zhou Lan (Broadcom) presented “Unifying QoS Control and BSR A-Control for Buffer Status Report,” based on the submission 11-17-0719-00.**
      1. Summary
         1. There is an incompatibility issue of supporting two buffer status report mechanisms.
            1. The Queue Size in QoS Data is reported per TID while Queue Size in BSR A-Control is reported per AC.
         2. Proposed to extend the supported Queue Size of QoS control from 64 768 octets to 1024 K octets and to replace the per AC Queue size in the BSR Control with per TID Queue size.
      2. Discussion
         1. A member prefers to differentiate the information reported by QoS Control and BSR Control.
         2. Another member mentioned current BSR mechanism is enough for UL scheduling 🡪 Zhou disagrees with this since there is only 8 bit in the QoS Control which is not enough for most of the applications.
         3. A member asked if it is enough to change one of the existing spec. 🡪 Whether to change the existing spec or to add a new spec is up to the group.
         4. A member commented that we should be more efficient compared to the other solutions. Some company would prefer simple way to do this and replacing existing spec may not be welcomed.
      3. Next Step
         1. More discussion suggested.
   3. **Alfred Asterjadhi (Qualcomm) presented “Comment resolutions for miscellaneous OM Control,” based on the submission 11-17-0601-01.**
      1. Summary
         1. Incorporated some suggestions to clarify that the RUs are allocated within the Tx Channel Width as suggested by some members.
         2. Relevant CIDs: 6260, 7051, 7192, and 7193.
      2. Discussion
         1. A member asked a question about the trigger frame. The member does not see clarification in the text.
         2. Another member discussed about the relationship with current spec of TOMI and ROMI. 🡪 This proposal separate the issue. OM is only applied for reception while OMI is for both Tx and Rx.
         3. There was a question asking which channel will be used when reducing the Tx bandwidth. 🡪 The original proposal was to limit it to the primary channel, however, it was relaxed to allow to use the secondary channel as suggested by a member.
         4. A member commented that giving a flexibility does not resolve any issues.
      3. Straw Poll: Which option do you prefer?
         1. Option #1: R0 of this document.
         2. Option #2: R1 of this document.
         3. Option #3: None of the above
         4. Discussion
            1. 🡪 R0 is the one presented yesterday.
         5. Result: SP not conducted.
   4. **Alfred Asterjadhi (Qualcomm) presented “Comment resolution for 27.7.4 Block 3,” based on the submission 11-17-0297-00.**
      1. Summary
         1. Resolutions for multiple comments related to TGax D1.0 clause 27.7.4 TWT with the following CIDs:
            1. CIDs: 3240, ~~4847,~~ 7403, 7636, 8109, 3248, 3257, 3266, 4176, 4187, 4196, 6753, 9982, 10281 (13 CIDs).
         2. Resolution for the CID #4847 is provided in another document.
      2. Discussion
         1. There was a discussion on the proposed text for 27.7.4.3 TWT information for flexible TWT. Also, the flexibility of TWT procedure described in the 27.7.4.1 General was discussed.
         2. A member discussed the reason for canceling the broadcast TWT.
         3. Another member discussed the behavior of a STA to participate TWT.
      3. Next Step
         1. **Chair asked if there is any objection to the document. – No objection.**
2. **Recess for lunch @ 11:59 AM until 13:30.**

