IEEE P802.11  
Wireless LANs

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| TGaz Meeting Minutes  July 10th-12th, 2018  San Diego, California | | | | |
| Date: 2018-07-10 | | | | |
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Abstract

Minutes for the TGaz meeting, beginning on July 10th, 2018.

**IEEE 802.11 Task Group AZ**

**July 10th – 12th, 2018**

1. **TGaz – July 10th, 2018 – Slot #1**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **10.30am PT**; Technical Editor, Chao Chun (MediaTek); Secretary, Roy Want (Google Inc.).
   2. Agenda Doc. **IEEE 802.11-18/0982r2**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patent Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~32 present
   4. Review Agenda
      1. Called for any additional submissions for the week.
      2. Agenda review and setting:
         1. Reviewed submissions for the week.
         2. Group originally scheduled for 6 slots, requested to consider requesting of additional meeting slot - approved by group, chair to bring request to mid-week plenary.
      3. Chair called for any additional feedback and changes to agenda.
      4. **Motion:** We approve the agenda for document **11-18/0982r3** (**in progress**)
         1. **Approved** by unanimous consent
   5. Approve previous meeting minutes (posted to Mentor May 22nd, 2018)
      * 1. **Motion:** Move to approve document 11-18/0926r0 as TGaz meeting minutes for the May meeting.
        2. Mover: Assaf Kasher, Seconder: Roy Want.
        3. Discussion of the motion: none
        4. **Results (Y/N/A)**:15/0/0: **motion passes.**
   6. TGaz approved plan
      1. Review/verify draft meets the 802.11 style guide (missing parts, naming conventions, normative and descriptive sections).
      2. Freeze SFD and perform internal comment collection coming out of July 2018 meeting.
      3. Perform internal comment resolution during the Sep. and possibly Nov. meeting (reject any remaining comments).
      4. Go to Initial WG ballot coming out of Nov. 2018.
   7. Reviewed SFD revisions by Chao Chun Wang (MediaTek) who presented doc. **11-18/0462r15**
      1. Will release the final version of this document after this meeting and freeze it.
      2. **Discussion**: - none
      3. Chair proposes we move to a motion.
      4. **Motion**: Move to adopt document 11-17-462r15 as TGaz Spec Framework working draft document.
      5. Mover: Chou Chun Wang.
      6. Seconder: Qinghua Li.
      7. **Results (Y/N/A):** 14/0/1: **motion passes.**
   8. Chao Chun Wang (MediaTek) reviewed draft of **11az D0.3** amendment text.
      1. Expect to have Draft 0.4 available by end of month.
      2. We will move to first round of comment collection after D0.4
      3. D0.4 will have all changes accepted and turned to black, and track changes enabled, ready for comment.
      4. Reviewed edited-text/additions.
      5. **Discussion**
      6. C. Amendment text for discussion this week. Will these be added to 0.3, but based on D0.2?
      7. R. Better to redo this on top of D0.3 or it will be difficult to merge into working draft baseline (currently 0.3).
      8. **Motion**  
         We adopt document P802.11az D0.3 as the TGaz working draft document.
      9. Mover: Ganesh Venkatesan
      10. Seconder: Qinghua Li
      11. **Results (Y/N/A):** 14/0/2: **motion passes**
   9. Feng Jiang (Intel) presented document **11-18/1269r0**
      1. **Title:** **Clock Synchronization between ISTA and RSTA**
      2. **Summary**: In 11az, the ToA/ToD is estimated based on ISTA’s UL NDP and RSTA’s DL NDP. The ISTA and RSTA use its own sampling clock to calculate ToA/ToD. ISTA’s or RSTA’s sampling clock error is translated to the range estimation error through ToA/ToD. It’s necessary to investigate the ISTA’s and RSTA’s sampling clock error’s impact on the range estimation
      3. **Discussion**
      4. C. Can you highlight the actual change?
      5. R. It is just an estimate of the (Clock Frequency Offset) CFO.
      6. C. The RSTA cannot compensate?
      7. R. In Trigger Based (TB) operation, the ISTA measures and adjusts the UL NDP transmission carrier to match that of the RSTA, as measured over TF, hence the offset is not observable by the RSTA. However when measuring the timing of t1, t4, the clock may be the free running ISTA baseband clock. As a result adjustment of t1 to t4 is required to occur by the RSTA or ISTA such that t1,t4 and t2,t3 are measured using same baseband clock reference. The proposed solution is to report the offset in ISTA to RSTA LMR.
      8. C. If the CFO is measured on the downlink NDP, the uplink would have to adjust. We should be specific about what CFO is being adjusted.
      9. R. Yes, we should add that in the motion.
      10. **Strawpoll:**   
          In HEz and VHTz ISTA2RSTA LMR, do you support that  
          -The ISTA2RSTA LMR shall include a CFO feedback,  
          -Based on the CFO feedback, RSTA can tune t4, t1
      11. **Results (Y/N/A):** 13/0/6.
      12. **Motion**  
          Move to adopt the following requirements in section 3.2.2 VHTz Measurement Exchange and 3.2.3 HEz Measurement Exchange, instruct the SFD editor to incorporate it in the SFD and empower the editor to perform editorial changes.

