IEEE P802.11  
Wireless LANs

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| TGaz Meeting minutes  September 12-14th, 2017 | | | | |
| Date: 2017-09-12 | | | | |
| Author(s): | | | | |
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Abstract

Minutes for the TGaz meeting beginning on September, 12th, 2017.

**IEEE 802.11 Task Group AZ**

**September 12th-14th, 2017**

1. **TGaz – 12th September 2017 – Slot #1**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **8.00am HST**, Vice Chair Carlos Aldana (Intel Corporation), Roy Want (Google) Secretary.
   2. Agenda Doc. **IEEE 802.11-17/1209r3**
   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: ~21 present
   4. Review Agenda
      1. Called for any additional submissions for the week.
      2. Reviewed and modified the agenda
      3. Chair called for any additional feedback and changes to agenda.
      4. **Motion: We approve the agenda for document 11-17/1209r4**
      5. Approved by unanimous consent
   5. Approve previous meeting minutes (posted July 30th)
      1. Roy Want (Google) reviewed July Meeting Minutes **11-17/1171r1**
         1. **Motion: Move to approve document 11-17-1171r1 as TG meeting minutes for the July meeting**
         2. Mover: Chao Chun Wang, Seconder: Stephen McCann
         3. Discussion of the motion: none
         4. **Vote:** Y: 13, N: 0, A: 0; **Motion passes**
   6. Approve previous meeting minutes (posted Sept 8th)
      1. Roy Want (Google) reviewed August Telecon Minutes **11-17/1385r0**
         1. **Motion: Move to approve document 11-17-1385r0 as TG meeting minutes for August 30th telecon**
         2. Discussion of the motion: none
         3. Mover: Roy Want, Seconder: SK Yong
         4. **Vote:** Y: 14, N: 0, A: 0; **Motion passes**
   7. Allan Zhu (Hauwei) reviewed changes **11-16-424r10**
      1. Title: **Approval of** **FRD Working Draft**
      2. Revisit motion to approve later in meeting
   8. Chao Chun Wang (Mediatek) reviewed changes to **11-17/462r6** posted on September, 12th
      1. Title: **Approval of** **SFD Working Draft**
      2. Request for any additional changes to the document: no further comments
      3. **Motion: Move to adopt document 11-16-462r7 as TGaz Working Draft Spec Framework Document**
      4. Mover: Ganesh Venkatesan, Seconder: Chao Chun Wang
      5. **Vote:** Y: 12, N: 0, A: 0; **Motion passes**
   9. Jon Rosdahl (Qualcomm) reviewed modifications to the PAR in document 11-17/1319r0
      1. Title: **P802 11az PAR Modification**
      2. Summary: Modifications documented in section 8.1
      3. C. Add reference to the “Threat Model”
      4. R. Its referenced in the CSD (Ref. 13), and that reference can be added here as (Ref. 6); need some time to work on it.
      5. Proposal to revisit in last 10mins of session – no one objected.
   10. Christian Berger (Marvell) presented 11-17-1305r2
       1. Title: **SU Sounding Measurement Exchange and Feedback**
       2. **Strawpoll #1:   
          For SU operation the following behavior bounds the protocol development:**

**Only LMR feedback calculation (TOA) and then delivery may require a scheduling mechanism.**

**We agree that the SU case does not require a reoccurring availability window mechanism.**

* + 1. Discussion of the motion: none
    2. **Results**: Y: 8, N: 0, A: 4
    3. **Motion 1:  
       Move to adopt the following text to the spec framework document,**

**instruct the SFD editor to include it in the TGaz SFD under sub-section 3.2, and grant editorial license to the editor:**

**“For SU operation, the following behavior bounds the protocol development:**

* + - * **Only LMR feedback calculation (TOA) and then delivery may require a scheduling mechanism.**
      * **We agree that the SU case does not require a reoccurring availability window mechanism.”**
    1. Mover: Eric Lindskog, Seconder: Ganesh Venkatesan
    2. **Vote:** Y: 11, N: 0, A: 3: **Motion passes**
    3. **Strawpoll #2:**  
       **Should the SU protocol support immediate and delayed feedback.**

