IEEE P802.11
Wireless LANs

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| TGaz Ad Hoc Meeting MinutesMay 1st-3rd, 2019Santa Clara, CA |
| Date: 2019-05-01 |
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Abstract

Minutes for the TGaz meeting, beginning on May 1st, 2019.

**IEEE 802.11 Task Group AZ**

**May 1st – 3rd, 2019**

1. **TGaz Ad Hoc – Wednesday May 1st, 2019 – DAY #1**
	1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **9.20am PST**; Vice Chair Assaf Kasher (Qualcomm), Technical Co-Editor, Chao Chun (MediaTek); Technical Co-Editor, Roy Want (Google Inc.); Secretary, Roy Want (Google Inc.).
	2. Agenda Doc. **IEEE 802.11-19/0689r2 (in progress)**
	3. Review Patent Policy and logistics
		1. Chair reviewed the IEEE-SA Patent Policy, and, and logistics – no clarifications requested.
		2. Chair called for any potentially essential patents, no one stepped up.
		3. Chair reviewed IEEE 802 WG participation as an individual professional, and anti-trust requirements – no clarification requested.
		4. Chair reminded all to record their attendance
		5. Recorded Participation requirement
			1. Headcount: ~15 present
	4. Review Agenda
		1. Agenda review and setting: reviewed submissions for the week.
		2. Chair called for any additional feedback and changes to agenda.
			1. Agenda agreed – no objections.
	5. Ganesh Venkatesan (Intel) presented document **11-19/466r1**
		1. **Title**: Resolutions to a few LB240 comments
		2. **Summary**: This submission proposes resolutions to the following LB240 CIDs 1026, 1099, 1235, 1883, 1923, 2223, 2235, 2253, 2335, 2339, 2451 and 1593.
		3. **Previous TGaz discussion**: strawpoll was suggesting option B was favoured.
		4. **Discussion of presentation**
		5. C. Resolution of what frames need to be listed as in option B?
		6. C. Do they have to start a secure PASN session first?
		7. R. Yes, this is established in the ranging parameters, and for EDMG it also needs the Fine Timing Measurement (FTM) secure parameters field to be set.
		8. C. There is a difference for EDMG between the request and measurement frames.
		9. C. Use option A to avoid an extensive list (could be a source of future problems).
		10. R. More homework needed (and will be brought back in a later session).
	6. Qi Wang (Apple) presented document **11-19/659r1**
		1. **Title**: Proposed resolutions to LB#240 CIDs on NTB ranging timing Parameters.
		2. **Summary:** This submission contains a proposal to resolve CID-2275, 2276, 2277, 2278, 2279, 2280, 1654, 1220, 2431, and 1126, received during TGaz LB# 240.
		3. **Discussion**
		4. C. Is the original intent that the measurement was delayed.
		5. C. We should strike the line from the comment resolution “When the ISTA to RSTA LMR is not negotiated …”
		6. R. Acknowledged – revisit this later.
		7. C. Re: timeout value 23^-1 should be 2^24-1 in 100us units., doesn’t need to have the actual time max in the text.
		8. R. Okay, removed sentence.
		9. C. The RSTA keeps the context. Its successful when it transmits an LMR. ISTA is only successful when it receives an LMR. If not, it times out and retransmits the requests. A new request starts the process.
		10. C. The Max-time between measurements is the max time for two consecutive adjacent rounds.
		11. C. Use the terminology ISTA requests, and RSTA assigns.
		12. C. The Min-time is the minimum time between measurements for two consecutive adjacent rounds.
	7. **Lunch break**: 12.00 – 13.10pm
	8. Assaf Kasher (Qualcomm) presented document **11-19/646r0**
		1. **Title**: LB240-clause-9-CIDs
		2. **Summary**: This document presents resolutions to Clause 9 CIDs: 2053, 2055, 2056, 1449, 1451, 2091, 2093, 1684, 2251, 2439, 2336, 2378, 1430, 2095, 1214, 1215, 1223, 1070, 1071, 1075, 1400, 1401, 1402, 1493, 1403, 1404, 1405, 1406, 1407, 1408, 1430, 1385, 1226, 2440, 1662, 1685, 1686, 1074, 2252, 1428, 1094, 1076
		3. **Discussion**
		4. C. [#2053, 2055, 2056] Are these going to be addressed even though many of these comments are pre-D1.0?
		5. R. We will address them, if we have established the issue for D1.0.
		6. C. [#2056] I like the style [It makes it clearer] of referring to the setting of the fields/subfield with respect to 1) ISTA, and 2) the RSTA as separate sentences in the paragraph. It would be good if we could make this standard practice.
		7. C. [#1449] Secure FTM requests are made in a Protected Dual of Fine Timing Measurement (text updated on fly to reflect this).
		8. R. Terminology: Protected frames are MAC action frames, Secure frames are PHY frames.
		9. C. Suggest move the bits that are specific to the DMG Directional Measurement Parameters to a 60GHz subelement.
		10. [#2439] Issue about retransmission of an FTM request. Needs later resolution as its not strictly a retransmission.
	9. **Break**: 3pm – 3.35pm
	10. Assaf Kasher (Qualcomm) **continuation** of document **11-19/646r0**:
		1. **Strawpoll:**

