IEEE P802.11  
Wireless LANs

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| Minutes for 802.11 be MAC Ad-Hoc teleconferences in March 2020 and April 2020 | | | | |
| Date: 2020-03-13 | | | | |
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Abstract

This document contains the meeting minutes for the TGbe MAC ad hoc teleconferences held in March 2020 and April 2020.

Revisions:

* Rev0: Added the minutes from the telephone conference held on March 13, 2020.

**Friday 13 December 2020, 12:00 – 15:00 ET (TGbe MAC ad hoc)**

Chairman: Liwen Chu (NXP)

Secretary: Matthew Fischer (Broadcom)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Liwen Chu, NXP) calls the meeting to order at 12:13 EDT. The Chair introduces himself and the Secretary, Matthew Fischer (Broadcom)
2. The Chair goes through the 802 and 802.11 IPR policy and procedures and asks if there is anyone that is aware of any potentially essential patents. Nobody speaks up.
3. The Chair reminds everyone to report their attendance by sending an e-mail to the Secretary and the Chairman himself. The webex app indicates about 93 people on the call.  
     
   **Recorded attendance through the webex app and/or reported attendance through e-mail:**
   * **YELLOW names are not yet confirmed**
   * Abhishek Patil (Qualcomm)
   * Akira Kishida (NTT)
   * Al Petrick (InterDigital)
   * Albert Bredewoud (Broadcom)
   * Alfred Asterjadhi (Qualcomm)
   * Bo Sun (ZTE)
   * Cheng Chen (Intel)
   * Chunyu Hu (Facebook)
   * Dandan Liang (Huawei)
   * Dibakar Das (Intel)
   * Dmitry Akhmetov (Intel)
   * Edward Au (Huawei)
   * Gaurav Patwardhan (Hewlett Packard Enterprises)
   * Beonjung Ko (WILUS Inc)
   * George Cherian (Qualcomm)
   * Guogang Huang (Huawei)
   * Guoqing Li (Apple)
   * Hanqing Lou (InterDigital)
   * Hanseul Hong (Yonsei Univ.)
   * Harry Bims ???? (Bims Laboratories) – “harry” on SP list
   * Hedayat, Reza (Charter Communications)
   * Hirohiko Inohiza (Canon???) – affiliation not confirmed
   * Huizhao Wang (On, Qunatenna)
   * Insun Jang (LGE)
   * James Yee (Mediatek)
   * Jarkko Knecht (Apple)
   * Jason Yuchen Guo (Huawei)
   * Jeongki Kim (LGE)
   * Jinjing Jiang (Apple)
   * Jinsoo Choi (LGE)
   * John Sun (WILUS)
   * John Yi (?????) – no affiliation
   * Kaiying Lu (Mediatek)
   * Laurent Cariou (Intel)
   * Lei Wang (Futurewei)
   * Liangxiao Xin (Sony)
   * Li-Hsiang Sun (InterDigital)
   * Li Nan (ZTE)
   * Liwen Chu (NXP)
   * Li Yiqing (Huawei)
   * Mark Rison (Samsung)
   * Massinissa Lalam (Sagecom)
   * Matthew Fischer (Broadcom)
   * Mengshi Hu (Huawei)
   * Ming Gan (Huawei)
   * Minyoung Park (Intel)
   * Mohammed Abouelseoud (Sony)
   * Nameyeong Kim (LGE)
   * Osama Aboul-Magd (Huawei)
   * Patrice Nezou (Canon)
   * Po-kai Huang (Intel)
   * Pooya Monajemi (Cisco)
   * Qi Wang (Apple)
   * Robert Stacey (Intel)
   * Ronny Yongho Kim (KNUT)
   * Ross Jian Yu (Huawei)
   * Ruchen Duan (Samsung)
   * Rui Yang (InterDigital)
   * Sang Kim (LGE)
   * Sanghyun Kim (WILUS)
   * Sean Coffey (Realtek)
   * Sharan Naribole (Samsung)
   * Shubhodeep Ahikari (Broadcom)
   * Sindhu Verma (Broadcom)
   * Srinivas Kandala (Samsung)
   * Stephane Baron (Canon)
   * Subir Das (Perspecta Labs)
   * Sungjin Park (LGE)
   * Taewon Song (LGE)
   * Tianyu Wu (Apple)
   * Viger Pascal (Canon)
   * Wook Bong Lee (Samsung)
   * Yan Xin (Huawei)
   * Yanjun Sun (Qualcomm)
   * Yifan Zhou (Huawei)
   * Yong Liu (Apple)
   * Yonggang Fang (ZTE)
   * Yongho Seok (MediaTek)
   * Yongsu Gwak (KNUT)
   * Young Hoon Kwon (NXP)
   * Yunbo Li (Huawei)
   * Zhou Lan (Broadcom)

1. The Chair reminds that the agenda can be found in 11-19/2146r1. Today we will go through submissions related to multi-link.