“In HEz and VHTz measurement exchange sequences, the ISTA2RSTA LMR shall include a CFO feedback.”

* + 1. Mover: Qinghua Li
    2. Seconder: Feng Jiang
    3. Discussion of the motion: none
    4. **Results (Y/N/A)**: 11/0/2: **motion passes.**
  1. Assaf Kasher (Qualcomm) presented document **11-18/1261r0**
     1. **Summary**: Editorial suggestions for amendment text changes to the baseline (add, change, delete and replace). Proposes the edit style we should adopt for changes. Instructions to the 802.11 editor should be in red bold italics.
     2. Proposal that this format is adopted in the next meeting onward.
     3. Chair pointed out this needs to be turned into an action to have an effect.
     4. **Motion**  
        Move to adopt the conventions depicted by submission 11-18-1261 as TGaz convention set for draft text contributions
     5. Mover: Assaf Kasher
     6. Seconder: Chao Chun Wang
     7. **Results (Y/NA):** 11/0/0: **motion passes**
  2. Attendance reminder
  3. Recess at 12.31am.

1. **TGaz – July 10th, 2018 – Slot #2**
   1. Called to order by TGaz Chair, Jonathan Segev (Intel Corporation) at **4.00pm PT**; and Secretary Roy Want (Google Inc.).
   2. Agenda Doc. **Now working with revision 11-18/0982r4 (in progress)**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~23 present
   4. Reviewed submission order and updated agenda
      1. **11-18/1248** has been removed from this session, but will be revisited at a later time.
      2. Updated agenda presentation order and feedback requested: none received
      3. Agenda agreed.
   5. TGaz Election for **Vice Chair position**.
      1. A call was made for additional candidates – none received, chair closed the nomination for vice chair position.
      2. Candidates presented a short statement on their qualification for the position.
      3. Options
      4. O1) Assaf Kasher
      5. O2) Roy Want
      6. **Results**:
      7. O1) 11
      8. O2) 6
      9. The new Vice Chair is Assaf Kasher and will take effect on Friday, pending WG confirmation.
   6. Christian Berger (Marvell) presented document **11-18/1272r1**
      1. **Title:** **LMR AoA Feedback**
      2. **Summary:** **Angular in TGaz:** subsection for sub 7-GHz angular is removed from SFD. Now there is only specific support for AoD/AoA in DMG/eDMG.

**Existing Angular:** sub 7 GHz AoA is already implemented using proprietary receive array processing. It does not need specific protocol support. Usually performed at the APs, can be used in network-centric localization, and would be beneficial in client-centric localization.

There is a need to share AoA Measurements from AP with STA: RSTA-ISTA LMR is an obvious place to provide feedback per packet (NDP) AoA measurements.

* + 1. **Discussion**
    2. C. There are no changes to the protocol exchange?
    3. R. Correct.
    4. C. Do you have any results to show the accuracy benefits of angular information?
    5. R. I don’t have any at this point.
    6. **Strawpoll:**Do you support to include optional Angle-of-Arrival (AoA) feedback in the Fine Timing Measurement Report field of the VHTz and HEz LMR (RSTA-ISTA)?
    7. **Results (Y/N/A)**: 22/0/1
    8. **Motion**:  
       Move to adopt the following requirements to section 3.2.2 VHTz Measurement Exchange and 3.2.3 HEz Measurement Exchange, instruct SFD editor to incorporate it in the SFD and empower the editor to perform editorial changes.

“The Fine Timing Measurement Report field of the VHTz and HEz LMR (RSTA to ISTA) shall include an optional Angle of Arrival (AoA) feedback field.

* + 1. **Discussion** of motion: - none
    2. Mover: Christian Berger
    3. Seconder: Assaf Kasher
    4. **Results (Y/N/A)**: 15/0/1: **motion passes**
  1. Dibakar Das (Intel) presented **11-18/1193r1**
     1. **Title:** **HEz Polling Frame Format**
     2. **Summary:** **The design of polling TF and response needs to satisfy the following constraints:**

-Allow for sufficiently large number of ISTAs to be polled.

-Allow RSTA to derive a TF Location Sounding allocating sounding resources  
 to the subset of responding ISTAs (with SIFS time).

-Support for both associated and unassociated ISTAs.

In this presentation we propose a design for Polling TF satisfying the above constraints.

* + 1. **Strawpoll #1:**   
       Do you support that the Poll Response frame for HEz ranging shall be a CTS-to-self frame carried in a HE TB PPDU?
    2. **Discussion**
    3. C. Clarification of what has changed in the packet length
    4. R. It contains a shorter Mac
    5. C. What is the HEz frame format?
    6. R. Added text to clarify the HEz format ‘HE TB PPDU.’
    7. **Results**: 10/0/8.
    8. **Motion**Move to adopt the following requirements to section 3.2.3 HEz Measurement Exchange, instruct SFD editor to incorporate it in the SFD and empower the editor to perform editorial changes:

“The Poll Response frame for HEz ranging shall be a CTS-to-self frame carried in an HE TB PPDU”.

* + 1. Mover:Qinghua Li
    2. Seconder: Feng Jiang
    3. **Results (Y/N/A):** 8/0/4: **motion passes**
    4. **Strawpoll #2**:   
       Do you support that the Location Trigger frame subtype HEz Poll shall have the following constraint?