Agree to the resolutions depicted by document 11-19-646r1 for CIDs 2053, 2055, 1449, 1451, 2091, 2093, 1684, 2251, 2336, 1214, 1215, 1223, 1070, 1071, 1075, 1400, 1401, 1402, 1493, 1403, 1404, 1405, 1406, 1407, 1408, 1385, 1226, 2440, 1662, 1685, 1686, 1074, 2252, 1428, 1094, 1076.

* + 1. **Results (Y/N/A): 8/0/0**
	1. Christian Berger (Marvell) presented document **11-19/702r0**.
		1. **Title**: 11az LB240 Comment Resolution Section 11.22.6.4.3.3
		2. **Summary**: This submission proposes the comment resolution of CIDs in LB240 related to section 11.22.6.4.3.3
		3. **Discussion**
		4. C. [#1472] After much wordsmithing; added clarifying language.
		5. Discussion begins on how to refer to the three sub-parts of ranging.
		6. C. Poll results: “Polling part of TB Ranging” from choices: TB Polling Part, TB Ranging Polling Part, Polling Part of TB Ranging, Polling Part.
		7. **Strawpoll:**
		Agree to the resolutions depicted by document 11-19-702r1 for CIDs 1472, 1890, 1893, 1984, 2158, 2159, 2160, 2161, 2162, 2163, 2165, 2166, 2167, 2168.
		8. **Results (Y/N/A): 10/0/0**
	2. **Recess at 17.30pm**
1. **TGaz Ad Hoc – Thursday May 2nd, 2019 – DAY #2.**
	1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **9.20am PST**; Vice Chair Assaf Kasher (Qualcomm), Technical Co-Editor, Chao Chun (MediaTek); Technical Co-Editor, Roy Want (Google Inc.); Secretary, Roy Want (Google Inc.).
	2. Agenda Doc. **IEEE 802.11-19/0689r3 (in progress)**
	3. Review Patent Policy and logistics
		1. Chair reviewed the IEEE-SA Patent Policy, and, and logistics – no clarifications requested.
		2. Chair called for any potentially essential patents, no one stepped up.
		3. Chair reviewed IEEE 802 WG participation as an individual professional, and anti-trust requirements – no clarification requested.
		4. Chair reminded all to record their attendance
		5. Recorded Participation requirement
			1. Headcount: ~19 present
	4. Review Agenda
		1. Agenda review and setting: reviewed remaining submissions.
		2. Chair called for any additional changes to agenda.
			1. Agenda set – no objections.
	5. Christian Berger (Marvell) presented **continuation** of document **11-19/702r2** on page 6**.**
		1. **Discussion**
		2. C. Note: comment resolution for an incorrect statement or clarification is ‘Revise’ only if amendment text is changed as a result, otherwise ‘Reject’, as in [#2169].
		3. **Strawpoll**:
		Agree to the resolutions depicted by document **11-19-702r2** for CIDs 2164, 2169, 2170, 2171, 2172, 2173 and 2174.
		4. **Results (Y/N/A):** 10/0/0
	6. Christian Berger (Marvell) continued with document **11-19/701r0 (showing r1 for changes**)
		1. **Title**: 11az LB240 Comment Resolution Section 11.22.6.4.3.4
		2. **Summary**: This submission proposes the comment resolution of CIDs in LB240 related to section 11.22.6.4.3.4.
		3. **Discussion**
		4. [#1343] C. Revised text for clarification of sequence, and explain why the sequence is an extension of the basic 11az sequence. Exclude this for now and update the figure Fig 11-36h to show the DL and UL sequence more clearly, and with the shading used in other TG11az figures.
		5. C. Discussion, with show of hands, if we should have a **note** to indicate that the last measurement is a burst, or the delayed TB sequence is thrown away.
		6. **Strawpoll**
		Agree to the resolutions depicted by document **11-19-701r1** for CIDs 1343, 1474, 2175, 2176, 2180, 2181, 2182, 2183, 2184 and 2185.
		7. **Results** (Y/N/A): 13/0/0
	7. Dibakar Das (Intel) presented document **11-19/697r1**
		1. **Title**: LB 240 Miscellaneous CIDs
		2. **Summary**: This document proposes resolution to LB 240 CIDs on 11.22.6.4.3: 1154, 1336, 1977, 1566, 1170, 1567, 1568.
		3. **Discussion**
		4. [#1154] Discussion of “More TF” bit. Can set to 0 in first TB poll indicating this is the only poll. Considering text edit later on, and will bring it back to group.
		5. [#1566] In REVmc we only had one session active.
		6. C. There may be a deficiency running with multiple bands and modes.
		7. C. Multi-band is okay because it uses multiple BSS (i.e. MAC addresses)
		8. C. It could use MAC address for different modes.
		9. C. As a result there is no need to add anymore complexity.
		10. **Strawpoll**:
		Do you agree that the spec should support:

O1) A single FTM session between RSTA and ISTA?