**Submissions**

1. [**11-20-00028r1**](https://mentor.ieee.org/802.11/documents?is_dcn=28&is_group=00be)**, 11-20-0028-01-00be-indication-of-multi-link-information (Insun Jang - LGE)**   
     
   **Summary:** Introduces format of an ML element for use in ML management exchanges.

**Discussion:**  
**C:** slide 9, in ADDBA REQ and RSP, link xxx is included, why? BA setup is MLD, not per STA, so at the time of association, the link to be used by each TID is already set up, so as long as the TID and MLD rae provided, this is enough to disfferentiate BA agreements.

**A:** TID to link mapping in my understanding, ADDBA REQ and RSP, already agreed to single agreement on single link, so have to indicate the multiple links

**C:** for each specific TID, we know which link will be used before setting up the BA agreement

**A:** I understand, but, the single BA agreement and TID link mapping, you are saying that there is no difference between the TID to link, no need to further define with a bit map, right?

**C:** yes

**A:** for now, let me think about the comment

**C:** ML element use by non-AP MLD, mainly for association, after setup, links can be enabled, STR capability are dynamic, we should have some element or control format to be used dynamically notify changes in these parameters

**A:** you want dynamic capability to be changed, so you think it should not be here?

**C:** not saying that we should not include the element, include it during setup, but also during other times, not restrict it to association

**A:** agree, not limited to association, also for update, this is just an example during association, still can be included in other elements and control fields

**C:** slide 8, common information and per link information and cross link information, agree we need common and link, but cross link could be part of common, why is it separate? You can think about that. Other question, applicable to multiple frames, beacon, discovery, probing, association, my opinion, such structure can be useful in AP and non-AP providing capability but also need to be careful about size, beacon bloat, need to limit, do not overwhelm the beacon, need a general, flexible framework with varying amount of information, control bitmap indicating presence and absence of fields, to avoid ten elements, one container with flexible contents, depending on the use of the exchange in which the information appears

**A:** I was saying, my intention, unify the structure, depending on phase, which frame is transmitted, for example, this is beacon, it should be flexible, I agree, here the intention is high level, the details of the fields we can discuss further

**C:** you have too many different topics, BA should be separate, a lot of information in the slides, could be done separately

**A:** just an example, we can utilize the bitmap,

**C:** slide 9, same as previous commenter, weird to have the bitmap, for each TID, originator and responder, only one agreement, when you have the bitmap, it might sound like two agreements between MLDs, not aligned with what we have today, a single SEQ space, adding this link bitmap is confusing, clarify for MLD, originator, responder, only one agreement, do not need two agreements, do you agree or have other thoughts?

**A:** let me think about this

**C:** a lot of topics covered, you have a slide you want to use BAR setup in ASSOC REQ, I think I discussed in a slide, no problem with this, we have a setup and teardown and will have a re-setup and we have association and reassaciation, if we are to use the current frame, maybe we want to reuse dissaassociation we already use the current frame BA for MLD, but if we reuse one like this, we should reuse for all of it, if we use the existing frame for association, we should do it for all frames, not create some frames for some and reuse frames for others

**A:** ok, thank you

**C:** single frame format to carry all ML information and use for different methods, like negotiation, beacon frame, but the contents of the frames, the format, some is like capability, others are dynamic channel access and loading information, might not be necessary in the association request, loading information changes, and capability information is unchanged, then this information is not necessary in link setup, but some information needed in setup, so need to separate two different contents, one for beacon and transmitted to all STA, other is for ML setup so we cannot duplicate information between beacon and setup frames

**A:** similar to previous comment, I do not want to define the size of the field, depending on this information cannot be transmitted in xxxx depending on phase, transmitter can some field can be present, sure