No Trigger Dependent User Info field.

* + 1. **Discussion**
    2. C. Did you specify the OFDMA frame format type?
    3. R. Option #2 specifies the constraints
    4. C. Seems obvious, thus we don’t need this, normally specifies what is needed and not what is not needed.
    5. R. The Trigger Frame structure is defined by similarity to the basic Trigger Frame type, thus we need to specify the constraints that are unique to that of the type Location sub type Poll.
    6. C. Did we specify this is based on the basic trigger?
    7. R: yes, the Location->Poll is based on the Trigger Frame of type basic TF.
    8. C. What you are suggesting is to make this clear.
    9. R. correct.
    10. **Results (Y/N/A)**: 12/0/3.
    11. **Motion**   
        Move to adopt the following requirements to section 3.2.3 HEz Measurement Exchange, instruct SFD editor to incorporate it in the SFD and empower the editor to perform editorial changes:

“The Location Trigger frame subtype HEz Poll shall have no Trigger Dependent User Info field.”

* + 1. Moved: Chitto Ghosh
    2. Second: Assaf Kasher
    3. **Results (Y/N/A)**: 9/0/4: **motion passes.**
    4. **Strawpoll #3**:  
       Do you support that OFDMA is the mandatory mode for conveying HEz polling responses?

Note:

Support for UL MU MIMO and/or mixed mode (UL MU MIMO and OFDMA concurrently) capabilities are exchanged during the 11az negotiation; and modes beyond ODFMA can only be supported if both ends are capable.

* + 1. **Results (Y/N/A)**: 13/0/3
    2. **Motion**

Move to adopt the following requirements to section 3.2.3 HEz Measurement Exchange, instruct SFD editor to incorporate it in the SFD and empower the editor to perform editorial changes:

“OFDMA is the mandatory mode for conveying HEz polling responses.  
Note:

Support for UL MU MIMO and/or mixed mode (UL MU MIMO and OFDMA concurrently) capabilities is exchanged during the 11az negotiation; and modes beyond ODFMA can only be supported if both ends are capable.”

* + 1. Mover: Chitto Ghosh
    2. Seconder: Ganesh Venkatesan
    3. **Discussion:**
    4. C. Can we make OFDMA mode mandatory for all ranging?
    5. R. We can clarify this after the motion.
    6. C. Will all 11az devices have to support UL MIMO
    7. R. Its outside the scope of this motion. HEz sounding requires multiuser MIMO.
    8. **Results (Y/N/A):** 11/0/2: **motion passes**
  1. Assaf Kasher (Qualcomm) presented document **11-18/1147r0**
     1. Title: **60GHz AOD Messaging Draft Text**.
     2. **Discussion #1**: To enable AOD measurement in which the initiator performs AOD, we need to allow the responder to send the best TRN field index to the initiator. This is added to Direction Measurement Result element sent within the LMR.
     3. **Discussion #2**: To enable AOD measurements in from the RSTA to the ISTA, we need to allow the ISTA to send best sector feedbacks to the RSTA. This cannot be done during the burst as during the burst the ISTA only sends ACK frames. We therefore need to define an element that will contain several BS feedback results. The RSTA will also need to send a response to the ISTA, containing the AOD results per each best sector the ISTA measured. For this we need an element that will contain several AOD measurement fields. Each AOD
     4. C. Isn’t the ISTA sending an FTM-req frame?
     5. R. No. Its sending an FTM frame, not a request frame, with a measurement field, which will have AOD azimuth, elevation and their accuracies.
     6. **Discussion #3**: Unrelated to AOD messaging. When the first path AWV FTM exchange was added to the draft, a new value of trigger was proposed. This value needs to be added to the list of valid trigger values in 9.6.7.32 Fine Timing Measurement Request frame format.
     7. C. Using the value of 2 as the next value may lead to confusion as it’s used in other places. Making it a value of 3 will make it easier to parse [in traces], and lead to less confusion.
     8. R. I’m fine making that change – but that would require a written comment to make it coherent in the draft.
     9. **Motion**

Move to adopt the text changes proposed in 11-18-1147r0 and instruct the technical editor to incorporate it in the 802.11az draft amendment text.

* + 1. Mover: Assaf Kasher
    2. Seconder: Eitan Alecsander.
    3. **Results (Y/N/A):** 8/0/5, **motion passes.**
  1. Ganesh Venkatesan (Intel) presented document **11-18/0787r0**
     1. **Title:** **11az Negotiation Protocol Update (overview)**
     2. **Summary**: Submission 17-1473r2 discussed the 802.11az Negotiation Protocol and had several aspects designated as TBD. Proposals discussing details of the Ranging Protocols have resulted in further refinements to the 802.11az Negotiation Protocol. In this presentation, we summarize the developments since the last discussion, and provide an update to the 802.11az Negotiation protocol.

The companion submission document 18/788 has the corresponding amendment text.

* + 1. Session is out of time, so the presentation will continue in slot #3.
  1. Reminder to do attendance.
  2. Now at recess 6pm PT.