O2) Multiple concurrent FTM sessions between a unique pair of a RSTA and an ISTA?

Note:
For MBSS operation, multiple concurrent FTM sessions between a unique pair of a RSTA with unique MBSS ID and an ISTA.

* + 1. **Results:** O1) 15 , O2), 1 A) 1
		2. **Discussion of the Strawpoll**
		3. C. Clarification of text (shown above).
		4. C. An RSTA isn’t necessarily an AP.
		5. C. There should be a note for the case where and RSTA is an AP
		6. [1170] Relates to the multiple session issue above, and resolved in poll.
		7. **Strawpoll**
		Agree to the resolutions depicted by document **11-19-697r2** for CIDs 1336, 1977, 1170, 1567, and 1568.
		8. **Results (Y/N/A)**: 16/0/0
		9. **Discussion of strawpoll**: none
	1. **Lunch: break**: 12.02pm – 1pm
	2. Ali Raissinia (Qualcomm) presented document **11-19/481r3**
		1. **Title**: Text proposal on ISTA-2-RSTA LMR feedback.
		2. **Summary**: Clarifies the issues regarding the ISTA2RSTALMR sharing capabilities / beacon bit that was presented at the Vancouver meeting; and proposed this is not needed. Instead the proposal is to keep this as a negotiated parameter like all others.
		3. **Discussion**
		4. C. Don’t know how this will help the infrastructure?
		5. R. You may have a trust relationship between the ISTA and RSTA, and you should, or you shouldn’t, share location depending on that relationship.
		6. C. Question on the wording for section 11.22.6.4.3.3 (page 10) – clean up wording.
		7. C. The original discussion was to put a bit in the beacon
		8. C. page 10. More clarification of text based on discussion.
		9. C. ISTA would be reluctant to share due to nefarious stations. What can we do to make this safe?
		10. R. You are concerned? – there is a generic problem of a beacon not being validated.
		11. C. I support the proposal and understand the concern. It leaves the rights for both the RSTA, and the ISTA, to decide. Its fairer.
		12. C. This is a great step forward. I like this because there are options to make policy on a finer granularity, e.g. private space for employees ok, but not visitors; and for airports operation to monitor the flow of people through the building.
		13. C. There may be some agreement based on a higher layer. We should give some guidance for sharing of location.
		14. C. They can track you anyway; we are just making it a little harder.
		15. C. We only enable this for a particular MAC.
		16. C. There is an issue if this is done as a business model, then the client device is complicit in the arrangement, which would be an issue for mobile platforms.
		17. C. We have a mechanism, but what happens if the RSTA just choses to reject
		18. R. This proposal does not mandate anything.
		19. R. Would like to run a strawpoll on the proposal.
		20. **Strawpoll**
		We agree in principle to submission **11-19-481r3** address comment resolution 2295, 2296, 2297, 2298, 2299 and 2300.
		21. **Results (Y/N/A):** 11/4/2
		22. **Discussion**
		23. Show of hands for continued discussion for 10mins. As a result, chair will change the agenda to allow for this.
		24. **Discussion of strawpoll**
		25. C. Okay to move ahead as a strawpoll is not binding, the objective is to get agreement.
		26. C. Would like to ask your intent on Privacy Identifiable Information (PII).
		27. R. I’m just proposing the negotiation mechanism.
		28. C. ISTA may decide to proceed or not. ISTA can terminate, if it wants.
		29. C. It’s a binary decision on negotiation – it’s not like LTF length, where there is a compromise. This is a little different in my opinion.
	3. **Break:** Short 10-minute break.
	4. Christian Berger (Marvell) continued document **11-19/701r2**
		1. **Title:** 11az LB240 Comment Resolution Section 11.22.6.4.3.4
		2. **Summary:** fixes to the figure to use shading for uplink, TF Ranging LMR text, and Dibakar #1977 CID text, and fixed a typo.
		3. C. [#2158] The LMRs can be carried in the “HE MU PPDU” it’s not exhaustive, but one could be in an SU frame. There is a valid use for SU, which has a shorter preamble.
		4. R. changed text from ‘can’ to ‘may’ in text above.
		5. **Strawpoll**

Agree to the resolutions depicted by document **11-19-701r2** for CID 1343.

