IEEE P802.11  
Wireless LANs

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| Tgbn MAC ad hoc teleconferences in January to March 2024 | | | | |
| Date: 2024-02-05 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Srinivas Kandala | Samsung |  |  |  |
| Xiaofei Wang | Interdigital |  |  |  |
| Jeongki Kim | Offino |  |  |  |

Abstract

This document contains the meeting minutes for the TGbn MAC ad hoc teleconferences held between January 2024 and Mach 2024.

Revisions:

* Rev0: Added the minutes from the telephone conference held on January 29.
* Rev1: Added the minutes from the telephone conference held on February 5. Corrections to the minutes of January 29th including correcting the date
* Rev2: Added recorded attendance for Jan. 29 and Feb.5 teleconferences

Abbreviations:

* C: Comment.
* A: Answer.

# Monday, 29 January 2024, 07:00pm – 09:00pm ET (TGbn MAC ad hoc conference call)

Chairman: Jeongki Kim (Ofinno)

Secretary: Srinivas Kandala (Samsung)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Jeongki, Ofinno) calls the meeting to order at 07:01pm EDT. The Chair introduces himself and the Secretary, Srini (Samsung)
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.
   1. Nobody responds.
3. The Chair goes through the IEEE copyright policy and no comments received on the floor
4. The Chair recommends using IMAT for recording the attendance.
   * Please record your attendance during the conference call by using the IMAT system:
     1. 1) login to [imat](https://imat.ieee.org/attendance), 2) select “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “TGbn <MAC/PHY/Joint> conference call that you are attending.
   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Jeongki Kim ([jeongki.kim.ieee@gmail.com](mailto:jeongki.kim.ieee@gmail.com)), Xiaofei Wang ([xiaofei.wang@interdigital.com](mailto:xiaofei.wang@interdigital.coma)) and Srinivas Kandala ([srini.k1@samsung.com](mailto:srini.k1@samsung.com))

**Recorded attendance through Imat and e-mail:**

Breakout Timestamp Name Affiliation

TGbn (MAC) 1/29 Adachi, Tomoko TOSHIBA Corporation

TGbn (MAC) 1/29 Ajami, Abdel Karim Apple Inc.

TGbn (MAC) 1/29 Asai, Yusuke NTT

TGbn (MAC) 1/29 Asterjadhi, Alfred Qualcomm Technologies, Inc

TGbn (MAC) 1/29 Baek, SunHee LG ELECTRONICS

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TGbn (MAC) 1/29 Fischer, Matthew Broadcom Corporation

TGbn (MAC) 1/29 Fujimori, Yuki Canon Research Centre France

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TGbn (MAC) 1/29 Gupta, Binita Cisco Systems, Inc.

TGbn (MAC) 1/29 Ha, Taeyoung Samsung Electronics Co., Ltd.

TGbn (MAC) 1/29 Haider, Muhammad Kumail Meta Platforms Inc.

TGbn (MAC) 1/29 Hedayat, Ahmadreza Apple Inc.

TGbn (MAC) 1/29 Hervieu, Lili Cable Television Laboratories Inc. (CableLabs)

TGbn (MAC) 1/29 Ho, Duncan Qualcomm Incorporated

TGbn (MAC) 1/29 Huang, Po-Kai Intel

TGbn (MAC) 1/29 Inohiza, Hirohiko Canon

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TGbn (MAC) 1/29 Kalamkar, Sanket Qualcomm Technologies, Inc

TGbn (MAC) 1/29 Kandala, Srinivas SAMSUNG

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TGbn (MAC) 1/29 Kim, Sang Gook LG ELECTRONICS

TGbn (MAC) 1/29 Kim, Sanghyun WILUS Inc.