**C:** a lot of details here, temptation to say that we have a container applied everywhere, look at the use cases, you highlight exchange for setup, then you say that you could have this in beacons and probe responses, now discovery, differentn use cases, very initial discovery, usually in beacons, PRSP, for other links, evaluate the minimum set of information or beacon bloat, what is use case, minimum information in beacon, sent by AP MLD your own information plus what about other Aps in the same MLD, bear in mind existence of RNR already has basic information, mandated by 11ax, what would be the minimum to be added for MLD, minimum probably , here is the lise of AP within this MLD, do we need more than that. Other use cases, PREQ, asks for complete information of entire MLD, now requesting complete information, this is different, want to provide everything, cannot avoid an element like your proposal, that’s a good thing, but start by looking at what we need in the different situations and what is already present, do not throw away what we have already, we could end up with a crazy amount of information beacon, look at the use cases and existing frames, what information do we carry, what information do we have already from previous amendments, what is new that is needed to be added?

**A:** did not mention PREQ, non-AP MLD does not know MLD information, so not included in PREQ,

**C:** slide 8, how is the sequence of the events, initially AP indicates number of links operational, and capabilities on pairs of links, can restrict to pairs of links, only implicitly in SFD, we say only two is maximum, if we assume two, AP indicates cap per pair and per link, non-AP STA MLD capability should not be limited to those links id by ctr freq, given that capability is related to banks of freq bands, should the non-AP response be limited to only the links to which the AP is currently operational, or should the combinations of bands supported matter – for TID to link mapping, is this the only method? It would always be this container?

**A:** capability of non-AP MLD, should not be limited to xxx links

**C:** AP say, two links operational, ctr freq X and Y, same capability for ctr freq 20 MHz from X and 20 from Y, if AP wants to switch to these different links, AP has to send a new message and non-AP STA has to provide new capability information for the new links?

**A:** it could be designed, have only capability for the existing link, not limited to any number of links, open to designing this field, TID to link mapping, can be updated or remapped, intention is to use bitmap indication, can be used for ML setup and association and updates, another control field to use this field,

**C:** TID to link remapping would not need all of that other information

**A:** do not want to define fixed fields, updating TID link mapping might not use these fields, just the TID link mapping fields here

**C:** what framework for AP to ask non-AP to measure other links outside of AP operational links, to scan or measure? If AP is link1, lnik2, could switch to link3, link4, depending on measurements of those links by both AP and non-AP, what method is there for this, how to manage links optimally, each time a link deteriorates, can switch, some information needs to be present for candidate links

1. [**11-20-00034r0**](https://mentor.ieee.org/802.11/documents?is_dcn=34&is_group=00be)**, 11-20-0034-00-00be-multi-link-grouping (Jason Yuchen Guo - Huawei)**   
     
   **Summary:** Group has discussed asynch mode, synch mode, quasi asynch mode. There might be a mix of such devices, and therefore a need to create groups of different devices to manage the access method.

**Discussion:**  
**C:** have seen proposals on characterizing links, for these groupings, do you have any foundation to say that this is better for making the network operating better? What is the justification of the method? Another idea for how to group links, I have a similar proposal to provide different service based on reuqirements of STA or applications to provide different services on different links, do thsese need to be converged, do these conflict?

**A:** starting with channel access, because of limitations of capability, if the MLD can support STR, then it uses synch mode, this is easiest, if MLD does not support STR, then need limitations, best compromise is allow EDCA on only one link, if other links not STR, putting together, best management of many links is the grouping concept, if MLD supports STR, then use synch mode, once you have this principle, only need group management – relating to traffic, that is TID to link mapping

**C:** first question, starting point is for better management, but do you know the reason for STR and non-STR is cross link, but if you do grouping, does it make the performance better per group or per network – do you have a study or results?