* + 1. **Results (Y/N/A):** 13/0/0
	1. Christian Berger (Marvell) presented **continuation** of document **11-19/702r3**
		1. **Title**: 11az LB240 Comment Resolution Section 11.22.6.4.3.3
		2. **Summary**: This submission proposes the comment resolution of CIDs in LB240 related to section 11.22.6.4.3.3.
		3. C. [#2158] Change: TB Ranging Measurement Sounding Part -> Measurement Sounding Part of TB Ranging. This shorthand is carried through the rest of the text.
		4. This completes CIDs referenced in this document.
		5. **Strawpoll**

Agree to the resolutions depicted by document **11-19-702r3** for CID 1977.

* + 1. **Results (Y/N/A):** 12/0/0
	1. Dibakar Das (Intel) presented document **11-19/676r0**
		1. **Title**: LB 240 Trigger frame format CIDs
		2. **Summary**: This document proposes resolution to LB 240 CIDs on 9.3.1.23: 1391, 2045, 2260, 2263, 1393, 1394, 2261, 2421, 2048, 1707, 1116, 1583, 1395, 1397, 1424.
		3. **Discussion**
		4. C. [#2260, 2263] Are we going to have one figure for these fields.
		5. R. We’ll have separate figures for each field.
		6. C. The generic trigger frame in Figure 9-61c is wrong.
		7. C. We need to be explicit about what each TF subvariant uses.
		8. C. Why is UL MCS needed in Figure 9-61c.
		9. R. This about the polling part, not the sounding part.
		10. C. Add note to fix references text for Draft 11ax D4.0.
	2. **Break:** 3.36pm – 4.05pm
	3. Dibakar Das (Intel) presented **continuation** of document **11-19/676r0**
		1. C. Should leave the #CID next to the actual edited text
		2. C. The #CID should remain until next major draft. The numbering space is different for each major draft e.g. 1xxx, 2xxx which allows tracking.
		3. R. Will resolve the details when the numbers are removed later.
		4. **Strawpoll**

Agree to the resolutions depicted by document **11-19-676r1** for CIDs 1707, 1116, 1583, 1395, 1397 and 1424.

* + 1. **Results (Y/N/A):** 13/0/1
	1. Chao-Chun (MediaTek) Presented **LB240 comment resolution database** update
		1. **Progress**: 600+ Editorial (589 done) comment resolution
		2. **Summary**: Will allow 2 weeks for everybody to review. No strawpolls at this time. Instead we’ll go over how the changes are marked and what the process was to make them.
		3. **Request to do this**: no objections
		4. Notes:
		5. Some CIDs are too general e.g. format for figures & tables generally wrong
		6. Some clauses don’t match the page number. We resolve these when we can with search, but not always possible to find the match, so we reject.
		7. Issues that were marked editorial, and were really technical should be marked technical and transferred back to the group to resolve.
		8. In this case, ask for an explanation of what editorial changes have occurred between strawpoll and motion in session.
		9. The current changes were uploaded to the main DB last night. A new version of the xls spreadsheet snapshot (v6) will be uploaded to mentor shortly.
	2. Assaf Kasher (Qualcomm) presented document **11-19/666r0**
		1. **Title**: D3.0 Bug Fixes
		2. **Summary**: This document proposes a fix to some bugs found in TGaz D3.0
		3. Discussion – none (strawpoll follow on in Part 2 below).
	3. Assaf Kasher (Qualcomm) Part 2 presentation of **11-19/705r0**
		1. **Title**: First Path AWV issue.
		2. **Summary**: This document discusses issues with first path AWV FTM procedure and proposes solutions.
		3. **Discussion**
		4. C. When you say that data frames don’t use the first path, can you move back to your original path? R. Yes.
		5. C. Original FTM protocol implies the antenna is set for the FTM path, and because of the inter-burst inefficiency, the ‘best path’ used for data is locked out.
		6. C. How bad is it when using data on the first path.
		7. R. It can be as much as 30dBm down, and you can’t do better than MCS1.
		8. C. On solution 3 (recommended). A) do you need switching time, B) you may be 30dBm signal, so your AGC may not adjust in time?
		9. R. Switching is fast and first symbols can be lost.
		10. C. Why isn’t this an issue for 11ay?
		11. R. Beacon forming is done periodically, based on signal degradation.
		12. C. CTS-self: why is it necessary to use the Control Trailer (CT), what’s the benefit?
		13. R It’s a control frame, thus the medium quiet time is a SIFS prior to the RTS.
		14. **Strawpoll**

Do you agree to the solution for bug#1 as described in document **11-19/666r1**?