**Report format (e.g. TOA, CSI) is TBD.**

* + 1. **Vote:** Y: 7, N: 1, A: 6, **Motion passes**
    2. **Motion 2:**  
       **Move to adopt the following text to the spec framework document, instruct the SFD editor to incude it in the TGaz SFD under the subsection 3.2 and grant editorial license to the editor:**

**“The SU ranging protocol will support both immediate and delayed reporting.**

**Note: The report formats (e.g. TOA, CSI) to be defined separately”.**

* + 1. Discussion of the motion:
    2. C. Why was there one vote against the motion in the strawpoll. Invitation to voter to explain.
    3. R. We don’t need delayed feedback. Straightforeward to give immediate feedback based on CSI etc
    4. R. Immediate response is the most efficient, but the delayed response option provides more flexibility.
    5. Mover: Feng Jiang, Seconder: SK Yong
    6. **Vote:** Y: 9, N: 2, A: 5; **Motion passes**
    7. Chair defers continuation of presentation to PM1 due to time constraints in this session. Allan Zhu also requested 2mins, and Chair also postpones to PM1
  1. Jon Rosedahl presented updates to document **11-17/1319r1**.
     1. Using term “PAR Modification” rather than “PAR Extension”, because the latter also affects when the PAR is reviewed.
     2. C. Changes to 5.5 added reference “Secured Location Threat Model [6]” to match [13] in the CSD.
     3. Approve PAR Modification  
        **Motion: Believing that the PAR contained in the document referenced below meets IEEE-SA guidelines, request that the PAR contained in 11-17-1319r1 be posted to the IEEE 802 Executive Committee (EC) agenda for WG 802 preview and EC approval to submit to NesCom.**
     4. Mover: Jon Rosdah, Seconder: SK Yong
     5. **Vote:** Y: 17, N: 0, A: 0; **Motion passes**
  2. Jon Rosedahl presented updates to document **11/17/1318r0**.
     1. Approve CSD Modification

**Motion: Believing that the CSD contained in the document referenced below meets IEEE 802 guidelines, request that the CSD contained in 11-17-1318r0 be posted to the IEEE 802 Executive Committee (EC) agenda for WG 802 preview and EC approval.**

* + 1. Mover: Jon Rosdahl, Seconder: SK Yong
    2. **Vote:** Y: 16, N: 0, A: 1; **Motion passes**
  1. TGaz at recess at 10.00am

1. **TGaz – 12th Sept 2017 – Slot #2**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **1.30pm HST**; Vice Chair, Carlos Aldana (Intel Corporation); Roy Want (Google) Secretary.
   2. Agenda Doc. **Now at revsion 11-17/1209r4**
   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: ~18 present
   4. Reviewed submission order and updated agenda
      1. Removed ‘NGP CSD Update’ – as discussion now complete in Slot #1
      2. Delay discussion on 11-16-424r7 until when presenter Allan Zhu is available
      3. Asked for comments and feedback – none
      4. Revised agenda for session approved.
   5. Continuation of Christan Berger’s (Marvell) presentation on document **11-17-1305r2**
      1. **Straw poll #3:   
         Should the single SU measurement and measurement report sequence be (as described on slide 2):   
          - NDPA (UL) <-SIFS-> NDP (UL) <-SIFS-> NDP (DL) <-SIFS-> LMR (DL)  
          - Where for immediate feedback the LMR is of this round and for delayed the LMR is the feedback from previous round.**
      2. Discussion
      3. C. Is there a token defining which LMR feedback element it is referring to.
      4. R. Its always the last token, only one should be kept in the queue.
      5. R. There is a notion of a token that could be used, but its probably not needed.
      6. **Results:** Y: 11. N: 0, A: 5
      7. **Motion 3:**

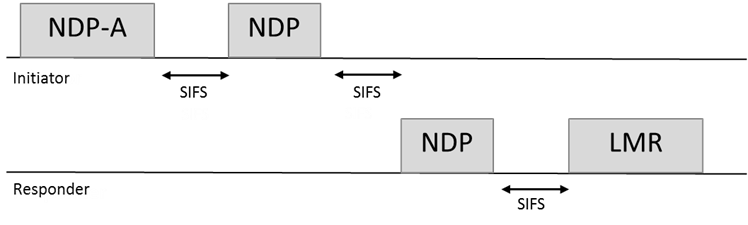
**Move to:**

**Adopt the following text to spec framework document, instruct the SFD editor to include it in the TGaz SFD under the sub-section 3.2 and grant the editorial license to the editor.**

