IEEE P802.11  
Wireless LANs

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| IEEE 802.11 Task Group AY  March 2016 Macau Meeting Minutes | | | | |
| Date: 2016-3-13 | | | | |
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Abstract

Task Group AY meeting minutes from the IEEE 802.11 Macau session, March 13-18, 2016.

**IEEE 802.11 Task Group AY**

**March 2016 Macau Meeting**

**March 13-18, 2016**

**Monday, March 14, 2016, PM2 Session (16:00-18:00)**

1. The IEEE 802.11ay task group meeting was called to order at 16:00 by the Chair, Edward Au (Huawei).
2. Chair introduced himself and secretary, Jeorge Hurtarte (Teradyne).
3. Agenda Doc. IEEE 802.11-16/0202r2
4. Chair reviewed theIEEE-SA patentpolicy, logistics, and reminders on Task Group rules, including meeting guidelines and attendance recording procedures.
   1. Chair asked if anyone has any questions about the IEEE-SA patent policy, logistics or reminders. No questions.
   2. Chair asked if anybody has any disclosures related to the patent policy. None.
   3. Chair asked if there were any questions on any of the above items. None.
   4. Chair reminded all to record their attendance.
   5. Chair reminded all to upload their presentations.
5. Chair introduced the leadership of the AY TG (slide 11)
6. Chair reviewed the meeting time slots, locations and agenda items for the week (see slides12 and 13of the agendadocument).
7. Chair proceeded to discuss the agenda items for the Monday March 14, 2016 PM2 meeting.
8. Motion #36: Motion to approve the January 2016Atlanta Georgia minutes
   1. Move: Rakesh Taori
   2. Second: Assaf Kasher
   3. No objections noted. Unanimous consent.
   4. The January March 14, 2016 minutes were approved.
9. Chair reviewed the timeline of the AY TG (slide 18) and progress on Task Group documents.
10. Chair reviewed the list of presentations submitted (slides 19-25) and schedule for presenting those during the week.
    1. Chair asked if there were any additional presentations submissions
11. Chair reviewed the selection procedure for contributions (slide 27).
12. Presentations
    1. Presentation by Katsuo Yunoki, (KDDI R&D Laboratories), Possible Solutions for Mobile Offloading Use Case, Doc. IEEE 11-16/0034r1. Key points reviewed:
       1. This contribution proposed the following three possible solutions to compensate blocking and short coverage for mobile devices:
          1. Remote RF Head (RRH)
          2. Multi-Millimeter FST (Definitive name is TBD)
          3. Link Aggregation
       2. Opened the floor for discussion.
       3. Straw Poll #1:Do you think RRH (Remote RF Head) will be effective to improve space diversity in mobile use case?
          1. Yes: 7
          2. No: 6
          3. Need more study: Many
       4. Straw Poll #2: If Straw Poll # 1 were supported, Do you agree to add the following text into the TGay functional requirements document?

“11ay amendment addresses “Remote RF Head (RRH)” features as an option to improve space diversity efficiency.”

* + - 1. Yes:
      2. No:
      3. Need more study:
      4. Since the Straw Poll # 1 did not pass, Straw Poll #2 was not proceeded.
    1. Straw Poll #3:Do you agree to add the following text into the TGay functional requirements document?

“11ay amendment addresses the following features to compensate blocking and short coverage:

- Multi-Millimeter FST

- Link Aggregation”