* + 1. **Results (Y/N/A):**
		2. **Discussion**
		3. C. Suggest we run the strawpoll tomorrow instead.
		4. R. Okay - withdrawn
	1. **Recess 5.30pm**
1. **TGaz Ad Hoc– Friday May 3rd, 2019 – DAY #3**

* 1. Called to order by TGaz chair, Jonathan Segev (Intel Corporation) at **9.12am PST**; Vice Chair Assaf Kasher (Qualcomm), Technical Co-Editor, Chao Chun (MediaTek); Technical Co-Editor, Roy Want (Google Inc.); Secretary, Roy Want (Google Inc.).
	2. Agenda Doc. **IEEE 802.11-19/0689r5 (in progress)**
	3. Review Patent Policy and logistics
		1. Chair reviewed the IEEE-SA Patent Policy, and, and logistics – no clarifications requested.
		2. Chair called for any potentially essential patents, no one stepped up.
		3. Chair reviewed IEEE 802 WG participation as an individual professional, and anti-trust requirements – no clarification requested.
		4. Recorded Participation requirement
			1. Headcount: ~10 present
	4. Review Agenda
		1. Agenda review and setting: reviewed submissions remaining.
		2. Chair called for any additional feedback and changes to agenda.
			1. Agenda edited: no objections.
	5. Assaf Kasher (Qualcomm) presented **continuation** of **11-19/666r1**
		1. **Title**: D3.0 Bug Fixes
		2. **Summary**: This document proposes a fix to some bugs found in TGaz D3.0
		3. **Discussion** **of strawpoll** – none
		4. **Strawpoll**

Do you agree to the solution for bug#1 as described in document **11-19/666r1**.

* + 1. **Results (Y/N/A):** 7/0/2
	1. Tianyu Wu (Apple) presented document **11-19/699r0**
		1. **Title**: LB240 CR on PHY structure
		2. **Summary**: This document proposes comment resolutions to the following CIDs (6 CIDs) for TGaz D1.0: 1172 1731 2477 2502 2503 2504
		3. **Discussion**
		4. C. Clarification of question for [#2502] – is this a valid mode in 11ax?
		5. C. There are some similar behaviors in the PHY between 11ax and 11az.
		6. C. We can solve this by tagging the packets for each PHY.
		7. C. Suggestion to put our behavior in a subclass for 11az.
		8. R. The 11az amendment PPDUs are already separated: the HE Ranging NDP and the HE TB Ranging NDP use separate sections, so I see no benefit in doing that. 11az will need to re-develop all sections related to PPDU formatting (e.g. resource allocation, modulation and coding…).
		9. C. The 11az project doesn’t call for a new PHY. Don’t recommend we change this, or we risk not meeting the project scope.
		10. C. Is it okay as a subclause?
		11. R. yes, it’s already a subclause.
		12. C. Part of the issue of mixing amendments, it’s hard to know what’s optional
		13. R. Suggested changes: Adding ranging PHY to 27.6, and move the 11az PHYs across to these sections.
		14. C. The 11ax work group owns this. There is a danger we will introduce bugs into the standard.
		15. C. Did you talk to the Technical Co-editor about this?
		16. R. Commenters are proposing mixing these in, but I am proposing grouping them together under their own section.
		17. C.LB 240 passed letter ballot, there may be commenters you cannot satisfy or alternatively you don’t want to get more comments in the recirculation ballot. The proposal is likely to bring many more comments.
		18. C. The problem with the TX Vector and RX Vector section, it needs to overlap with an earlier 11ax section (either replicate it, or specify differences).
	2. **Break 10.10 – 10.40am**
	3. Tianyu Wu (Apple) presented **continuation** of document **11-19/699r0**
		1. **Discussion**
		2. C. How does the receiver know the format of the PHY?
		3. R. The LTFVECTOR provides the information.
		4. R. The TXVector and contains parameters to tell you the PHY. These are copied to the RX system via PHY-RXLTFSEQUENCE, so it knows how to receive the response.
		5. C. The RX parameters have to go through a separate interface.
		6. C. Place #2360 (if it’s the reason) by all changes in the Table: LTFVECTOR parameters.
		7. C. Documented change issues. Use indication for edits with delete text to be **underline under track changes**. Some of these are inconsistent and need to be fixed.
		8. C. How do we know the LTF offset in the PHY? How does the PHY know the LTF\_SEQUENCE order?
		9. C. In the text ‘… number of target ISTAs ‘ target is a new concept. We need consistent text.
		10. C. These parameters are sent to the PHY without knowledge of the number of ISTAs. The length of the parameters indicating do this in a loop.
		11. R. Perhaps change NUM\_USER filed to be NUM\_SETs to indicate this more accurately.
		12. **End of timeslot**.
	4. Christian Berger (Marvell) presented document **11-19/662r1**
		1. **Title**: Comment Resolution LB240
		2. **Summary**: Looking for new name of control Type for Table 9-1. It could be just called NDP Announcement Frame vs. VHT HE NDP Announcement Frame.
		3. **Discussion**
		4. C. If we change this we’ll have to change other parts of the spec. One approach is to keep adding component names to the full name using slashes.
		5. C. One possibility is to defer these comments to the maintenance project 802.11REV**me**.
		6. C. Address this with the commenter to see if they are happy with this solution.
		7. C. We have a single Frame type that has two names.
		8. C. A way to break this down VHT/HW/Ranging NDP A is to use separate terms: VHT NDPA, HE NDPA, Ranging NDPA
		9. **Strawpoll #1**