**“The SU measurement and measurement report sequence shall be:**

**NDPA (UL) <-SIFS-> NDP (UL) <-SIFS-> NDP (DL) <-SIFS-> LMR (DL)**

**Where for immediate feedback the LMR is of this round and for delayed the LMR is the feedback from previous round.”**

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* + 1. Discussion of the motion:
    2. C. Is the text “…editorial license to editor” standard?
    3. R. Yes, this is what we usually use [w/ small grammatical edit needed]
    4. Mover: Feng Jiang, Seconder: Ganesh Venkatesan
    5. **Vote**: Y: 12, N: 0, A: 1; **Motion passes**
    6. **Strawpoll #4**

**Should for delayed SU operation:  
-The iSTA shall not initiate another measurement sequence earlier than MinToaReady.   
-If the iSTA initiates a following measurement sequence later than MaxToaAvailable, then the results may not be available (flushed).**

* + 1. Discussion – none.
    2. **Results**: Y: 13, N: 0, A: 1
    3. **Motion 4:**

Move to:  
Adopt the following text to the spec framework document, instruct the SFD editor to incude it in the TGaz SFD under the subsection 3.2 and grant editorial license to the editor.

“The iSTA shall not initiate another measurement sequence earlier than MinToaReady.

If the iSTA initiates a following measurement sequence later than MaxToaAvailable, then the results may not be available (flushed)”

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* + 1. Discussion: none
    2. Mover: Erik Lindskog, Seconder: SK Yong
    3. **Vote:** Y: 12, N: 0, A: 0; **Motion passes**
  1. Chittabrata Ghosh (Intel) presented **11-17-1455r0.**
     1. Title: **MU Measurement and Feedback Scheduling**
     2. Summary: The STAs would like to spent minimum time on a channel to minimize PWR and scheduling conflicts. The AP would like to minimize the memory footprint while avoiding completion of TOA measurement for all STAs that have participated in the measurement phase (Availability Window).
     3. Discussion:
     4. C. What does ‘signalling’ refer to in the summary? Is there a signalling protocol?
     5. R. Its referring to the trigger control Frame, or DL NDPA control frame.
     6. **Straw poll #1**

**We propose to define availability windows where the rSTA shall perform MU measurements**

* **These availability windows are scheduled**
* **Within an availability window, rSTAs shall perform ranging activities related to polling, measurement, and measurement results and group related scheduling**
* **Each availability window consists by default of a single TXOP and can be extended to multiple TxOPs by announcement if single TxOP is insufficient to accommodate all STAs responding to the polling phase**
* **Availability windows are negotiated/signaled between AP and a STA such that the STA knows when those availability windows occur.**
* **A STA is not expected and does not perform MU ranging measurement and measurement results activities outside these windows.**
  + 1. Discussion of straw poll:
    2. C. Can we break this Strawpoll into a number of smaller polls? Participants may agree with some of the bullet points, but not others.
    3. R. The points are all related, so need to be together.
    4. C. Concerns about bullet 4 - is this describing the trigger frame?
    5. R. This strawpoll does not specify the signalling mechanism.
    6. C. Another proposal to break up the straw poll.
    7. R. It stands as the straw poll
    8. Chair: due to time constraints, we need to end discussion and execute straw poll.
    9. **Results**: Y: 7, N: 1, A: 10
    10. Decision to defer motion until after additional discussion between participants.
    11. **Strawpoll #2**  
        **We propose the following signaling behavior on LMR feedback scheduling:**
* **Measurements and/or measurement results are provided for in the same availability window**
* **Measurement results may be from this window’s measurement or the results of a measurement performed in a prior window**
* **Protocol will support signaling for measurement results availability for current or next availability window within the measurement phase**
* **The Trigger control frame or the NDPA control frame carries a dynamic signaling of measurement results availability in this or next availability window**
  + 1. Discussion: none
    2. **Results**: Y: 7, N: 0, A: 11
    3. Presenter defers moton to a later slot
  1. SK Yong (Apple) presented document 11-17-1373r0
     1. Title: **PHY Security FRD and SRD Text**
     2. Summary: Addresses Security attacks in FRD 424r6 discussed in July’17 TG 11az meeting.
     3. Disusssion:
     4. C. On slide 4, DMG/EDMG Type B, is it realistic to spec it to 10nsec? Isn’t it more realistic for 100nS.
     5. R. A hardware based attack could respond at these speeds
     6. C. Does the last bullet of proposed SFD Text mean its optional or required?