**A:** if you do not separate into groups, there will be problems as highlighted in the slides

**C:** not very natural, need concrete evidence of an improvement

**A:** --

**C:** ok with concept, but with many links, for an AP MLD, one or zero decision, either it has or has not constraints, STA side, even less variability, for lifetime of 11be, do you envision more than two links? I doubt it. Idea is good, but reality will not need this. Example AP DL, if not MU, then it is peer to peer, grouping does not matter, other capability does not matter, unless you are doing MU and you have a mix of STA STR and non-STR, AP side depends on implementation, can solicit ACK or BA on multiple links supported by those STAs, do not see much usefulness of the grouping even for MU – PIFS check, not clear it will be allowed by regulations, if we are talking about 5 + 6 band links, or single band >160, not clear that will be allowed, so do not believe that we should consider PIFS access

**A:** PIFS check is similar to the 80+80, this is allowed, no limitation on the separate of the two 80 channels

**C:** for ML you want to have much larger BW per link, not allowed

**A:** might be fewer links in reality, so this is architecture for future flexibility, later generations might support more links, we should be flexible

**C:** confused about motivation of grouping, you have STR and non-STR capability, shouldn’t it simply be defining channel access – example does not help, slide 7, L1 and L3 are STR on both, but placed in same group, then it is confusing how it works, in ppt, in same group only one primary link, clarify

**A:** L2 being used will not impact L1 and L3, so need to make those as 1 group, MLD TX on L1, L2, then allow a STA TX on L3, then AP will not be able to RX PPDU on L3, in this case, need to keep all three links in one group.

**C:** but in general, do not see a benefit from this grouping, if you have support showing performance difference, that would be helpful

**A:** grouping only allows one link of the group to do EDCA, otherwise problems as specified will arise,

**C:** L1 and L3 can do EDCA at same time, but from this concept it seems like they should not be doing this

**A:** if L2 is added into the group, then we should not allow L1 and L3 to perform EDCA at the same time, because L2 is used for TX

**C:** continuing on the channel access aspect, not certain why this EDCA restriction is useful, Dmitry has shown that independent access is better or as good as yiou can get, no benefit of restricting EDCA on the other link, would depend on congestion in the links, if you restrict to L1 and not L2 L3, then you are probably missing advantages of ML configuration – not certain if all STA have the same group, or would grouping be per STA, slide 7 is this for all, or per STA?

**A:** grouping is done for all STA, not per STA – simulation results shown before allow asynch mode, presumption is that device supports STR, and we have that – if devices support STR, then can work independently, but this case is when a device does not have STR in the 3 links, then have to choose one link for EDCA, otherwise, problems will occur, as shown on slide 4

**C:** but the problem is only a problem at that transmitting STA, do not see the issue –

**A:** slide 4, AP does not support STR

**C:** not typical, we believe STR should be supported by AP

**A:** if AP supports STR, no issue, if there are some links close, then AP does not support STR, then grouping is useful, EDCA on one link, AP supports STR among different groups

**C:** grouping is same for all STAs, slide 7, if STA1 can STR on L1, L2, L3, but STAx cannot do STR, then will have to put all three links into same group

**A:** AP does not support, so one group

**C:** if maintain same group, for all STAs, then performance is limited by worst capability of all STAs

**A:** maybe not clear, grouping is not done on STA side, does not care about STA capability, only AP capability, if AP supports STR on all three links, then separate groups, AP is the limitation

**C:** what if STA cannot do STR, how does the AP handle non-AP capability?

**A:** slide 8, AP must make certain non-AP is not transmitting on L2 when STA is not STR

**C:** AP must operate differently for different non-AP MLD capabilities

**C:** entire presentation is based on AP non-STR, and this is not a case that we should worry about, we should assume that AP is STR, if proposal is to disable EDCA on separate links, then you have only a fraction of the number of links, because if you disable EDCA, you are throwing away the throughput and already existing end-to-end delay, channel access capabilities and performance, from having multiple links to contend and compete and deliver, you are reducing to a single link type of operation, you are converging MLO to single link operation

**A:** assume AP supports STR on all links, then AP discards L2 to make certain that it is using STR on all three links, then all links can be used, throughput will be higher

**C:** concur with previous comments that R1 should be restricted to assumption of AP STR only

1. [**11-20-00030r3**](https://mentor.ieee.org/802.11/documents?is_dcn=30&is_group=00be)**, 11-20-0030-03-00be-multi-link-association-follow-up (Guangang Huang - Huawei)**   
     
   **Summary:** Proposal of new element to carry MLD information on a single link to accommodate MLD setup on a single link.

**Discussion:**  
**C:** slide 4, clarification in the past for MLD setup, you have step 3, each STA associate with corresponding AP, idea is that each link, STA-AP is changed to MLD, legacy association is exchange capability, connection to DS upper layer is through MLD, AP MLD is an entrance, STA1 association with AP1, looks like 3 entrance to upper layer, you mean that each link is separate capability, but not association, right?