We prefer the following option for naming of subclause 9.3.19

O1) VHT/HE/Ranging NDP Announcement frame format

O2) NDP Announcement frame format

* + 1. **Results (O1/O2/A):** 9/3/1
		2. **Strawpoll #2**
		We prefer the following structure for subclause 9.3.19

O1) Separate subsections for VHT NDPA, HE NDPA and Ranging NDPA.

O2) Single subsection as per baseline.

* + 1. **Results (O1/O2/A):** 3/9/0
	1. **Lunch 12.16pm – 1.20pm**
	2. Reallocating agenda time and order
		1. Any objections to new order: None
	3. Tianyu Wu (Apple) presented document **11-19/698r1**
		1. **Title**: AOD Passive ranging
		2. **Summary**: Reduces the number of anchor stations (ASTAs) with which an ASTA needs to interact from 3 to 2 (with AoD) achieving the same accuracy,
		3. Presented this proposal earlier, and this is a follow up to the discussion.
		4. **Discussion**
		5. C. Are there any requirements on the number of antennas?
		6. R. Some analysis is shown at the end of the presentation (but does not require more than 2-antennas to achieve this number of ASTA reduction).
		7. C. Is there an accuracy comparison with TDoA only?
		8. R. Not yet. May not improve accuracy in all cases (depending on how accurate the AoD estimate is). The estimation engine can heuristically determine if an AoD sample should be used/dropped (to keep the error in the estimation constrained/bounded).
		9. C. Any assumptions on antenna configuration. With a Linear Array it is harder to estimate accurate AoD.
		10. R. There are no assumptions on how antennas are positioned relative to each other (no assumptions on antenna configuration)
		11. R. this is a general concept on how AoD could be leveraged.
		12. C. Would augmentation of the AoD estimate improve accuracy; R: Yes
		13. R. No, accuracy depends on the accuracy of the AoD estimate. Augmenting an erroneous AoD will not improve accuracy.
		14. C. More information is better, but depends on error(s) built into the estimate(s).
		15. C. if AoD is estimated from an NLOS signal, how would it affect the position estimate?
		16. R. near reflectors have less impact on the AoD estimate.
		17. C. Augmenting AoD with finger printing can improve performance. Information from P-Matrix, CSD Matrix, Q-Matrix (or I-Matrix) and per chain phase offset (D-Matrix): contributes to per chain phase difference estimation.
		18. C. What is D-Matrix?
		19. R. Phase delay/offset between antenna
		20. R: If implicit feedback is used, complex calibration may be required (a chip resets results in different phase relationships, rendering changes in the D-Matrix.
		21. C. ASTA's estimation of the D-Matrix involves calibration (may be resource intensive)
		22. C. Can passive STAs estimate the D-Matrix by a survey method?
		23. R. Yes, but it takes time to build the database, and has to be repeated for every reset at the passive STA.
		24. C. The effectiveness of option: 1, 2 or 3 (in Slide #8) may be implementation dependent.
		25. R. The use of AoD probably should be rendered optional, since performance depends a lot on implementation; and in some cases, AoD estimates may be erroneous and unusable.
		26. C. In order for Passive location to work well with AoD, the ASTA has to take on a lot of burden, such as: monitor, calibrate, allow time for passive station training. This is the reason for recommending that AoD estimates be rendered optional.
		27. C. Option-1: may not be suitable in all cases, but may respond with this information in Probe Responses (for example).
		28. C. Passive ISTA and Passive RSTA need to support more than 1 antenna.
		29. C. Option-3: passive STAs build a table with information derived from a survey. There are enough pairwise measurements to fill the entries in the table, and the estimates depend on the implementation at the passive STA.
		30. C. Broadcasting/adding the D-matrix information to a probe response (or similar frames) will bloat the frame size; adding real-time data to probe responses is hard
		31. C. Is the benefit of using AoD (vs. complexity) not worth it?
		32. R. The goal of this submission is to illustrate what options are available to support AoD, and augment the current passive protocol to improve performance.
		33. R. The spec changes to support option-3 are simple and trivial.
		34. C. Option-3 is doable, but will take several iterations to get it right. Making it optional would be the best approach.
		35. R. Option-3 is not complex. Rendering it optional may delay adoption.
		36. C. Passive Location activity is periodic and an Option-1 like approach increases information broadcast/sent from the ASTA.
		37. C. Do all passive STA do the work? Can the information be leveraged from some passive STAs that do the work; and others get it for free?
		38. C. Is AoD a requirement for Passive Location?
		39. R. The proposed submission requires a passive ISTA and passive RSTA to send the information whenever the last transmitted D-Matrix has changed.
		40. C. Generating an accurate D-Matrix is the concern (not transmitting it frequently). Sending inaccurate information (even only it changes) is useless.
		41. C. Generating an accurate D-Matrix takes substantial effort.
		42. **Straw Poll (CID #2302) - Options**