1. **TGaz – July 11th, 2018 – Slot #3**
   1. Called to order by TGaz Chair, Jonathan Segev (Intel Corporation) at **01.30pm PT**, and Secretary Roy Want (Google Inc.).
   2. Agenda Doc. **Now working with revision 11-18/0982r5 (in progress).**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~29 present
   4. Reviewed submission order and updated agenda
      1. Updated agenda presentation order agreed.
   5. Ganesh Venkatesan **continued** to present document **11-18/0787r0** 
      1. Title: **11az Negotiation Protocol Update (overview) continued**
      2. **Summary:** see earlier in slot #2.
      3. **Discussion**
      4. C. You just need one bit and a value rather than the interpretation of a field based on minToaReady !=0
      5. R. When we review the amendment text in **11-18/788r1,** we can look into that.
   6. Ganesh Venkatesan (Intel) **continued** to present document **11-18/0788r1**
      1. **Title: 802.11az Negotiation Protocol (Update)**

(Relative to IEEE 802.11 REVmd D1.0 and 802.11az D0.3)

* + 1. **Summary:** This submission is an update to 802.11az D0.3 related to the Negotiation Protocol.
    2. Ganesh presented the revisions to document
    3. **Discussion**
    4. C. Cannot have all fields optional – need to specify one as the default.
    5. R. Yes agreed. We need to add a note of the defaults. Section, 11.22.6.3.
    6. C. Do we have anything that specifies the modes available e.g. HEz vs VHTz?
    7. R. We will, but not currently in the draft, as we haven’t discussed that.
    8. C. Are we integrating these additions with EDMG?
    9. R. Yes, it’s needed for all HEz, VHTz and EDMGz modes.
    10. C. (page 12) MaxToAAvailableExp – should it be in units of 100 microseconds?
    11. R. I just moved this text (it was already written this way). Need to fix separately.
    12. C. Do we have security supported for EDMG?
    13. R. It will in the next draft.
    14. Because of these comments: no motion at this time to allow edits to be included.
  1. Mingguang Xu (Apple) presented document **11-18/0939r1**
     1. **Title: Clock Attack Threat Model for 11az**
     2. **Summary:** We consider an I-STA which attempts to estimate the frequency offset between its own clock and that of R-STA and uses this estimate to correct timing information reported by R-STA. An attacker can exploit the estimation and correction process performed by the I-STA to decrease the estimated range between the I-STA and R-STA.
     3. **Strawpoll**  
        Do you support to add the following recommended note in the 11az spec?

“Note: It is recommended that a device discards ranging measurements when it detects that its ranging peer’s clock drift considering its local clock, exceeds the allowed tolerance from the values specified by the 802.11 requirements. See section 21.3.17.3 for VHTz, 28.3.18.3 and 28.3.14.3 for HEz, and 20.3.3.2.1 for DMGz/EDMGz.”

* + 1. **Discussion**
    2. C. After the trigger frame the CFO is also adjusted, so 28.3.14.3 should be included.
    3. R. Added to the strawpoll text (included above).
    4. **Results (Y/N/A):** 16/0/4
    5. **Motion**Move to adopt the text depicted by slide 59-60 of submission 110180982r5, instruct the technical editor to incorporate it in the IEEE P802.11az draft amendment under sections 11.22.6.4.6.1 VHTz mode, 11.22.6.4.6.2 HEz mode and the section dealing with secured PHY measurement in the DMG/EDMG mode text.
    6. Discussion:
    7. C. the note for VHTz, HEz and DMG/EDMG each needs to go in a different sections, thus 3 different notes needed.
    8. Discussed changes to proposed amendment text.
    9. Mover: Roy Want
    10. Seconder: Qi Wang
    11. **Results (Y/N/A):** 16/0/1, **motion passes**
  1. Ganesh Venkatesan (Intel) revisited document **11-18/0788r2**
     1. Responding to three issues discussed earlier in the session
     2. 1. Typos – fixed
     3. 2. Missing Format and Bandwidth field in Ranging Params (page 14). Explanation of this parameter also added below table.
     4. 3. The defaults are added for the negotiation in section 11.22.6.3.
     5. C. One level of hierarchy, rather than a split and two levels below it.
     6. R. Sounds like a good idea – the current proposal is a result of changes from the legacy. We can revisit this later.
     7. C. Re; Section 9.4.2.166 figure 9-810. ToA Error is one byte, but in the baseline is 2 bytes.
     8. R. Need to look at this and correct.
     9. Out of time for this session (will continue in next session)
     10. Reminder to do attendance
     11. Recess at 3.30pm

1. **TGaz – July 11th, 2018 – Slot #4**
   1. Called to order by TGaz Chair, Jonathan Segev (Intel Corporation) at **04.03pm, PT** and Secretary Roy Want (Google Inc.).
   2. Agenda Doc. **Now working with revision 11-18/0982r6 (in progress)**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~20 present
   4. Reviewed submission order and updated agenda
      1. Updated agenda presentation order and feedback requested: none received
      2. Agenda agreed.
   5. Yongho Seok (MediaTek) presented document **11-18/1265**
      1. **Title:** **HEz Passive Range Measurement Protocol**
      2. **Summary:** This submission proposes P802.11az draft amendment text for the P802.11az passive range measurement protocol. This submission addresses SFD (document 17/0462r15) requirements - clause 3.1 (5) and (6), clause 5. The baseline documents that this proposal depends on are (clause numbering relative to .11aj, .11ak, .11aq, .11ax and .11ay)