* + - 1. Yes: 1
      2. No: 9
      3. Need more study: Many
  1. Presentation by Simon Qu (Blackberry), I-Q Decoupled OFDM Modulation, Doc. IEEE 11-16/0318r2. Key points reviewed:
     1. IQI has adverse impact on regular OFDM systems.
     2. Real OFDM (time-domain) signal is robust to IQI.
     3. Real time-domain = Conjugate-symmetric in frequency domain.
     4. DC-OFDM signal:
        1. A complex OFDM signal formed by two independently generated real time-domain OFDM signals.
        2. Robust to IQI.
        3. Same data rate as regular OFDM.
        4. Providing frequency diversity gain.
        5. SU & MU.
     5. Opened the floor for discussion.
     6. Straw Poll #1: Do you agree that I-Q decoupled OFDM is more robust to I-Q imbalance than the regular OFDM ?
        1. Yes: 1
        2. No: 1
        3. Abstain: Many
     7. Straw Poll #2: Would you consider accepting I-Q decoupled OFDM, or a modified version of this proposal, in 802.11ay draft?
        1. Yes: 1
        2. No: 2
        3. Abstain: Many
  2. Presentation by Raymond Yeung (The Chinese University of Hong Kong), BATS: Network Coding for Wireless Relay Networks, Doc. IEEE 11-16/0317r0. Key points reviewed:
     1. BATS code stands for ‘BATched Sparse code’
     2. The most advanced network coding technology for wireless networks
     3. Significantly improves the multi-hop relay throughput, and/or reduces delay
     4. Throughput benefits in the following applications:
        1. Multi-hop transmission
        2. Multicast
        3. Content distribution
        4. Internet of things
     5. Opened the floor for discussion.
  3. Presentation by James Wang (MediaTek), 11ay MIMO BF Training Enhancements, Doc. IEEE 11-16/0100r2. Key points reviewed:
     1. The earlier version (r1) of the contribution was presented in the January 2016 F2F meeting
     2. Slide 11 describes a beamforming enhancement for RX Sector Down Selection which uses the antenna pattern reciprocity was described.
     3. A motion was passed to adopt this feature into SFD. However, the motion text did not include the condition that STA exploits antenna pattern reciprocity to achieve the RX Sector Down Selection.
     4. We try to clarify and amend the motion text.
     5. Opened the floor for discussion.
     6. Straw Poll #1: Do you agree to modify the SDF text “11ay shall support RX-Sector Down-Selection in BF training” with “The 11ay beamforming protocol shall support, for STAs with antenna pattern reciprocity, RX sector down selection as part of beamforming training.”
        1. Yes: 52
        2. No: 0
        3. Abstain: 4