a) Do you support to enable AoD measurement as a mandatory feature for Passive ranging?

b) Do you support to enable AoD measurement as a mandatory feature if Passive Ranging is supported?

c) If Passive Ranging is supported, do you agree to enable that AoD measurement as a mandatory mode?

* + 1. **Discussion of options**
		2. C. Assume that there is an effective technical solution for AoD-estimation (use at least one of the options from Slide #8).
		3. C. If a device supports AoD Passive ranging, then it shall support one of the options from slide #8. But, we have not seen performance data.
		4. C. The intent of the strawpoll is to enable AoD Measurement -- using it (or otherwise) it is up to the passive STA.
		5. C. Passive ASTAs will provide additional data (AoD and D-Matrix), but passive STAs may, or may not use it. Infrastructure devices mandated to support is a burden (its mandatory for APs and Anchor STAs).
		6. C. Is Passive ranging optional? Yes. But if Passive Ranging is supported then this straw poll mandates support for AoD.
		7. C. Running this strawpoll without discussing the performance data is meaningless
		8. Show of hands: should we spend 10mins on performance data before strawpoll?
			1. **Results (Y/N/A):** 2/5/5
		9. **Straw Poll (CID #2302)**

If Passive Ranging is supported, do you agree to enable that AoD measurement as an optional mode?

* + 1. **Results(Y/N/A):** 6/0/6
	1. **Break:** 2.45 – 3.05pm
	2. Modification Agenda rescheduling
		1. Proposal that document **11-19/659** be discussed now.
		2. Any objection? -- one objection.
		3. Show of hands in favor of moving **11-19/659** to be discussed now.
			1. **For**: 2, **Against**: 4
			2. **Result**: Removed from agenda
	3. Ali Raissinia (Qualcomm) presented **continuation** of document **11-19/481r3**
		1. **Title**: Text proposal on ISTA-2-RSTA LMR feedback.
		2. **Summary**: Clarifies the issues regarding the ISTA2RSTALMR sharing capabilities / beacon bit that was presented at the Vancouver meeting**.**
		3. **Discussion**
		4. C. You describe the behavior on the initial FTM frame. What’s the rationale talking about the response frame before the request frame in the text?
		5. C. Clause 9. What about the case ISTA2RSTA being LMR request set to 0?
		6. C. We don’t have this description what to do with the other parameters?
		7. C. There is more text in the spec that specifies this behavior for 0 to 1.
		8. C. Support is not the right word – to use.
		9. R. Are there more detailed comments like this? C. Yes
		10. R. This is not the finalized proposal, and this text will change anyway.
		11. **Strawpoll**

We agree to resolutions depicted by submission **11-19-481r3** address CIDs 2295, 2296, 2297, 2298, 2299, 2300 and 1624.

* + 1. **Results (Y/N/A):** 7/3/3
		2. **Discussion of strawpoll**
		3. C. Please clarify the intent of the strawpoll.
		4. R. We want to ensure that the resolutions are agreed.
		5. C. I oppose this strawpoll – it will reopen exactly the same discussion in Atlanta. We should have some offline general agreement first.
		6. C. Considering these issues, the submission that was postponed should not be discussed now.
		7. C. I don’t understand why this is so controversial? The proposed contentious bit has been removed from the beacon frame.
		8. R. There have been lots of other changes, that I need to process.
	1. Yongho Seok (MediaTek) presented document **11-19/602r0**
		1. **Title**: lb240-cr-mac-secure-ranging-measurement
		2. **Summary**: This submission proposes resolutions of comments received from TGaz LB240.
		3. (The proposed change is based on TGaz Draft 1.0.)
		4. CIDs: 2026, 2203, 2027, 1188, 2415, 2206, 2210, 1260, 1828, 1831, 1830, 1832, 1833, 1582, 2208, 2219 (1615 CIDs)
		5. C. Are making things clear with the wording “dot11SecureLTFImplemented …” for CID 1260.
		6. R. Instead using “secure LTF measurement setup as specified in 11.22.6.3.4”
		7. Discussion
		8. C. In the text we had secure text generation information, can we change to secure LTF counter? We need a narrow name not a broad name.
		9. R. The resolver can only address the comments by the commenter.
		10. C. For case in 1828 add to the resolution that this is the abnormal case. R: Done.
		11. C. Before we had a null in LTF, how did the MAC tell the PHY which LTF to use.
		12. R. Previously we didn’t have the pointer. Now we have it, so when it’s the default we provide a null.
		13. Uploaded with session edits as 602r1.
		14. **Strawpoll**