It should be optional.

* + 1. R. Yes, its optional, and means only in the PHY security mode.
    2. C. Lets change the language to make that clearer
    3. R. Proposed “In PHY Security Mode…” [changed on slide].
    4. **Straw poll #1:**

**Do you support to add the proposed text as shown in slide 4 to the FRD?**

* + 1. Discussion: none
    2. **Results**: Y: 14, N: 1, A:4
    3. **Straw poll #2:**

**Do you support to add the proposed text as shown in slide 6 to the SFD?**

* + 1. Discussion: none
    2. **Results**: Y: 11, N: 1, A: 7
    3. **Motion**

**Move to adopt the set of functional requirements listed in slide 4 of submission 1373r1 and instruct the FRD editor to include it in the TGaz FRD under the sub-section 2.1.6 (Security & Privacy) and grant editorial license to the FRD editor.**

* + 1. Discussion: none
    2. Mover: Roy Want, Seconder: SK Yong
    3. **Vote**: Y: 9, N: 0, A: 2; **Motion passes**
    4. **Motion**

**Move to adopt the SFD text listed in slide 6 of submission 1373r1 and instruct the SFD editor to include it in the TGaz SFD under the sub-section 6 (Security) and grant editorial license to the SFD editor.**

* + 1. Discussion:
    2. C. Points (2) & (3) should also be conditional – similar to point (4)
    3. R. In (2) it’s the same as the existing doc (only REVmc is removed)
    4. C. There are other ways to solve this problem proposed in condition (4) – but okay to continue with this text at this time.
    5. R. Background on reason for text. Remove all repetition in the cyclic prefix to avoid a CP-Relay attack.
    6. Mover: Ganesh Venkatesan, Seconder: SK Yong
    7. **Vote**: Y: 10, N: 1, A: 5; **Motion passes.**
    8. Chair: 8 mins remaining: moving presentation of 11-17-1461 to next slot.
    9. TGaz at recess at 3.24pm

1. **TGaz – 13th Sept 2017 – Slot #3**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **1.30pm HST**, Vice Chair, Carlos Aldana (Intel Corporation), Roy Want (Google) Secretary.
   2. 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: ~30 present
   3. Reviewed Agenda: **IEEE 802.11-17/1209r5**
      1. Called for any additional submissions for the week.
      2. Reviewed and modified the agenda
      3. Chair called for any additional feedback and changes to agenda.
      4. **Motion: We approve the agenda for document IEEE 802.11-17/1209r5**
         1. Approved by unanimous consent
   4. Chittabrata Ghosh (Intel) continued presentation of document **11-17-1455r0**
      1. **Motion:**

**Move to adopt the following text to the SFD and instruct the SFD editor to include it in section 3.2 and grant editorial license:**

**Availability windows where the rSTA shall perform MU measurements**

**are defined as follows:**

* + **These availability windows are scheduled**
  + **Within an availability window, rSTAs shall perform ranging activities related to polling, measurement, and measurement results and group related scheduling**
  + **Each availability window consists by default of a single TXOP and can be extended to multiple TxOPs by announcement if single TxOP is insufficient to accommodate all STAs responding to the polling phase**
  + **Availability windows are negotiated/signaled between AP and a STA such that the STA knows when those availability windows occur.**
  + **A STA is not expected and does not perform MU ranging measurement and measurement results activities outside these windows.**
    1. Discussion of motion: none
    2. Mover: Ganesh Venkatesan, Seconder: SK Yong
    3. **Vote**: Y: 11, N: 0, A: 7; **Motion passes**
    4. **Motion  
       Move to adopt the following text to the SFD and instruct the editor to include it in section 3.2 and grant editorial license:**

**Signaling behavior on LMR feedback scheduling is as follows:**

**- Measurements and/or measurement results are provided for in the same availability window**

**- Measurement results may be from this window’s measurement or the results of a measurement performed in a prior window**