D1.0 of REVmd; D8.0 of PIEEE802.11aj; D5.0 of PIEEE802.11ak; D13.0 of PIEEE802.11aq; D1.0 of PIEEE802.11ay, and D3.0 of IEEE 802.11ax

* + 1. Text changes in document reviewed.
    2. **Discussion**
    3. C. In the trigger frame the GI and the LTF are reserved. How can the passive client know the GI?
    4. R. The HEz Passive client can decode the HE-SIG-A2.
    5. C. The Master should control the TX-Power of the anchor station.
    6. R1. This is TBD, so adding text below:
    7. - Text added: The AP TX Power subfield in the Common Info field is TBD.
    8. - Text added: The UL Target RSSI field in the User Info field is TBD.
    9. C. 9.4.2.26: There are two types of GI.
    10. R. They could be shared.
    11. C. For a single station, it can send a single SU.
    12. R. Added the GI and LTG Type Number of the HE-LTF Symbol. AP Tx Power in the Common Info field is TBD.
    13. These changes are saved as Revision #1 – but minor so we can consider a motion now.
    14. **Strawpoll**
    15. We agree to the spec changes depicted by submission 11-18-1265r1.
    16. **Discussion** - none
    17. **Results (Y/N/A):** 17/0/6.
    18. **Motion**  
        Move to adopt document 11-18-1265r1, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
    19. Mover: Yongho Seok
    20. Seconder: George Calcev
    21. Discussion of the motion: none.
    22. **Results (Y/N/A): 13/0/0, motion passes**
  1. Ganesh Venkatesan (Intel) presented document **11-18/1138r2**
     1. **Title: HEz Ranging Availability Window**
     2. **Summary:** Submission 18-855r1 discussed the notion of Availability Window for HEz Ranging. In this presentation, we propose a structure to represent the Availability Window and describe the mechanism to assign a Ranging Availability Window to an ISTA in order to execute HEz Ranging Exchange.
     3. **Discussion**
     4. C. Considering the bit pattern, is there a bound on the number of bits/slot-time?
     5. R. We can discuss that, but the strawpoll does not cover the full description.  
        R. Background: It’s actually a 9-bit long mask, which is limited to 512mS. There are also other parameters that need to be considered.
     6. **Strawpoll**

We support the proposed Ranging Availability Window assignment procedure described in submission 11-18-1138r1

ISTA describes its Unavailability/Availability using a bit pattern (in IFTMR) that is synchronized to the RSTA’s TSF (based on the last received Beacon from the RSTA or other means)

RSTA assigns a matching Ranging Availability Window and returns it in IFTM

ISTA becomes ‘available’ and listens to the RSTA’s Trigger (Location Poll) at the start of the Ranging Availability Window in order to execute the HEz Ranging protocol with the RSTA

* + 1. **Results (Y/N/A):** 13/0/4
    2. **Motion**

Move to approve the following exchange for an RSTA to assign a Ranging Availability Window to an ISTA for HEz sequence negotiation:

ISTA describes its Unavailability/Availability using a bit pattern (in IFTMR) that is synchronized to the RSTA’s TSF (based on the last received Beacon from the RSTA or other means)

RSTA assigns a matching Ranging Availability Window and returns it in the corresponding IFTM

ISTA becomes ‘available’ and listens to the RSTA’s Trigger (Location Poll) at the start of the Ranging Availability Window in order to execute the HEz Ranging protocol with the RSTA.

* + 1. Mover: Ganesh Venkatesan
    2. Seconder: Qinghua Li
    3. **Results (Y/N/A):** 11/0/1**, motion passes**
  1. SK Yong (Apple) presented document **11-18/1274r2**
     1. **Title:** **802.11az EDMGz Secure ToF Amendment Text**
     2. **Summary:** This submission proposes P802.11az draft amendment text for the P802.11az EDMGz secure ranging measurement. This submission addresses SFD (document 17/0462r14) requirements 6 (Security) (17), (18) and (19). The baseline documents that this proposal depends on are (clause numbering relative to .11aj, .11ak, .11aq, .11ax and .11ay)   
        (a) D1.0 of REVmd; (b) D8.0 of PIEEE802.11aj; (c) D5.0 of PIEEE802.11ak; (d) D13.0 of PIEEE802.11aq; (e) D1.2 of PIEEE802.11ay and D2.3 of IEEE 802.11ax
     3. **Discussion**
     4. C. I’m not sure I understand the MAC/PHY boundary.
     5. R. The secure TRN is not part of the PPDU. Please clarify.
     6. C. Where is the secure ranging field calculated MAC or PHY
     7. R. The mechanism is implementation specific.
     8. C. RE: Ranging parameters: you changed the name of LTF Supported to ToF Supported. The names are not aligned with the negotiation part of spec. There are two supported fields.
     9. R. Understand, changed one, but did not realize it affected the HEz and VHTz definitions too.
     10. Out of time for this session. Continued in slot #5.
  2. Reminder to do attendance.
  3. Recess at 6.03pm.