We agree to resolutions depicted by submission 11-19-602r1 address CIDs

2026, 2203, 2027, 2415, 2206, 2210, 1260, 1828, 1831, 1830, 1832, 1833, 1582, 2208 and 2219.

* + 1. **Results (Y/N/A):** 11/0/0
	1. Ganesh Venkatesan (Intel) presented document **11-19/704r0**
		1. **Title**: Resolutions to a few LB240 Comments (Part-2)
		2. **Summary**: This submission proposes resolutions to the following LB240 CIDs 1106, 1119, 1120, 1399, 1589, 1626, 1639, 1667, 1674, 1760, 1901, 2485
		3. **Discussion**
		4. C. [#1119] It may be the case that the RSTA may require everyone to respond securely.
		5. C. There may be a security policy.
		6. C. Why is it that PHY security requires it, but MAC does not?
		7. C. For example, ATMs and high-end cars may require PHY security.
		8. C. These use cases are a little different as often identity needs to be involved.
		9. C. An upper layer needs to be aware of the application. If you would like to have an indication at the ISTA about what the RSTA would prefer. NaN provides another way of doing it in WFA.
		10. C. Why does MAC vs PHY have a different policy?
		11. C. [#1119] Issue open for future discussion
		12. C. Can an implementation do TB and non-TB?
		13. R. [#1399] only both, so we’ll remove both single user, and multiuser bits.
		14. **Chair time-check**: We will defer the remaining submissions to the next IEEE session, and finish **11-19/704r0** today.
		15. C. [#1661] Comment refers to moving the secure ranging parameters under ranging parameters.
		16. R. It is more logical. It’s not a lot of new text, but a lot of moving.
		17. C. [#1667] Check with Assaf on the resolution for AWV.
		18. **Out of time for more discussion**.
	2. **AOB for the meeting? – None**
	3. **Adjourned at 17.26pm.**

**References:**

1. <https://mentor.ieee.org/802.11/dcn/19/11-19-0689-05-00az-may-ad-hoc-agenda.pptx>
2. <https://mentor.ieee.org/802.11/dcn/19/11-19-0466-02-00az-resolutions-to-a-few-lb240-comments.docx>
3. <https://mentor.ieee.org/802.11/dcn/19/11-19-0659-01-00az-proposed-resolution-to-cids-on-ntb-ranging-timing-control.doc>
4. <https://mentor.ieee.org/802.11/dcn/19/11-19-0646-01-00az-lb240-clause-9-cids.docx>
5. <https://mentor.ieee.org/802.11/dcn/19/11-19-0702-03-00az-comment-resolution-lb240-section-11-22-6-4-3-3.docx>
6. <https://mentor.ieee.org/802.11/dcn/19/11-19-0701-02-00az-comment-resolution-lb240-section-11-22-6-4-3-4.docx>
7. <https://mentor.ieee.org/802.11/dcn/19/11-19-0697-02-00az-cr-for-misc-cids.docx>
8. <https://mentor.ieee.org/802.11/dcn/19/11-19-0481-03-00az-negotiating-ltf-repetition-values-in-iftmr-iftm-exchange-proposed-text-changes.docx>
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12. <https://mentor.ieee.org/802.11/dcn/19/11-19-0699-00-00az-lb240-cr-on-phy-structure.docx>
13. <https://mentor.ieee.org/802.11/dcn/19/11-19-0662-00-00az-comment-resolution-lb240-section-9-3-1-19.docx>
14. <https://mentor.ieee.org/802.11/dcn/19/11-19-0698-01-00az-aod-in-passive-ranging.pptx>
15. <https://mentor.ieee.org/802.11/dcn/19/11-19-0481-03-00az-negotiating-ltf-repetition-values-in-iftmr-iftm-exchange-proposed-text-changes.docx>
16. <https://mentor.ieee.org/802.11/dcn/19/11-19-0602-01-00az-lb240-cr-mac-secure-ranging-measurement.docx>
17. <https://mentor.ieee.org/802.11/dcn/19/11-19-0704-00-00az-resolutions-to-a-few-lb240-comments-part-2.docx>