TGbn (MAC) 1/29 Kim, Yongho Korea National University of Transportation

TGbn (MAC) 1/29 Kishida, Akira Nippon Telegraph and Telephone Corporation (NTT)

TGbn (MAC) 1/29 Klein, Arik Huawei Technologies Co., Ltd

TGbn (MAC) 1/29 Koo, Jonghoe Samsung Electronics Co., Ltd.

TGbn (MAC) 1/29 Lanante, Leonardo Ofinno

TGbn (MAC) 1/29 Lee, Gwangho Korea National University of Transportation

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TGbn (MAC) 1/29 Lee, Jack SAMSUNG

TGbn (MAC) 1/29 LEE, JOONSOO Newracom Inc.

TGbn (MAC) 1/29 LEE, Mingyu Samsung Electronics Co., Ltd.

TGbn (MAC) 1/29 Levy, Joseph InterDigital, Inc.

TGbn (MAC) 1/29 Li, Weiyi Spreadtrum Communication USA, Inc

TGbn (MAC) 1/29 Li, Xin Huawei Technologies Co., Ltd

TGbn (MAC) 1/29 li, yan ZTE Corporation

TGbn (MAC) 1/29 Li, Yanchun Huawei Technologies Co., Ltd

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TGbn (MAC) 1/29 Lu, Liuming Guangdong OPPO Mobile Telecommunications Corp.,Ltd

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TGbn (MAC) 1/29 Luo, Chaoming Beijing OPPO telecommunications corp., ltd.

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TGbn (MAC) 1/29 Ryu, Kiseon NXP Semiconductors

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TGbn (MAC) 1/29 Zhang, Maolin Huawei Technologies Co., Ltd

TGbn (MAC) 1/29 Zhao, Yue Huawei Technologies Co., Ltd

TGbn (MAC) 1/29 Zhou, Pei TCL

1. The Chair reminds that the agenda can be found in 11-24/0201r2. The Chair asks for the comments about the agenda.

* C: When will the straw polls for preemption will be run?
* A: Procedurally anybody can run straw polls when they want some information. The motions can be only run with ten day notice. Chair also proposes to have straw polls during face-to-face meetings, but should anyone desire, send an email to chair & reflector askign for straw poll in the teleconference.
* The proposed agenda is approved.

1. Technical submissions – Premeption:
2. [23/1886](https://mentor.ieee.org/802.11/dcn/23/11-23-1886-02-00bn-preemption-techniques-to-meet-low-latency-ll-targets.pptx) Preemption techniques to meet low-latency (LL) targets Giovanni Chisci (Qualcomm)

Discussion:

* + C: On the low-latency STA contending inside of the TXOP. What happens to the MAC state machine? To they start all over again or goes back to previous state
  + A: These things can be discussed further. These can be thought of as an internal collision or somewhat like TXOP sharing or probably the STA will contend from scratch. Since this is more like an internal collision it does not need exponential backoff and the STA will just randomize a new number
  + C: PRI is transmitted from the STA to whom the AP is transmitting. What happens if another STA has low-latency traffic,
  + A: It will send the pre-emption indication using the same set of resources and start EDCA based access
  + C: What happens to the uplink transmission?
  + A: The PRI will be sent by the AP
  + C: How would a second STA get access over the first STA
  + A: We did not consider the case
  + C: The PR enablement in DL PPDU and PR enablement in BA frames, are they the same of they are different? Asking becasue with indication in DL PPDU the PRI transmission happens AFTER BA transmission and when indication happens in BA, the PRI happens immediatelly after BA.
  + A: We are considering two cases: PRI and BA.
  + C: Are the PR enablement in DL PPDU and BA be same?
  + A: Can be discussed further. Dont see much difference.
  + C: Slide 10: How are you going to stop from another STA to use it?
  + A: Structurally PRI are similar from both AP and STA, but the STA needs to understand AP sent the PRI
  + C: How to make sure that other STAs that have no low-latency traffic also access the channel
  + A: There is no focussed contention. When preemption is started, all STAs will contend of the channel whether they have low-latency traffic or other traffic
  + C: Slide 7. Did you also consider the case when any other STA transmits PRI? When will the other STA send PRI?
  + A: The AP is not collecting PRI and whch STA is sendng the PRI, only that a PRI is sent
  + C: What if the STA does not hear the ACK?
  + A: Doesnt really matter.
  + C: My worry is the PRI may collide if multiple STAs transmit
  + A: Yes, they can collide but AP only needs to receive one
  + C: How long would the contention period? What if two STAs collide? This solution is not scalable. Everyone jumps in or someone outside the contention and take over the channel
  + A: The idea is to have a few STAs can collide, but the effect should be managed. Even if the traffic is unpredictable. But there are other tools in the tool box and can be applied
  + C: How do you handle the collision if EDCA is used within the TXOP? There could be multiple STAs and they could be transmitting at the same time.
  + A: Collision will result in AP missing the ACK and the normal BA would be sent by the AP. No new iteration of preemption can be resumed.
  + C: Will the STAs be retransmitted?
  + A: There could be pre-negotiate time during which the retransmission can be done after which the AP would resume
  + C: It seems that there is only one BSS. What happens if there is OBSS activity? Would this lead to a longer TXOP reserved by the AP and what would be the effect?
  + A: We are preparing something on OBSS but right now not recommending any inter-BSS coordination. In terms of over-reservation, we dont need to mandate it. The key part is that the AP can truncate its transmissions. You dont need to reserve more