**- Protocol will support signaling for measurement results availability for current or next availability window within the measurement phase**

**- The Trigger control frame or the NDPA control frame carries a dynamic signaling of measurement results availability in this or next availability window**

* + 1. Discussion of motion:
    2. C. Preamble text does not scan well.
    3. R. Remove “performed” to have the correct meaning.
    4. Mover: Jiang Feng, Seconder: Yongho Seok
    5. **Vote**: Y: 9, N: 0, A: 4; **Motion passes.**
  1. Allan Zhu reviews updates to TG 11az FRD document 11-16/424r8
     1. Title: **Update to FRD Document**
     2. Summary: added (2) Definitions
     3. C. Item #3 Position / Location is a little confusing.
     4. R: Changed to “The location where the position is calculated”
     5. **Motion**
     6. **“Move to adopt document 11-16-424r9 as TGaz Functional Requirement Document”**
     7. Mover: Allan Zhu, Seconded: Yunsong Yang
     8. **Vote**: Y: 10, N: 0, A:1; **Motion passes.**
  2. Ganesh Venkatesan (Intel) presented document 11-17-1461r0
     1. Title: **Security for location determination at a Public Domain**
     2. C. Corrrect Motion text ‘was/is’ to ‘has been’.   
        R. Changed
     3. **Motion**  
        **Move to add the following requirement to section 3.1.6 (Security and Privacy) of the 802.11az FRD, and grant the FRD editor editorial license:**

**The 11az protocol shall support shared key generation between Responding-Station and Initiating-Station when no previous shared secret has been pre-configured.**

* + 1. Mover: Ganesh Venkatesan, Seconder: SK Yong
    2. **Vote**: Y: 9, N: 0, A: 1; **Motion passes**
  1. Ofer Bar-Shalom (Intel Corp) presented Document: **11-17/1308r0**
     1. Title: **Collaborative Time of Arrival (CToA)**
     2. Summary: Client (listen only solution) and network-centric methods for a tag locating solution (e.g. asset tag).
     3. Discussion (during presentation)
     4. C: Does the example/results presented assume the same channel.
     5. R. Yes – for the results presented here.
     6. C: Is the ToD value accurate (i.e. not subject to delayed scheduling).
     7. R. Yes. A hardware counter is read on transmitting the frame.
     8. Discussion (at end of presentation)
     9. C. Would like to understand what is simulated vs. real measurements
     10. R. The mobile is making real ToF measurements, other results are post-calculated
     11. C. Updates are 1/2/5Hz – how many points are needed for an accurate location estimate?
     12. R. More information is available offline – but time is needed for KF to converge.
     13. C. How would the system sleep to save power when not receiving?
     14. R. The client can calculate when a bSTA will transmit next. All the bSTAs transmit within 200ms at 5Hz, and the client receives all of them.
     15. C. …but if you need to listen the whole time, there will be a power issue.
     16. C. Line of sight error can vary for different pairs of devices. Is this an issue?
     17. R. variable error is taken into account during simulation.
     18. Chair: number of questions has to be limited due to allocated time.
  2. Erik Lindskog (Qualcomm) presented document **11-17/1370r0**
     1. Title: **Scaleable Location Protocol Comparison**
     2. TGaz at recess at slide 24 (3.30pm) – to be continued in Slot #4.