**Friday, May 5th, 2017, TGax Non-PHY ad hoc Session (PM)**

1. **Meeting reconvened @ 13:34.**
2. **Reminder – We are still operating under the IEEE 802 and 802.11 Policy and Procedure.**
3. **Presentations**
   1. **Stephane Baron (Canon Research) presented “Proposed resolution for comments related to OFDMA random access procedure (RAPS element),” based on the submission 11-17-0645-01.**
      1. Summary
         1. Resolutions to TGax D1.0 comments related to clause 27.5.2.6 Random access procedure, concerning the RAPS element are proposed.
            1. CIDs: 5386, 5401, 5722, 6182, 7043, 7410, 7414, 8282, 8300, and 8557 (10 CIDs).
      2. Discussion
         1. A member asked for modification of the proposed text on initiation of OBO procedure. So is modified.
         2. CID 8557 was withdrawn.
      3. Next Step
         1. **Chair asked if there is any objection to the document. – No objection..**
   2. **Kaiying Lv (ZTE) presented “Proposed resolution for CID 4928,” based on the submission 11-17-0669-01.**
      1. Summary
         1. Resolution for CID 4928 is proposed.
         2. Point is to disallow any SP operation during transmission of NDPA, NDP, Beamforming Report Poll or FTM frame.
      2. Discussion
         1. People had a long discussion on the proposed text, especially SR\_DILAY related part.
      3. Next Step
         1. Kaiying to talk to members who have comments.
   3. **Liwen Chu (Marvell) presented “LB225 11ax D1.0 Comment Resolution 27.10.4 Part 1,” based on the submission 11-17-0553-01.**
      1. Summary
         1. Resolutions for multiple comments related to TGax D1.0 clause 27.10.4 (Block ACK) with the following CIDs :
            1. CIDs: 6187, 6183, 7605, 4793, 5402, 9392, 9393, 10332, 8136, 8135, 7947, 7944, 7943, 7942, 7941, 7940, 7949, 7950, 7948, 7962, 7863, 7864, 8401, 8393 (24 CIDs).
      2. Discussion
         1. A member commented clause 27.10.4 A-MPDU with multiple TIDs should be re-organized since there are some rules and it is difficult to follow the rule. 🡪 Liwen does not agree with the commenter since the sequence is the same.
         2. Another member commented
      3. Next Step
         1. .
4. **Recess @ 15:00 until 15:15.**

**<15 minutes break>**

1. **Meeting reconvened @ 15:15.**
2. **Presentation**
   1. **Patrice NEZOU (Canon Research) presented “Comment resolution for UL OFDMA-based random access (UORA),” based on the submission 11-17-0646-03.**
      1. Summary
         1. This is an update from the presentation yesterday.
      2. Discussion
         1. A member suggested changes to the proposed text of 27.5.2.6.2. Restriction and recommendation should use different work to show the level of requirement.
      3. Next Step
         1. **Chair asked if there is any objection to accept resolutions for CIDs #6106, #9571 and #10173. – No objection.**
   2. **Sean Coffey (RealTek) presented “Comment resolution for OBSS\_PD spatial reuse Disallow / Prohibit,” based on the submission 11-17-0xxx-0x.**
      1. Summary
         1. Proposed to introduce a new condition of SRP\_AND\_NON-SRG\_OBSS\_PD\_PROHIBITED and NON\_SRG\_OBSS\_PD\_SR\_Disallowed for spatial reuse operation.
      2. Discussion
         1. Need to take a look at the editor’s note of the related comment in the latest revision of 17/0010 and address the comment from the editor.
         2. A member commented that SR\_Delay and SR\_Restricted should be renamed as well.
         3. Another member suggested some editorial changes.
         4. A member mentioned that the SRG is a difficult concept and asked a question if there will be a way for APs to collaborate.
         5. A member pointed out that the document is not on the server.
      3. Next Step
         1. Sean to give presentation next week..
   3. **Chao-Chun Wang (MediaTek) presented “11ax D1.0 MAC Comment Resolution for,” based on the submission 11-17-0700-00.**
      1. Summary
         1. Resolutions for the second set of the comments for the Quiet Time Period and modifications to the text for the 27.16.4 are proposed.
      2. Discussion
         1. Resolution for the CID #5788 is changed to “Revised” from “Countered”.
      3. Next Step
         1. **Chair asked if there is any objection to the resolutions. – No objection..**
   4. **Suhwook Kim (LG Electronics) presented “Comment resolution for 10.22,” based on the submission 11-17-0723-01.**
      1. Summary
         1. Resolutions for multiple comments related to TGax D1.0 clause 10.22 (HCF) with the following CIDs are proposed.
            1. CIDs: 3187, 5756, 8266, 9431, 9432, 9691, 9857, 9858, 9859, 9860, and 10179 (11 CIDs).
      2. Discussion
         1. A member suggested a change to the proposed text of “An HE STA resume the backoff counter countdown …”
         2. The member has another suggestion to modify the text.
      3. Next Step
         1. **Chair asked if there is any objection to the resolutions. －No objection.**
3. **AoB**
   1. 5 minutes left.
   2. Again, thank people from LG Electronics to host the ad hoc meeting.
4. **TGax ad hoc meeting adjourned @ 16:56 (local time)**

Have a safe trip to Daejeon!