1. **TGaz – July 12th, 2018 – Slot #5**
   1. Called to order by TGaz Chair, Jonathan Segev (Intel Corporation) at **08.00am PT** and Secretary Roy Want (Google Inc.).
   2. Agenda Doc. **Now working with revision 11-18/0982r7 (in progress)**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~10 present
   4. Reviewed submission order and updated agenda
      1. Updated agenda presentation order and feedback requested: none received
      2. Agenda agreed.
   5. SK Yong (Apple) continued to present document **11-18/1274r3**
      1. **Title:** **802.11az EDMGz Secure ToF Amendment Text**
      2. **Summary:** see earlier (slot #4)
      3. **Discussion:** none
      4. **Motion**  
         Move to adopt document 11-18-1274r3, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
      5. **Mover**: SK Yong
      6. **Seconder**: Ganesh Venkatesan
      7. **Results (Y/N/A)**: 9/0/1: **motion passes**
   6. Ganesh Venkatesan (Intel) continued to present document **11-78/0788r4** cont. from slot#4
      1. **Title:** **802.11az Negotiation Protocol (Update)**
      2. **Summary:** see earlier(slot #4).
      3. **Discussion**
      4. C. 0-32ms? The number of bits in the Exponent is 4.
      5. R. Yes, range now edited to 0 – 15.
      6. C. What about a delayed LMR from ISTA to RSTA
      7. R. We have not discussed this and there could be several options (delay/un-delayed – all combinations).
      8. C. For the HEz specific subelement, should we change the name of the Availability Window?
      9. R. Flagged, and we’ll address that at the next revision.
      10. Any further discussion for this revision – none  
          (Minor changes made in this meeting incorporated in r5)
      11. **Motion**   
          Move to adopt document 11-18-788r5, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
      12. **Discussion** of the motion – none.
      13. Mover: Ganesh Venkatesan
      14. Seconder: Christian Berger
      15. **Results (Y/N/A):** 7/0/0: **motion passes**
   7. Feng Jiang (Intel) presented document **11-18/0925r2**
      1. **Title**: **802.11az PHY Spec Text for Under 7GHz**
      2. **Summary**: This submission proposes P802.11az draft amendment text for the P802.11az Negotiation Protocol. The baseline documents that this proposal depends on are: (a) D0.05 of REVmd, (b) D8.0 of PIEEE802.11aj, (c) D5.0 of PIEEE802.11ak, (d) D13.0 of PIEEE802.11aq.
      3. **Discussion**
      4. C. The Multi-antenna LTF fields are a bundle that are used for one session
      5. R. Yes.
      6. C. Page 6 edit: We need to make sure the document is clear and indicates the whole bundle is repeated each time.
      7. R. Yes, the entire field is described as containing the bundle.
      8. C. Edited text modified to “In VHTz mode, the measurement exchange phase of the ranging protocol operates in an ISTA centric scheduling FTM operation.”
      9. C. Size of the HEz-LTF field is TBD.
      10. R. Is this negotiated?
      11. C. Yes, but it’s limited by the size of the field and that needs to be defined.
      12. **Motion**   
          Move to adopt document 11-18-925r3, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
      13. Mover: Feng Jiang
      14. Seconder: Ganesh Venkatesan
      15. **Results (Y/N/A):** 9/0/0: **motion passes.**
   8. Feng Jiang (Intel) presented document **11-18/1267r0**
      1. Title: **802.11az Spec Text for Invalid Measurement Indication in LMR**  
         (relative to REVmd D0.5)
      2. **Summary**: This submission proposes P802.11az draft amendment text for the P802.11az Negotiation Protocol. The baseline documents that this proposal depends on are: (a) D0.05 of REVmd, (b) D8.0 of PIEEE802.11aj, (c) D5.0 of PIEEE802.11ak, (d) D13.0 of PIEEE802.11aq;
      3. **Discussion**:
      4. C What is the connection between the Invalid Measurement field and MaxToA Error Exponent field.
      5. R. If the invalid measurement, you should ignore the MaxToA Error
      6. C. Is it testable? What does detect mean?
      7. R. Yes – you can check it at the service level e.g. Is the range invalid or not?
      8. **Attendance reminder.**
      9. **Motion**  
         Move to adopt document 11-18-1267r1, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
      10. Mover: Feng Jiang
      11. Seconder: Das Dibakar
      12. **Results (Y/N/A):** 9/0/0: **motion passes**.
   9. Feng Jiang (Intel) presented document **11-18/1268r0**
      1. **Title:** 802.11az Spec Text for Bidirectional LMR in VHTz and HEz.  
         (relative to REVmd D0.5)
      2. **Summary:** This submission proposes P802.11az draft amendment text for the P802.11az Negotiation Protocol. The baseline documents that this proposal depends on are: (a) D0.05 of REVmd. (b) D8.0 of PIEEE802.11aj, (c) D5.0 of PIEEE802.11ak, (d) D13.0 of PIEEE802.11aq
      3. **Discussion:**
      4. C. Do we need the sentence “The data rate of MCS used for delivering ranging report is solely decided by the RSTA and ISTA. “
      5. C. [Several suggestions]
      6. R. [Final result] “The data rate or MCS used for delivering the ranging report is solely decide by the transmitter of the corresponding report.”
   10. Out of time for this presentation – continued in slot#6.
   11. Recess at 10.00am.
2. **TGaz – July 12th, 2018 – Slot #6**
   1. Called to order by TGaz Chair, Jonathan Segev (Intel Corporation) at **10.30am PT** and Secretary Roy Want (Google Inc.).
   2. Agenda Doc. **Now working with revision 11-18/0982r8 (in progress)**
   3. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – no clarifications requested.
      2. Chair called for any potentially essential patent, no one stepped up.
      3. Chair reviewed IEEE 802 WG participation as individual professional – no clarification requested.
      4. Chair reminded all to record their attendance
      5. Recorded Participation requirement
         1. Headcount: ~16 present
   4. Reviewed submission order and updated agenda
      1. Updated agenda presentation order and feedback requested: none received
      2. Agenda agreed.
   5. Feng Jiang (Intel) continued to present document **11-18/1268r0** from slot #5
      1. **Title: 802.11az Spec Text for Bidirectional LMR in VHTz and HEz.**  
         (relative to REVmd D0.5)
      2. **Summary:** see earlier (slot #5).
      3. **Motion**