1. Meeting recessed at 17:57 and will resume on Tuesday AM1.

**Tuesday, March 15, 2016, AM1 Session (08:00-10:00)**

1. The meeting was called to order at 08:00by the Chair, Edward Au (Huawei).
2. Agenda Doc.IEEE 802.11-16/0202r4
3. Chair reviewed the IEEE-SA patentpolicy, logistics, email reflector logistics, and reminders on Task Group rules.
   1. Chair asked if anybody has any disclosures related to the patent policy. None.
   2. Chair asked if anyone has any questions about the IEEE-SA patent policy, logistics or reminders. No questions.
   3. Chair reminded all to record their attendance.
4. Presentations
   1. Presentation by Xiaofei Wang (InterDigital Communications), Relays for 11ay, Doc. IEEE 11-16/0337r0. Key points reviewed:
      1. While 802.11ad relaying procedure adds important capabilities and imparts robustness to directional transmissions, it has some deficiencies.
      2. Usage models for 11ay require relaying capabilities and 11ay should consider to enhance 11ad relaying features.
      3. Opened the floor for discussion.
      4. Straw Poll #1: Do you agree that 11ay shall provide enhanced relay capabilities and efficient relay procedures relevant to 11ay usage models?
         1. Yes: 10
         2. No: 4
         3. Abstain: Many
   2. Presentation by Lei Huang(Panasonic), Spatial Sharing Enhancement for MIMO Operation, Doc. IEEE 11-16/0295r2. Key points reviewed:
      1. 11ad spatial sharing mechanism should be enhanced for 11ay to support SU-MIMO transmission in candidate SP and existing SP.
      2. It is proposed that an EDMG STA can be requested by EDMG PCP/AP to perform multiple measurements concurrently employing multiple RX antenna configurations as are used for receiving multiple streams from the target EDMG STA based on the same measurement configuration.
      3. The proposed modifications on the Directional Channel Quality Report frame format is backward compatible with 11ad.
      4. Opened the floor for discussion.
      5. Straw Poll #1: The EDMG spatial sharing mechanism shall enable an EDMG STA to perform concurrent measurements employing multiple RX antenna configurations as are used for receiving multiple streams from the target EDMG STA based on the same measurement configuration.
         1. Yes: 30
         2. No: 0
         3. Abstain: 15
   3. Presentation by Lei Huang (Panasonic), BF Training for SU MIMO, Doc. IEEE 11-16/0420r1. Key points reviewed:
      1. Many BF features were agreed in 11ay SFD:
         * The 11ay SLS beamforming protocol shall enable feedback of one or more sectors per TX and RX antenna.
         * The 11ay beamforming protocol shall enable TX and RX training using the same BRP frame.
         * The 11ay beamforming protocol shall enable simultaneous BF training of transmit DMG antennas.
         * The 11ay beamforming protocol shall support simultaneous RX antenna training.
         * The 11ay beamforming protocol shall provide means to enable TX sector down selection as part of beamforming training.
      2. Based on these BF features, this contribution intends to address the flow of BF for SU MIMO.
      3. Opened the floor for discussion.
      4. Straw Poll #1: Do you agree to insert the following text into 11ay SFD?
         1. BF for SU MIMO comprises the following phases:
            * SLS: Coarse BF training to allow TX sector down selection for Initiator and Responder including feedback with candidate sectors.
            * TX-RX Sector/Antenna Mapping (name: TBD): BF training of RX sectors/antennas/RF chains for each of the candidate TX sectors to determine best TX-RX configuration for SU MIMO.
            * Others: TBD
            1. Yes: 40
            2. No: 0
            3. Abstain:10
   4. Presentation by James Wang (MediaTek), 11ay DL MU-MIMO BF Training and User Selection, Doc. IEEE 11-16/0405r0. Key points reviewed:
      1. MU-MIMO BF training and transmission operation are described.
      2. Two metrics for CSI feedback are proposed.
      3. Opened floor for discussion
      4. Straw Poll #1: Do you support to insert into the SFD "11ay MU-MIMO BF support training of more users (including collecting feedbacks from them) than the number of users transmitted to in each MU-MIMO transmission.”
         1. Yes: 42
         2. No: 0
         3. Abstain: 5
   5. Presentation by Carlos Cordeiro (Intel), EDMG Support Discovery, Doc. IEEE 11-16/0372r0. Key points reviewed:
      1. The traditional way (11n/ac/ad) of discovering the type of a STA is not desirable for EDMG and beyond
      2. Additional overhead and power consumption
      3. Discovering whether a STA is an EDMG STA should be done with the least amount of overhead
      4. We recommend using reserved bits for this purpose
      5. Opened floor for discussion
      6. Straw Poll #1: Include the following in section 3.1 of the SFD: “A EDMG Supported field shall be defined by using one reserved bit from the DMG Parameters field. An EDMG STA shall set the EDMG Supported field to 1."
         1. Yes: 38
         2. No: 0
         3. Abstain: 8
   6. Presentation by Solomon Trainin (Intel), Block Ack (BA) performance for high EDMG PHY rates, Doc. IEEE 11-16/0308r0. Key points reviewed.
      1. Recommendations:
         * Increase bitmap of the BA to 1024 bits
         * Modify multi TID BA to keep high LU when aggregating few TIDs in the same A-MPDU
         * Extend MPDU to 9Kbyte
         * Provide MPDU size negotiation by adding MPDU size to ADDBA Request and Response
         * Modify flow control to keep high LU
         * Shorten overhead of BA response (TBD)
      2. Opened floor for discussion
      3. Straw Poll #1: Would you agree to include the following in the SFD: “The size of the Block Ack window bitmap for EDMG STAs shall be 1024 bits”?
         1. Yes:35
         2. No: 0
         3. Abstain: 10
5. Meeting recessed at 10:00 and will resume on Tuesday PM3.