1. **TG 11az – 13th September, 2017 - Slot #4**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **4.00pm HST**, Vice Chair, Carlos Aldana (Intel Corporation), Roy Want (Google) Secretary.
   2. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – nobody asked for clarification.
      2. Chair called for any potentially essential patents, 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: no one asked for clarification or feedback
         1. Headcount: ~35 present
   3. Reviewed Agenda: **IEEE 802.11-17/1209r5**
      1. Reviewed and modified the agenda
      2. Chair called for any additional feedback and changes to agenda.
         1. Changed order / times of some presentations
      3. Called for approval of agenda – agreed unanimously,
   4. Erik Lindskog (Qualcomm) continued presentation of document: **11-17/1370r0**
      1. Discussion:
      2. C. For the DToA Multiuser protocol, there are two issues: 1) the APs need to have capabilities of stations to ping other Aps; 2) DToA imposes a new capability on the client to estimate ToA (from two Aps simultaneously), and 3) it’s a Network initiated solution. These points increase the complexity of the silicon solution.
      3. R. The anchor stations could be derived from fixed WiFi deployed devices [TVs, speakers etc], and the protocol could be based on the SU protocol too (doesn’t have to be MU).
      4. C. But it requires new capabilities to be added (inter-station compatibilities)
      5. R. Any new cababilities require additional protocol and silicon additions  
         .
   5. Ofer Bar Shalom (Intel corportation) presents document **11-17/1309r0**
      1. Title: **CToA Protocol Analysis**
      2. Discussion:
      3. C. Variance on slide 10 is a constant– what about NLOS errors doesn’t this vary between station pairs.
      4. R. KF assumes gaussian errors with the variance determined by experience.
      5. C. Your DToA error simulation looks so much worse than the CToA because of the hyperbolic geometry. Do you take a simplistic approach to calculating postion out of all pairs, or do you do outlier removal?
      6. R. The simulation was designed to show that the hyperbolic geometry is much more semnsitive to errors. There was no outlier removal in the location estimate(LE).
      7. C. The CToA method inherently uses a KF which removes the extremes of the Gaussian error. The DToA was purely a location estimate but could also have a KF applied to the LE output (but is not shown here). You are not comparing apples to apples.
      8. R. Yes, the DToA method could benefit from applying a KF.
   6. Erik Lindskog (Qualcomm) presents **11-17-1371r0**
      1. Title: **Scalable Location Performance**
      2. Discussion
      3. C. You are using an iterative method to solve the hyperbolic equations vs. a closed form – you didn’t say why?
      4. R. Its just one of the approaches.
      5. C. Between the AP stations and Anchor stations there may be NLOS estimates.
      6. R. NLOS between master/anchor stations cancels out.
      7. C. Does the simulation have the same number of measurements when comparing CToA and DToA?
      8. R. Yes – believe so. C. but on slide 14, TDoA has 15, but CToA only has 6.
      9. R. They are probably equivalent (but can check further)
      10. C. When a client enters into, for example, a mall – one AP can have a summary of all the clock offsets gathered over time. This is an advantage.
      11. R. But the KF in the client still needs to stabilize based on the ToA measurements.
      12. Chair: time issues: need to wind up questions.
   7. Erik Lindskog (Qualcomm) presents document **11-17/1372r1**
      1. Title: **CP Replay Attack Protection**
      2. Summary: We can protect against the CP relay attack, caused by the repetition of the cyclic prefix, by using a null CP, or encrypting the CP using a key transferred in the packet extension.
      3. Discussion:
      4. C. If you use a null, or PS code for the CP, there will be distortion of the channel estimation, and there will be some pulses that appear ahead of your true time estimation.
      5. R. Used a tried and trusted simulator and didn’t see a problem.
      6. C. Request that the simulation parameters be shared with the group.
      7. R. Yes, and I also encourage others to reproduce the simulation.
      8. C. Tend to agree the results look promising, but your conclusions are just for the the receiver side.
      9. R. There are possible scenaries where this breaks down – but couldn’t find one.
      10. C. A possible example is with an alternate path 15dB down, it may be an issue.
      11. R. That’s something to try out.
      12. C. You presented two methods – how do you encode the key in the second?
      13. R. Use the legacy extension to encode the key at the end of the frame.
      14. R. NDP also has a legacy part that can be used.
      15. C. How is the key protected?
      16. R. Just needs to be hidden from the attacker
      17. C. If there are several clients – would they all need to have the same key?
      18. R. One client could also be the attacker, so the key would need to be different for each client.
      19. R. If you don’t trust the whole group, putting the encoding in the pkt extension is a possible solution. BY the time an attacker gets the key, its too late to encrypt the CP with thAT key to stage a CP-relay attack.
   8. Chair: 5mins to time
      1. Reviewed the presentations left for Slot #5.
      2. Allan Zhu will have a version of the FRD for approval in the next slot.
      3. TGaz at recess at 5.58pm.
2. **TG 11az – September 14th, 2017 - Slot #5**
   1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **8.00am HST**, Vice Chair, Carlos Aldana (Intel Corporation), Roy Want (Google) Secretary.
   2. Review Patent Policy and logistics
      1. Chair reviewed the IEEE-SA Patency Policy, additional guidelines about IEEE-SA meeting and logistics – nobody asked for clarification
      2. Chair called for any potentially essential patents, 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
   3. Reviewed Agenda document **IEEE 802.11-17/1209r7**
      1. Reviewed and modified the agenda
      2. Chair called for any additional feedback and changes to agenda.
         1. Changed order / times of some presentations
      3. Called for approval of agenda – agreed unanimously,
   4. Ganesh Venkatesan (Intel Corp) continued presentation of document: **11-17/1473r0**
      1. Title: **11az Negotiation Protocol (update)**
      2. Summary: Mechanism to joinly agree on the ranging parameters between initiator and responder.
      3. Discussion
      4. C. What is the lifetime of the Ranging ID? Here its described in use for unassociated states, and could be a privacy issue.
      5. R. This is just a framework for negotiation. We are not defining all the fields and how they are used at this time (but in this case, a timeout will likely be used).
      6. **Motion:  
         “Move to adopt the text depicted by slides 15,16,17 of submission 11-17-1473r1 and include it in the 802.11az SFD (Section 8 Frame Formats), granting the SFD Editor editorial license.”**
      7. Discussion
      8. C. Return code: “SUCCESS” vs “SUCCESSFUL” (SUCCESS is more usual)
      9. R. SUCCESSFUL has been used in other parts of the iFTM spec (so used here for consistency).
      10. Note: “SUCCESS” is a noun, and “SUCCESSFUL” is an adjective, so we may want to correct this at some point in the future.
      11. Mover: Ganesh Venkatesan, Seconder: Naveen Kakani
      12. **Vote**: Y: 10, N: 0, A: 1; **Motion passes**
      13. **Motion-2:**  
          **Move to adopt the following text and include it in the 802.11az SFD (Section-1 Definitions), granting the SFD Editor editorial license:**