Move to adopt document 11-18-1268r1, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.

* + 1. Mover: Feng Jiang
    2. Seconder: Allan Zhu
    3. **Discussion** of Motion – None.
    4. **Results (Y/N/A):** 13/0/1: **motion passes**
  1. Qinghua Li (Intel) presented document **11-18/1276r3**
     1. Title: **802.11az PHY Spec Text for Random LTF Symbol Generation**

(Relative to REVmd D0.5)

* + 1. **Summary**: This submission proposes P802.11az draft amendment text for the P802.11az Negotiation Protocol. The baseline documents that this proposal depends on are: (a) D0.05 of REVmd, (b) D8.0 of PIEEE802.11aj, (c) D5.0 of PIEEE802.11ak, (d) D13.0 of PIEEE802.11aq
    2. **Discussion**
    3. C. Does this only apply to HEz PPDU?
    4. R. Yes, VHTz PPDU is not supported, earlier this week group removed the support of the VHTz PPDU and the VHTz protocol now uses HE SU PPDU.
    5. C. Is there any mode for Pilots? Cannot have unencoded pilots, as that would open up an attack surface.
    6. R. Discussion of pilots should be deferred to later.
    7. C. Does this proposal expect the LTF size to be given? It needs to be determined.
    8. R. Its determined by the bandwidth (there are only two choices 40/80MHz).
    9. C. The input (number of bits) will generate the same number of bits. But the results may need to be at a different bandwidth.
    10. R. Needs to be another section that describes the overall operation.
    11. C. Need to have enough time to choose between the 40/80MHz result.
    12. C. Can always create the result from 80Mhz and then down sample.
    13. **Motion**  
        Move to adopt document 11-18-1276r3, instruct the technical editor to incorporate the changes to IEEE P802.11az draft amendment and empower the editor to perform editorial changes.
    14. Moved: Qinghua Li
    15. Seconder: Feng Jiang
    16. **Results (Y/N/A):** 10/0/2, **motion passes**
  1. Assaf Kasher (Qualcomm) presented document **11-18/1270r0**
     1. **Title: 60GHz LOSNLOS test**
     2. **Summary:** In this contribution we propose a protocol to enable determining whether a transmission is LOS or NLOS based on transmitting and receiving through different polarization.

PHY support was implemented in 11ay.

* + 1. C. How do you know how many times a polarization switch is needed?
    2. R. This is dealt with in 11ay.
    3. C. How is the decision made to support the polarization switching?
    4. R. It’s a decision by the ISTA.
    5. C. What does this process guarantee?
    6. R. You can only prove its NLOS, but not LOS.
  1. Assaf Kasher (Qualcomm) **presented** document **11-18/1273r0**
     1. **Title:** **60GHz Passive Location Justification**
     2. **Summary:** We discuss the justification of 60GHz passive location protocols. We examine whether passive location would provide lower power-consumption on mobile 60GHz stations, and medium time used for location.
     3. **Use case I: Stadium (see slides for more details)**
        1. Active location - 20 users per AP - 60ms. 6% of AP time. Some contention issues.
        2. Passive location - 3ms per 1s - 0.3% of AP time - however, occasionally STAs may want to acquire passive location schedule. Not clear whether it is optimal to do it using <6GHz band
     4. **Use case II: Mall (see slides for more details)**
        1. Active location: 5 users per AP - 15ms - 1.5% of AP time.
        2. Passive location, 3ms per 1s - 0.3of AP time.
     5. Discussion: none
  2. Jonathan Segev, Chair (Intel) presented the closing task list: document **11-18/982r8**, including the current status and accomplishments, outstanding tasks on the 11az development timeline, and plan for next meeting. The resulting motions are listed below:
  3. Plan to Freeze the SFD out of this session.
     1. **Motion**   
        Move to instruct the SFD editor to generate and publish the TGaz SFD based on SFD working draft R15 and SFD text adopted during the July meeting.
     2. Mover: Assaf Kasher
     3. Seconder: Roy Want
     4. **Results (Y/N/A):** 12/0/2, **motion passes**
  4. Internal comment collection proposed after this session.
     1. **Motion**  
        Move to:

Instruct the technical editor to generate and publish IEEE P802.11az D0.4 based on D0.3 and any amendment text adopted during the July meeting.   
Initiate a 30-day internal comment collection based on IEEE P802.11az D0.4.