1. **Summary from the non-PHY ad hoc meeting on Friday**
   1. **11-17/0722r0**
      1. CID 9947
      2. **SP: Y/N/A: 5/10/13**
   2. **11-17/0719 – only for collecting feedback**
   3. **11-17/0601r1 – revisited**
      1. Which option do you prefer?
         1. Option 1: R0 of this document
         2. Option 2: R1 of this document
         3. Option 3: Non of the above
      2. SP was withdrawn
   4. **11-17/0297r0**
      1. 3240, 4847, 7403, 7636, 8109, 3248, 3257, 3266, 4176, 4187, 4196, 6753, 9982, 10281
      2. No objection to the resolutions of the CIDs.
   5. **11-17/645r2**
      1. 5386, 5401, 5722, 6182, 7043, 7410, 7414, 8282, 8300, 8557
      2. No objection to any of the resolutions.
   6. **11-17/669r1 – revisited**
      1. CID 4928
      2. SP is deferred likely till next week.
   7. **11-17/0553r1**
      1. 6187, 6183, 7605, 4793, 5402, 9392, 9393, 10332, 8136, 8135, 7947, 7944, 7943, 7942, 7941, 7940, 7949, 7950, 7948, 7962, 7863, 7864, 8401, 8393
      2. SP is deferred. Adding changes based on feedback.
   8. **11-17/0646r1 – revisited**
      1. 6106, 9571,10173
      2. No objection to resolutions of these CIDs.
   9. **11-17/0xxx – on SR, not uploaded- just for feedback**
   10. **11-17/0700r1**
       1. 5344 , 5339, 6466 , 6794 ,7183 ,5744 ,6793 ,10302 ,6797, 6799, 6801, 6802 ,6803, 6806 ,9107 ,6809 ,6810 and 6813
       2. **No objection to the resolutions.**
   11. **11-17/0723r2**
       1. 3187, 5756, 8266, 9431, 9432, 9691, 9857, 9858, 9859, 9860, 10179
       2. No objection to CIDs resolutions.
2. **Attendees of the non-PHY ad hoc session**

**Following individuals are attending to the May 2017 TGax non-PHY ad hoc meeting.**

|  |  |  |
| --- | --- | --- |
|  | **Name** | **Affiliation** |
| 1 | Osama Aboul-Magd | Huawei Technologies |
| 2 | Woojin Ahn | Wilus Institute |
| 3 | Yaron Alpert | Intel |
| 4 | Alfred Asterjadhi | Qualcomm |
| 5 | Stephane Baron | Canon Research |
| 6 | Laurent Cariou | Intel |
| 7 | Rojan Chitrakar | Panasonich |
| 8 | Hangyu Cho | LG Electronics |
| 9 | Jinsoo Choi | LG Electronics |
| 10 | Liwen Chu | Marvell |
| 11 | Sean Coffey | RealTek |
| 12 | Matthew Fischer | Broadcom |
| 13 | Ming Gan | Huawei Technologies |
| 14 | Chittabrata Ghosh | Intel |
| 15 | Guido R. Hiertz | Ericsson |
| 16 | Yasuhiko Inoue | NTT |
| 17 | Nick Jackson | Samsung |
| 18 | Jeongki Kim | LG Electronics |
| 19 | Suhwook Kim | LG Electronics |
| 20 | Jarkko Kneckt | Apple |
| 21 | Geonjung Ko | Wilus Institute |
| 22 | Zhou Lan | Broadcom |
| 23 | Jae Seung Lee | ETRI |
| 24 | Sungeun Lee | Cypress |
| 25 | Guoqing Li | Apple |
| 26 | Yunbo Li | Huawei Technologies |
| 27 | Kaiying Lv | ZTE |
| 28 | Jing Ma | NICT |
| 29 | Patrice NEZOU | Canon Research |
| 30 | Abhishek Patil | Qualcomm |
| 31 | Albert Petrick | InterDigital |
| 32 | Kiseon Ryu | LG Electronics |
| 33 | John Son | Wilus Institute |
| 34 | Bo Sun | ZTE |
| 35 | Yusuke Tanaka | Sony |
| 36 | Chao Chun Wang | MediaTek |
| 37 | Huizhao Wang | Quantenna Communicatins |
| 38 | David Xun Yang | Huawei technologies |
| 39 | James Yee | MediaTek |
| 40 |  |  |