* **Ranging Protocols – Time of Flight (ToF) measurement; may be extended for others (needs more discussion)**
* **REVmc D8.0 Fine Timing Measurement Prototocol (FTM)**
* **VHT NDP Sounding-based .11az protocol (VHTz)**
* **HE NDP Sounding-based .11az protocol (HEz)**
* **Ranging protocol while operating in DMG/EDMG (EDMGz)**
* **Ranging Id   
  - Association ID-like value assigned to an unassociated STA by a rSTA to facilitate the negotiation phase and subsequently the ranging phase”**
  + 1. Discussion – none
    2. Mover: Feng Jiang, Seconder: Chao Chun Wang
    3. **Vote**: Y: 11, N: 0, A: 1; **Motion passes**
  1. Mingguang (Apple) presents document **11-17-1378r0**
     1. Title: **Zero-Padded Waveform for Secure Channel Estimation**
     2. Summary: Zero-padded waveforms can protect against a CP-replay threat with proper signal processing at both Tx/Rx sides. Distortionless and efficient channel estimation can be achieved if the FFT/IFFT analysis window and sizes are delicately chosen.
     3. Discussion:
     4. C. This clarifies some of the details, but more results are needed to examine the effect on power and channel estimation
     5. R. Performance on ToA specification. Not sure what metric is needed to make a good choice. Could be a generic metric, and we might not need a sophisticated channel estimate.
     6. C. Suggest a soft metric of how many dB down the signal can be before it causes a problem.
  2. Allan Zhu (Huawei) presented document **11-16-424r10**
     1. Title: **FRD text edit update for r10**.
     2. C: Minor typo in review to fix [agreed] and uploaded as r11.
     3. **Motion**

**Move to adopt document 11-16-424r11 as TGaz Functional Requirements Document**

* + 1. Discussion: none.
    2. Mover: Allan Zhu, Seconder Assaf Kasher
    3. **Vote**: Y: 11, N: 0, A: 1; **Motion passes**
  1. Proposal to freeze SFD
     1. C. Is there a downside?
     2. R. Yes, for sections that have not been fleshed out, going into amendment text will slow development as the draft amendment text will require a larger amount of effort to maintain it; if changes keep occurring.
     3. R. Proposal we can convert some of the unfleshed out sections to amendment text.
     4. C. In November we should start accepting amendment text proposals
     5. C. Seems a strange process – and a lot of work. Not saying shouldn’t have a call for amendment text.
     6. R. Yes, in November we’ll have a call for submissions.
     7. **Motion**