**Tuesday, March 15, 2016, PM3 Session (19:30-21:30)**

1. The meeting was called to order at 19:32by the Chair, Edward Au (Huawei).
2. Agenda Doc. IEEE 802.11-16/0202r4
3. Chair reminded all about the IEEE-SA patentpolicy, logistics, and reminders on Task Group rules.
   1. Chair asked if anybody has any disclosures related to the patent policy. None.
   2. Chair reminded all to record their attendance.
4. Presentations
   1. Presentation by Alexander Maltsev(Intel), NIST Channel Model for Conference Room at 83 GHz, Doc. IEEE 11-16/0338r0. Key points reviewed:
      1. This document presents the results for the Quasi-Deterministic (Q-D) Channel Model developed by NIST using measurements taken in a conference room at 83 GHz.
      2. Floor opened for discussion
   2. Presentation by Rui Yang (InterDigital), Channel Modeling with PAA Orientations, Doc. IEEE 11-16/0339r1. Key points reviewed:
      1. In this study, we use an example to demonstrate the impact of polarized antenna orientation on the channel capacity for different PAA configurations.
      2. We propose to include orientation information of the antennas in the channel model explicitly
      3. Floor opened for discussion
   3. Presentation by Shigenobu Sasaki (Niigata University),Channel Model for Outdoor Open Area Access Scenarios, Doc. IEEE 11-16/0342r0. Key points reviewed:
      1. In this contribution, the channel measurement results in an outdoor environment in Niigata university campus at an mm-wave band of 58.5 GHz assuming an open area outdoor hotspot access scenario will be introduced.
      2. Floor opened for discussion
   4. Presentation by Hiroyuki Motozuka (Panasonic), Experimental Measurement of USR, Doc. IEEE 11-16/0366r0. Key points reviewed:
      1. This work presents the experimental measurement results of USR communication with wide HPBW antenna.
      2. To confirm the effect of reflection between the bodies of the ticket gate and the smart phone, metal and non-metal plates were attached to Tx antenna and Rx antenna.
      3. The delay spread is very short for both metal plate attached antenna and non-metal plate attached antenna.
      4. These results of this work should be reflected in USR channel modeling.
      5. Floor opened for discussion
   5. Presentation by Kun Zeng (Huawei), Multi-zone for 11ay channel modeling, Doc. IEEE 11-16/0391r0. Key points reviewed:
      1. 802.11ay introduces new large scale scenarios, such as open area, street canyon, etc..
      2. Due to the fact that 802.11ay operates in the 60 GHz band, if the propagation distance is up to several hundred meters, signal propagation may experience multiple significantly different physical effects during its journey.
      3. In order to accurately reflect these effects, this presentation shows a multi-zone propagation model for 802.11ay new large-scale scenarios.
      4. Floor opened for discussion
5. Chair reviewed the balance of the agenda for the week.
6. Meeting recessed at 21:26 and will resume on Thursday AM1.

**Thursday, March 17, 2016, AM1 Session (08:00-10:00)**

1. The meeting was called to order at 18:00 by the Chair, Edward Au (Huawei).
2. Agenda Doc. IEEE 802.11-16/0202r5
3. Chair reminded all about the IEEE-SA patent policy, logistics, and reminders on Task Group rules.
   1. Chair asked if anybody has any additional presentations for the meeting.. None.
   2. Chair reminded all to record their attendance.
4. Presentations
   1. Presentation by Kun Zeng (Huawei), Antenna Pattern Decoupling Operation in 802.11ay Channel Modeling, Doc. IEEE 11-16/0392r0. Key points reviewed:
      1. The effect of antenna patterns should be considered in 802.11ay channel modeling.