**A:** link1, non-AP MLD, exchanges capability for 3 links,

**C:** fine to use this frame, want to use for tear down and setup

**A:** ok

**C:** SP1, slide4, what you mean in Step 3, the link between AP1, STA1, etc, links are established, not associations, after MLD setup, you have established multiple links, not associations, right? SP2 talks about inheritance, need to account for bloat

**A:** I can change the SP

**C:** similar question, on SP1, the note, you mention multiple associations, after MLD setup, can do associations separately?

**A:** yes, I believe that each STA of MLD can do separate association

**C:** if STA MLD does MLD setup, then if a single STA within the MLD STA does an association does it override the previous MLD setup?

**A:** ????

**C:** confusing, because you are saying that both MLD setup and separate associations

**C:** also confused

**A:** I can change the SP to clarify

**C:** but what is your view? there is a single MLD setup and we do not need per-link association

**A:** why do we need to prohibit per link association?

**C:** association has two meanings, association and entrance to DS

**C:** why can we not do per link association?

**C:** let’s not mix with legacy, legacy can do per link association, but MLD we do not agree that there is a per link association

1. [**11-20-1962r2**](https://mentor.ieee.org/802.11/documents?is_dcn=1962&is_group=00be)**, 11-19-1962-02-00be-multi-link-upper-mac-entity-instance-new-frame-mac-header (Huizhao Wang – On, Quantenna)**   
     
   **Summary:** Per SSID MLD identification and new MAC frame header for MLD.

**Discussion:**  
**C:** we agree each MLD should have a unique SSID – other use cases, a lot of users, single link case, many users like to partition a single AP into two SSIDs, to allow manual connection to different bands, for example, SSID2, SSID5 – if does not want to reconfigure IOT devices, might need to use different SSID on different bands – do you want to support this use case?

**A:** legacy IOT devices? Right?

**C:** yes

**A:** their association is per link, for that MLD instance should be uniform in all three links

**C:** what happens to IOT devices, e.g. uses SSID24, then user will have to reconfigure all IOT and existing Aps

**A:** not certain that this is necessary, if SSID24 no issue, if expand the SSID24 to 5 and 6 links, then need to reconfigure MLD AP which determines where SSID24 is applied

**C:** what happens to current devices that use SSID5

**A:** they will continue to use the SSID5 for single link

**C:** the new MLD AP will not be able to serve those devices, want to serve all existing clients

**A:** before SSID24 and SSID5 were bound to individual radios

**C:** you add a new MLD AP, in the MLD AP, forced to use a single SSID

**A:** slide 4 example, you could have one SSID on subset of links

**C:** slide 4, contect to enterprise guest network, then can use MLD to use 2.4, 5, 6, different SSID, similar to multiple BSSID, really, I see this slide as MBSSID – agree to use ID and MAC address to uniquely identify, need many bits, choose MAC address because this guarantees uniqueness

**A:** BSSID – actually basically equivalent to MLD MBSSID framework, do not like MBSSID because BSSID is link layer binding MAC address for BSSID, but MLD itself is a logical construction, MLD to SSID is the appropriate layer connection, BSSID is a link concept and SSID is logical and so is MLD, MLD is not a link layer, but basically, a BSSID-style approach – about ID using a number vs MAC address, you can avoid ambiguity because you have link layer MAC address and that tuple, link address with MLD ID is unique – with MAC address, you need to purchase space, only have 48 bits MAC address, some OUI have been reused,

**C:** set MLD address to one of the AP MAC address, do not need a new one, if we have an MLD MAC address, no need for an ID

**A:** not pushing for release 1, can be an alternative as an option, deployment decision

**C:** MBSSID covers much of this, I have a ppt in the q how MBSSID fits with MLD, addressing the use case that you show, multiple SSID on a link, each of multiple MLD corresponding to a logical set of APs – do not need any changes to the MAC header in my ppt, tied to the APs that are part of that set, do not need changes to MAC header, MBSSID MLA concept covers it

**A:** container will do the job, can add elements, other bits,

**C:** how do you tie an AP to an MLD, signanling details during association, setup, discovery

**A:** part of address filter operation, can know immediately, this frame is MLD, using legacy format, will simplify layer separation and processing