**Instruct the SFD editor to convert the current TG approved SFD text to amendment text to be considered in the Nov. meeting for section 3 and 9 on Positioning Protocol for Improved Accuracy and Coverage over 2.4 and 5 GHz bands.**

* + 1. Mover: Assaf Kasher, Seconder: Christian Berger
    2. **Vote**: Y: 12, N: 0, N: 0; **Motion passes**
  1. Achievements & Timelines
     1. FRD Freeze
     2. Approved 21 new spec framework requirements
     3. 18 submissions reviewed
     4. Amendment text conversion from SFD starting from section 3 to 9
     5. Reviewed Timelines (and expected extensions): FRD freeze shows a 4-month delay; TG approved additional scope on security – likely to push timelines further.
  2. Approve November meeting goals
     1. Continue SFD development.
     2. Review and address PAR and CSD comments from other WGs and possibly from EC members.
     3. Consider technical proposals
     4. Consider proposed Amendment text draft.
     5. **Motion**

**We commit for the Nov. meeting goals as the TG Plan of Record.**

* + 1. Discussion – none
    2. Mover: Allan Zhu, Seconded: Naveen Kakani
    3. **Vote**: Y: 12, N: 0, A: 0; **Motion passes**
  1. Teleconference scheduled: **Wed Oct 25th 11am ET**
     1. Any more calls needed? – none requested.
  2. Call for AOB – none identified.
  3. TGaz Adjourned 10.05am.

**References:**

1. <https://mentor.ieee.org/802.11/dcn/17/11-17-1209-08-00az-tgaz-sep-meeting-agenda.pptx>
2. <https://mentor.ieee.org/802.11/dcn/17/11-17-1209-08-00az-tgaz-sep-meeting-agenda.pptx>
3. <https://mentor.ieee.org/802.11/dcn/17/11-17-1385-00-00az-tgaz-teleconference-minutes-august-30th-2017.docx>
4. <https://mentor.ieee.org/802.11/dcn/16/11-16-0424-11-00az-proposed-802-11az-functional-requirements.docx>
5. <https://mentor.ieee.org/802.11/dcn/17/11-17-0462-07-00az-11-az-tg-sfd.docx>
6. <https://mentor.ieee.org/802.11/dcn/17/11-17-1319-01-00az-p802-11az-par-modification.pdf>
7. <https://mentor.ieee.org/802.11/dcn/17/11-17-1305-02-00az-su-sounding-measurement-exchange-and-feedback.pptx>
8. <https://mentor.ieee.org/802.11/dcn/17/11-17-1318-00-00az-ieee-802-11az-ngp-csd-update.docx>
9. <https://mentor.ieee.org/802.11/dcn/17/11-17-1455-01-00az-mu-measurement-and-feedback-scheduling.pptx>
10. <https://mentor.ieee.org/802.11/dcn/17/11-17-1373-01-00az-phy-security-frd-and-srd-text.pptx>
11. <https://mentor.ieee.org/802.11/dcn/17/11-17-1461-01-00az-security-for-location-determination-at-a-public-domain.pptx>
12. <https://mentor.ieee.org/802.11/dcn/17/11-17-1308-00-00az-collaborative-time-of-arrival-ctoa.pptx>
13. <https://mentor.ieee.org/802.11/dcn/17/11-17-1370-00-00az-scalable-location-protocol-comparison.pptx>
14. <https://mentor.ieee.org/802.11/dcn/17/11-17-1309-00-00az-ctoa-protocol-analysis.pptx>
15. <https://mentor.ieee.org/802.11/dcn/17/11-17-1371-00-00az-scalable-location-performance.pptx>
16. <https://mentor.ieee.org/802.11/dcn/17/11-17-1372-01-00az-cp-replay-attack-protection.pptx>
17. <https://mentor.ieee.org/802.11/dcn/17/11-17-1473-02-00az-11az-negotiation-protocol-update.pptx>
18. https://mentor.ieee.org/802.11/dcn/17/11-17-1378-02-00az-zero-padded-waveform-for-secure-channel-estimation.pptx