      2. This effect mainly affects the random components modeling in the Q-D channel modeling method.
      3. In this presentation, we propose considering antenna pattern decoupling operations as an essential processing step in Q-D channel modeling.
      4. In addition, we propose a general criterion to evaluate the effectiveness of antenna pattern decoupling.
      5. Opened floor for discussion
      6. Straw Poll #1: Would you agree to consider the operation of antenna pattern decoupling in 11ay channel modeling?
         1. Straw poll postponed
   2. Presentation by Kun Zeng (Huawei), Antenna Considerations on Phase Noise Model for 802.11ay, Doc. IEEE 11-16/0390r1. Key points reviewed:
      1. New use cases and features in 802.11ay suggest new requirements on PN modeling.
      2. For better performance evaluations, in this submission, possible multiple LOs structures are presented.
      3. Partially coherent common LO structure is suggested for 802.11ay, and a complementary PN model is proposed accordingly.
      4. Floor opened for discussion
   3. Presentation by Robert Muller (Technische Universität Ilmenau), Characterization of Polarimetric Scattering Effects for 802.11ay Channel Modelling, Doc. IEEE 11-16/0393r0. Key points reviewed:
      1. Conclusion 60 GHz vs. 70 GHz
         1. We can identify the same scatters at 60 GHz and 70 GHz
         2. The antenna pattern highly influences the measurements and the channel parameters
         3. We can see that the reflections from the ceiling at position Rx10 increase the diffuse multipath components
         4. We need a method to compare measurements with different antennas
      2. Presented channel parameters for the 60 GHz entrance hall scenario
      3. Showed that the antenna pattern have a big influence on the measurement results
      4. Opened floor for discussion.
   4. Presentation by Dana Ciochina (Sony), Low Complexity Beamtraining for Hybrid MIMO, Doc. IEEE 11-16/0316r0. Key points reviewed:
      1. Beam training for Hybrid MIMO in 11ay can be expensive as number of possible beam combinations grows exponentially with number of antenna arrays.
      2. This contribution proposes a low complexity beam training method for 11ay.
      3. The proposed method can be supported with minimal changes in protocols and frame structures of sector level sweep (SLS) and beam refinement phase (BRP) of 11ad.
      4. Results show significant reduction in complexity and negligible losses in resulting MIMO capacity compared to exhaustive search.
      5. Opened floor for discussion.
   5. Presentation by Kyungtae Jo (LG Electronics), Generalized Multi-Beamforming   
      for 11ay, Doc. IEEE 11-16/0398r1. Key points reviewed:
      1. For channel modeling in 11ay, polarization characteristics based on antenna sector operation in 11ad is considered.
      2. Exhaustive search in each phase of the 11ad beamforming is not practical in multi-stream/channel BF.
      3. In order to reduce BF time as well as to support BF for multi-stream/channel, BF protocols using the multiple sectors in parallel can be considered.
      4. This contribution details the proposed BF procedures based on multi-beam refinement in dual-polarized channels to support beamformed communications for 11ay.
      5. Further works : New elements design of Generalized multi-beamforming indicators
      6. Opened floor for discussion
      7. Straw Poll #1: Insert the following in the SFD:“11ay provides the means of Multi-BF capability exchange in which the initiator and responders exchange the information on whether they have the capability of multi-BF”
      8. Yes: 35
      9. No: 0
      10. Abstain: 10
5. Meeting recessed at 9:55 and will resume on Thursday AM2.