**C:** binding between MLD and AP, pass it higher up, MLD upper MAC logical entity handling BA exists, without any changes to MAC header, this still works as long as you have the binding between AP and STA with corresponding MLD, your solution requires many changes, how do you tie MLD with STA instance – MLD address, touching on other commenter points, agreement in SFD that MLD entity has a unique MAC address, does not need to be a different value, can be shared with one of the AP/STA instances,

**A:** processing complexity, using binding adds hardware complexity, this approach is simpler

**C:** slide 4, for legacy vs MLD, different SSID values?

**A:** not clear, each SSID can be bound to any of the APs, legacy associated with any SSID is the same as before, if SSID1 is bound to all 3 links, SSID2 is bound to 2 links,

**C:** unclear about the use cases, different SSIDs on same link?

**A:** complicated, MLD with links using two different SSID profiles, akward, one uses GCMP 256, one uses AES128, how do you handle that? Should not allow such combinations.

**C:** agree

**C:** slide 8, MLD ID is numeric or MAC address, if MAC Address, why not use existing RA TA fields?

**A:** using new MAC header numerical number not MAC address, can use combination of ID and existing MAC addresses

**C:** use DA and SA to replace MLD ID, I see,

**A:** addresses might not be the same, DA and SA are not necessarily related to RA and TA

**C:** SSID, I agree, everything is migrating to single SSID, support MLD is single SSID

**C:** SP3, unique ID for each MLD instance, other than MAC address?

**A:** need to make it more clear

**C:** what is scope of uniqueness

**A:** change to a tuple, MAC address plus MLD ID

**TEST OF POLL SYSTEM using WEBEX**

1. POLL displayed in the app is:
   1. Please choose between:
      1. YES
      2. NO
      3. Abstain
2. Discussion about exposure of names of voters and recording the names
   1. Names will not be recorded per vote
3. Names of attendees will be recorded in the minutes
4. Propose to extend the meeting by ten minutes to continue poll test
   1. No objection
5. If a name on the participant list is “caller #” that vote will not be counted, there must be a name to be counted, affiliation is not always possible, that must be included in an email or otherwise communicated to the secretary
6. A complete list of attendee requirements was mailed to the reflector by the TGbe chair, Alfred Asterjadhi, and is reproduced here:

Please find below some guidelines that we will be following to run strawpolls during the TGbe MAC ad-hoc meeting and subsequent conference calls. These guidelines are valid for WebEx (tomorrow we will test Zoom as well to see if we can do something similar there as well. As for Join.me it appears it does not have the polling feature).  

1. Each member that intends to join the conference call and vote needs to:

1)    Ensure that their name and affiliation is listed in the participants list

·         If you are not properly identified in the participants list, your vote will be removed from the straw polls results

2)    Ensure that they join the conference call online before dialing in, in order to ensure that name and affiliation appear in the participants list

·         Audio connection via cellphone or landline can be achieved by having WebEx calling the phone number or by dialing in using the identification numbers provided when joining online

1. One or more Straw Polls can be run for each presentation (no motions allowed)

1)    Straw Poll will first be shown on the screen (after discussions as usual))

2)    Chair will then copy the straw poll and display it via the conference call’s polling system

·         A straw poll can allow either a single choice response or multiple choice responses (e.g., vote for as many as you like); single choice will be used by default unless presenter indicates otherwise

3)    A Pop-Up window with the SP will appear for each member that is online

·         The Chair will remind members to cast their vote and will announce the end of the vote, after which no more voting can take place

·         Members are invited to cast their vote in a timely fashion, otherwise they will miss the window of vote and be unable to cast their vote

·         Choose carefully! The system will not allow a vote to be changed once the vote has been submitted, even if the SP is still open for voting

·         After a reasonable time (1 min or so) the chair will close the poll

4)    The Outcome of the SP is reported to the group and will be noted in the meeting minutes, as usual

·         Note: Votes cast by unidentified members may be removed, so please ensure that name and affiliation are correct

Note 1: Note that where a group of individuals is attending in common through a single dial in, there is only one vote available and therefore, all participants who wish to vote need to individually sign into the meeting to be included in the participant list.

Note 2: This is the first time that such a system is being used for this purpose and as such we will learn/adjust as we go.

**Adjourned at 15:14 EDT**