* + 1. Mover: Qinghua Li
    2. Seconder: Assaf Kasher
    3. **Results (Y/N/A):** 12/0/0, **motion passes.**
  1. Timelines Approval
     1. **Motion**   
        We commit to the timelines depicted by slide #90 of submission **11-18-982r8.**
     2. Mover: Christian Berger
     3. Seconder: Assaf Kasher
     4. **Results (Y/N/A):** 12/0/0, **motion passes**
  2. July Meeting Achievements:
     1. Published new draft, P802.11az D0.3.
     2. Adopted roughly 30 additional pages of amendment text (PHY frame formats, pre-association security context establishment and MAC security signalling).
     3. Adopted 4 new entries to SFD document.
     4. Performed SFD freeze.
     5. Approved internal comment collection out of July meeting.
     6. Reviewed 22 submissions and met for 6 slots during the week.
     7. Group is maintaining its timeline for more than a year.
     8. **Discussion/Comments** – None.
  3. September Meetings Goals:
     1. Conduct internal comment collection.
     2. Perform internal comment assignment.
     3. Initiate internal comment resolution.
     4. **Motion**We commit for the Sep. meeting goals depicted in slide 97 as the TG Plan Of Record.
     5. Mover: Alecsander Eitan
     6. Seconder: Roy Want
     7. **Results (Y/N/A):** 12/0/1: **motion passes**
  4. Teleconferences (Proposed)
     1. 11am August 22nd (1hr), 12pm Sept 5th (1hr).
     2. **Discussion**
     3. Dates chose relate to comment collection.
     4. Nobody objected to the above dates.
  5. Reminder to do attendance.
  6. **Any other business**? – None
  7. **Adjourned at 12.05pm**.

**References:**

1. <https://mentor.ieee.org/802.11/dcn/18/11-18-0982-08-00az-tgaz-july-meeting-agenda.pptx>
2. <https://mentor.ieee.org/802.11/dcn/18/11-18-0926-00-00az-meeting-minutes-may-2018.docx>
3. <https://mentor.ieee.org/802.11/dcn/17/11-17-0462-15-00az-11-az-tg-sfd.doc>
4. <https://mentor.ieee.org/802.11/dcn/18/11-18-1269-00-00az-clock-synchronization-between-ista-and-rsta.pptx>
5. <https://mentor.ieee.org/802.11/dcn/18/11-18-1261-00-00az-conventsion-for-draft-amendment-contributions-format.docx>
6. <https://mentor.ieee.org/802.11/dcn/18/11-18-1272-01-00az-lmr-aoa-feedback.pptx>
7. <https://mentor.ieee.org/802.11/dcn/18/11-18-1193-01-00az-hez-polling-frame-format.pptx>
8. <https://mentor.ieee.org/802.11/dcn/18/11-18-1147-00-00az-60ghz-aod-messaging-draft-text.docx>
9. <https://mentor.ieee.org/802.11/dcn/18/11-18-0787-01-00az-802-11az-negotiation-protocol-update-overview.pptx>
10. <https://mentor.ieee.org/802.11/dcn/18/11-18-0788-05-00az-802-11az-negotiation-protocol-update-amendment-text.docm>
11. <https://mentor.ieee.org/802.11/dcn/18/11-18-0939-01-00az-clock-attack-threat-model-for-11az.pptx>
12. <https://mentor.ieee.org/802.11/dcn/18/11-18-1265-01-00az-hez-passive-range-measurement-protocol-amendment-text.doc>
13. <https://mentor.ieee.org/802.11/dcn/18/11-18-1138-03-00az-ranging-availability-window-how-is-it-established-for-hez-ranging.pptx>
14. <https://mentor.ieee.org/802.11/dcn/18/11-18-1274-03-00az-edmg-secure-tof-amendment-text.docx>
15. <https://mentor.ieee.org/802.11/dcn/18/11-18-0925-03-00az-802-11az-phy-spec-text-for-under-7ghz.docx>
16. <https://mentor.ieee.org/802.11/dcn/18/11-18-1267-02-00az-spec-text-for-invalid-measurement-indication-in-lmr.docx>
17. <https://mentor.ieee.org/802.11/dcn/18/11-18-1268-02-00az-spec-text-for-bidirectional-lmr-in-vhtz-and-hez.docx>
18. <https://mentor.ieee.org/802.11/dcn/18/11-18-1270-00-00az-60ghz-losnlos-test.pptx>
19. <https://mentor.ieee.org/802.11/dcn/18/11-18-1273-00-00az-60ghz-passaive-location-justification.pptx>
20. <https://mentor.ieee.org/802.11/dcn/18/11-18-1275-00-00az-ranging-availability-window-amendment-text.docx>
21. <https://mentor.ieee.org/802.11/dcn/18/11-18-1276-03-00az-random-ltf-symbol-generation-amendment-text.docx>