**Thursday, March 17, 2016, AM2 Session (10:30-12:30)**

1. The meeting was called to order at 10:31 by the Chair, Edward Au (Huawei).
2. Chair reminded all about the IEEE-SA patent policy, logistics, and reminders on Task Group rules.
   1. Chair asked if anybody has any additional presentations for the meeting. None.
   2. Chair reminded all to record their attendance.
3. Agenda Doc. IEEE 802.11-16/0202r6
4. Presentations
   1. Presentation by Alecsander Eitan (Qualcomm), Short SSW Format for 11ay, Doc. IEEE 11-16/0416r0. Key points reviewed:
      1. The standard needs to support massive arrays with many sectors. The SLS overall duration scales with the number of sectors.
      2. We suggest to reduce the SLS duration by shortening the SSW duration.
      3. We suggest to add a Short SSW Format to 11ay to be used EDMG STAs reducing the transmission duration to 9.8usec (37.8% saving)
      4. Suggested format supports ISS and RSS up to 2048 sectors
      5. We also suggest to set the LBIFS to be same as duration of two Short-SSW and keep the counting CDOWN during this period.
      6. Opened floor for discussion
      7. Straw Poll #1: Insert the following in section 7 of the SFD: “7.6 EDMG Beamforming. The format of the Short SSW packet is defined in <slide 8>. ”
         1. Yes: 28
         2. No: 0
         3. Abstain:8
      8. Straw Poll #2: Insert the following in section 7 of the SFD: “An EDMG STA shall not transmit a Short SSW packet to another STA that is not also an EDMG STA.For SLS using Short SSW frames, LBIFS is equal to 2\*TXTIME(Short SSW) + 3\*SBIFS. An EDMG STA performing an SLS using Short SSW frames shall increase the value of the CDOWN field within the Short SSW frame by two for each LBIFS contained as part of a sector sweep.”
         1. Yes: 25
         2. No: 0
         3. Abstain:7
   2. Presentation by Artyom Lomayev (Intel), Performance Analysis of Open Loop SU-MIMO Receivers for IEEE 802.11ay, Doc. IEEE 11-16/0388r0. Key points reviewed:
      1. This work presents the results of simulation analysis of SU-MIMO schemes using OFDM and SC modulations. The ML, ZF, and LMMSE receivers are considered and the performance of the SC and OFDM modulations were compared.
      2. It was shown that MIMO SC has an advantage over the MIMO OFDM for the considered LOS channel model.
      3. For the NLOS channel model for horizontal coding the MIMO SC unbiased LMMSE receiver exhibits better performance for the data rates up to 7.0 Gbps and the MIMO OFDM unbiased LMMSE exhibits better performance for the data rates > 7.0 Gbps.
      4. For the NLOS channel model for vertical coding and interleaving the MIMO SC unbiased LMMSE receiver exhibits better performance for the entire considered data range.
      5. However MIMO OFDM ML receiver has significantly better performance in the entire considered data range over the MIMO SC unbiased LMMSE in the considered NLOS channel.
      6. Floor opened for discussion.
      7. Straw Poll #1: Would you agree to insert the following in section 7 of the SFD: ”The 11ay specification shall enable both SC and OFDM modulations for SU-MIMO and MU-MIMO data transmission”
         1. Yes: 31
         2. No: 0
         3. Abstain:6
   3. Presentation by Kyungtae Jo (LG Electronics), Short Multi-Channel Spatial Sharing, Doc. IEEE 11-16/0387r2. Key points reviewed:
      1. This contribution intends to investigate how spatial sharing protocol in single channel for 11ad is modified to extend to the spatial reuse for multi-channel.
      2. It suggests that “Enhanced Directional Channel Quality Request/Report frame” are modified by using the reserved bits of existing “Directional Channel Quality Request/Report frame” of 11ad in order to keep backward compatibility with legacy.
      3. Floor opened for discussion
      4. Insert the following in the SFD:
      5. Straw Poll #1: “11ay shall provide means to extend spatial sharing to be supported in multi-channel”
         1. Yes: 21
         2. No: 0
         3. Abstain:0
   4. Presentation by SungJin Park (LG Electronics), Short OFDMA in 11ay, Doc. IEEE 11-16/0400r1. Key points reviewed:
      1. Proposing OFDMA as one of techniques to enhance performance in 11ay.
      2. Proposing the size of granularity is the size of channel for simplicity of implementation and compatibility with other techniques.
      3. Opened floor for discussion
         1. Straw Poll #1: “Do you agree to insert the following in section 6.1 of the SFD: "11ay supports channel-wise DL OFDMA. This means that in a bonded channel, a PCP/AP can simultaneously transmit to multiple STAs allocated to different frequency resources in the unit of one channel bandwidth"
         2. Yes: 16
         3. No: 0
         4. Abstain:25
   5. Presentation by SungJin Park (LG Electronics), Multi-channel operation in 11ay, Doc. IEEE 11-16/0401r0. Key points reviewed:
      1. In 11ay channel utilization can be improved by extending the allocation defined in 11ad into the multi-channel operation.
      2. When the CBAP and SP are allocated over multiple channels, the STA’s capability of channel bonding should be considered.
      3. The allocation of CBAP and SP over multiple channels can be supported by simple modification of 11ad.
      4. Opened floor for discussion
         1. Straw Poll #1: Do you agree to add the following text to the SFD: “11ay shall support allocation of SP(s) and schedule CBAP(s) over more than one channel and/or over a bonded channel.”
         2. Yes: 17
         3. No: 0
         4. Abstain:18
5. Meeting recessed at 12:30 and will resume on Thursday PM2.

**Thursday, March 17, 2016, PM2 Session (16:00-18:00)**

1. The meeting was called to order at 10:31 by the Chair, Edward Au (Huawei).
2. Chair reminded all about the IEEE-SA patent policy, logistics, and reminders on Task Group rules.
   1. Chair asked if anybody has any additional presentations for the meeting.. None.
   2. Chair reminded all to record their attendance.
3. Agenda Doc. IEEE 802.11-16/0202r7
4. Presentations
   1. Presentation by Rob Sun(Huawei), 11ay Fast Association Authentication, Doc. IEEE 11-16/0354r1. Key points reviewed:
      1. 11.5.1.3.5 (11ad) defines the Security Association operations in PBSS
      2. The Association and Authentication are lock step procedures in order to satisfy the RSNA trust model.
      3. However it takes substantial time in completion of the authentication and association following the steps as specified in 11.5.1.3.5
      4. This presentations provides a proposal on how to optimize this issue.
      5. Floor opened for discussion
         1. Straw Poll #1: Do you agree to insert the following text into the SFD: “An EDMG STA may include the Authentication IE within management frames during discovery and association phase to parallelize the pre-shared key based authentication and key generation, to speed up the process of authentication and association”?
         2. Yes: 28
         3. No: 0
         4. Abstain:11
   2. Presentation by Alexander Maltsev (Intel), Channel models for IEEE 802.11ay, Doc. IEEE 11-16/1150r3. Key points reviewed:
      1. r3– March 2016 – Section 4.5 added, describing the mobility effects description within Q-D modeling approach. Section 6 added, with the description of the ultra-shout range channel model and measurements.
      2. Floor opened for discussion
   3. Presentation by SangHyun Chang (Samsung),Follow-up on the USR Wireless Docking Opportunity, Doc. IEEE 11-16/0418r1. Key points reviewed:
      1. We presented the Ultra-Short Range (USR) wireless docking usage model as a candidate mobile phone application, during the last F2F.
      2. This use case can serve various every-day applications which include remote desktop, cloud PC, gigabit docking with wireless charging service, and interactive game docking station.
      3. Today, we will compare the requirements of this use case (USR wireless docking) with the USR Communications (Usage Model #1) and Office Docking (Usage Model #9) and highlight the difference.
         1. Straw Poll #1: Do you agree to add USR wireless docking to the 11ay usage model document?
         2. Yes: 15
         3. No: 0
         4. Abstain: 25
5. Motions
   1. Motion #37: PHY
      1. Do you agree to modify the SFD text “11ay shall support RX-Sector Down-Selection in BF training” with “The 11ay beamforming protocol shall support, for STAs with antenna pattern reciprocity, RX sector down selection as part of beamforming training.”?
         1. Note 1: Contribution number: 16/0100r3
         2. Note 2: Straw poll results: 52 Yes, 0 No, 4 Abstain
         3. Move: Chris Hansen
         4. Second: SangHyun Chang
         5. Result: The motion is passed (28/0/4)
   2. Motion #38: PHY
      1. Do you agree to insert the following text into 11ay SFD? “The EDMG spatial sharing mechanism shall enable an EDMG STA to perform concurrent measurements employing multiple RX antenna configurations as are used for receiving multiple streams from the target EDMG STA based on the same measurement configuration.”
         1. Note 1: Contribution number: 16/0295r2
         2. Note 2: Straw poll results: 30 Yes, 0 No, 15 Abstain
         3. Move: Rob Sun
         4. Second: HanGyu Cho
         5. Result: The motion is passed (28/0/5)
   3. Motion #39: PHY
      1. Do you agree to insert the following text into 11ay SFD?
      * BF for SU MIMO comprises the following phases:
        + SLS: Coarse BF training to allow TX sector down selection for Initiator and Responder including feedback with candidate sectors.
        + TX-RX Sector/Antenna Mapping (name: TBD): BF training of RX sectors/antennas/RF chains for each of the candidate TX sectors to determine best TX-RX configuration for SU MIMO.
        + others: TBD
        1. Note 1: Contribution number: 16/0420r1
        2. Note 2: Straw poll results: 40 Yes, 0 No, 10 Abstain
        3. Move: Yan Xin
        4. Second: Hiroyuki Motozuka
        5. Result: The motion is passed (27/0/6)
   4. Motion #40: PHY
      1. Do you agree to insert the following text into the SFD? “11ay MU-MIMO BF support training of more users (including collecting feedbacks from them) than the number of users transmitted to in each MU-MIMO transmission.”
         1. Note 1: Contribution number: 16/0405r1
         2. Note 2: Straw poll results: 42 Yes, 0 No, 5 Abstain
         3. Move: HanGyu Cho
         4. Second: Rob Sun
         5. Result: The motion is passed (28/0/5)
   5. Motion #41: PHY
      1. Do you agree to include the following in section 3.1 of the SFD? “A EDMG Supported field shall be defined by using one reserved bit from the DMG Parameters field. An EDMG STA shall set the EDMG Supported field to 1.”
         1. Note 1: Contribution number: 16/0372r0
         2. Note 2: Straw poll results: 38 Yes, 0 No, 8 Abstain
         3. Move: Yan Xin
         4. Second: HanGyu Cho
         5. Result: The motion is passed (28/0/6)
   6. Motion #42: MAC
      1. Do you agree to include the following in the SFD? “The size of the Block Ack window bitmap for EDMG STAs shall be 1024 bits”
         1. Note 1: Contribution number: 16/0308r1
         2. Note 2: Straw poll results: 35 Yes, 0 No, 10 Abstain
         3. Move: Alexander Maltsev
         4. Second: AlecsanderEitan
         5. Result: The motion is passed (29/0/2)
   7. Motion #43: MAC
      1. Do you agree to insert the following in the SFD? “11ay provides the means of Multi-BF capability exchange in which the initiator and responders exchange the information on whether they have the capability of multi-BF.”
         1. Note 1: Contribution number: 16/0398r1
         2. Note 2: Straw poll results: 35 Yes, 0 No, 10 Abstain
         3. Move: HanGyu Cho
         4. Second: Shigenobu Sasaki
         5. Result: The motion is passed (27/0/5)
   8. Motion #44: PHY
      1. Do you agree to insert the following in section 7 of the SFD? “7.6 EDMG Beamforming. The format of the Short SSW packet is defined in slide 8 of 16/0416r1.”
         1. Note 1: Contribution number: 16/0416r1
         2. Note 2: Straw poll results: 28 Yes, 0 No, 8 Abstain
         3. Move: AlecsanderEitan
         4. Second: Chris Hansen
         5. Result: The motion is passed (27/0/4)
   9. Motion #45: PHY
      1. Do you agree to insert the following in section 4.2 of the SFD?
         * An EDMG STA shall not transmit a Short SSW packet to another STA that is not also an EDMG STA.
         * For SLS using Short SSW frames, LBIFS is equal to 2\*TXTIME(Short SSW) + 3\*SBIFS. An EDMG STA performing an SLS using Short SSW frames shall increase the value of the CDOWN field within the Short SSW frame by two for each LBIFS contained as part of a sector sweep.
         1. Note 1: Contribution number: 16/0416r1
         2. Note 2: Straw poll results: 25 Yes, 0 No, 7 Abstain
         3. Move: AlecsanderEitan
         4. Second: Chris Hansen
         5. Result: The motion is passed (23/0/7)
   10. Motion #46: PHY
       1. Do you agree to insert the following in section 7 of the SFD? “The 11ay specification shall enable both SC and OFDM modulations for SU-MIMO and MU-MIMO data transmission.”
          1. Note 1: Contribution number: 16/0388r0
          2. Note 2: Straw poll results: 31 Yes, 0 No, 6 Abstain
          3. Move: ArtyomLomayev
          4. Second: Hiroyuki Motozuka
          5. Result: The motion is passed (26/0/4)
   11. Motion #47: PHY
       1. Do you agree to insert the following in the SFD? “11ay shall provide means to extend the IEEE 802.11adspatial sharing mechanismto be supported in multi-channel.”
          1. Note 1: Contribution number: 16/0387r2
          2. Note 2: Straw poll results: 31 Yes, 0 No, 0 Abstain
          3. Move: HanGyu Cho
          4. Second: Hiroyuki Motozuka
          5. Result: The motion is passed (20/1/6)
   12. Motion #48: PHY
       1. Do you agree to insert the following in section 6.1 of the SFD? “11ay supports channel-wise DL OFDMA. This means that in a bonded channel, a PCP/AP can simultaneously transmit to multiple STAs allocated to different frequency resources in the unit of one channel bandwidth.”
          1. Note 1: Contribution number: 16/0400r1
          2. Note 2: Straw poll results: 16 Yes, 0 No, 25 Abstain
          3. Move: SungJin Park
          4. Second: HanGyu Cho
          5. Result: The motion is passed (9/1/18)
   13. Motion #49: PHY
       1. Do you agree to add the following text to the SFD? “11ay shall support allocation of SP(s) and scheduled CBAP(s) over more than one channel and/or over a bonded channel.”
          1. Note 1: Contribution number: 16/0401r0
          2. Note 2: Straw poll results: 17 Yes, 0 No, 18 Abstain
          3. Move: SungJin Park
          4. Second: Kyungtae Jo
          5. Result: The motion is passed (14/0/12)
   14. Motion #50: PHY
       1. Do you agree to insert the following text into the SFD? “An EDMG STA may include the Authentication IE within Management and Extension frames during discovery and association phase to parallelize the pre-shared key based authentication and key generation, to speed up the process of authentication and association.”
          1. Note 1: Contribution number: 16/0354r1
          2. Note 2: Straw poll results: 28 Yes, 0 No, 11 Abstain
          3. Move: Rob Sun
          4. Second: Yan Xin
          5. Result: The motion is passed (26/0/5)
6. Presentations
   1. Presentation by Kun Zeng (Huawei), Antenna Pattern Decoupling Operation in 802.11ay Channel Modeling, Doc. IEEE 11-16/0392r1. Key points reviewed:
      1. Straw Poll #1: Would you agree that 11ay channel modeling shall incorporate antenna pattern independent methodology?
         1. Yes: 21
         2. No: 0
         3. Abstain:8
7. Chair reviewed the goals for the May 2016 interim meeting.
8. Chair reviewed the teleconference schedule.
9. The Task Group AY Macau meeting was adjourned on March 17, 2016 at 17:57.