1. [23/1909](https://mentor.ieee.org/802.11/dcn/23/11-23-1909-00-00bn-transmission-method-of-low-latency-traffic.pptx) Transmission Method of Low Latency Traffic Insun Jang (LGE)

Discussion:

* + C: Slide 5. There appears to be some negotiation before even the TXOP starts. What happens if the low latency packet in the middle of the TXOP?
  + A: We need to discuss in the next phase, if it is mandatory or optional. Without negotiation, the STA cannot understand preemption
  + C: But the negotation will not be of much value in some cases. Take it offline
  + C: Slide 5. Are the negotiations between STAs or do you mean between STA and AP?
  + A: Not between non-AP STAs, but between Aps
  + C: Slide 9. The BA has LLT info so that STA knows that there is low-latency traffic. In slide 10, STA1 includes this info in BA before the AP transmits the trigger frame.
  + A: Discuss further offline
  + C: Slide 7. How would the STA send the triggering info? What does the LL information from the AP would do?
  + A: If you go to slide 8, the sequence is same as previous slide, the AP can inform the TXOP holder on the LL to allow the preemption
  + C: If STA1 has no LLT, if the AP keeps on sending the trigger info frame again and again would there be waste of the bandwidth
  + A: upto the AP
  + C: Slide 10. How would the allocations work? Common resources or specific RUs.
  + A: ...
  + C: How does the TXOP holder know the LLT presence
  + A: The AP indicates the LLT info
  + C: Is LLT Info a new frame?
  + A: Depends on the design

1. [23/1939](https://mentor.ieee.org/802.11/dcn/23/11-23-1939-02-00bn-priority-based-preemption-method.pptx) Priority Based Preemption Method Ronny Y. Kim (KNUT)

Discussion: None

1. [23/1950](https://mentor.ieee.org/802.11/dcn/23/11-23-1950-00-00bn-considerations-on-preemption-request.pptx) Considerations on Preemption Request Leonardo Lanante (Offino)

Discussion:

* + C:Slide 8. Regarding option 2, MU-RTS/CTS will silence OBSS interference. It is a tradeoff which should be prioritized
  + A: That is true, but we are open to suggestions
  + C: Option 2 can be used in specific use cases and should not be used in dense environments
  + A: Agreed
  + C: Slide 6 shows that the LLT should be protected but is discarded. What is happening?
  + A: Indeed, with option 1, it will be discarded, but you can show the overhead would be less with simpler implementation
  + C: So that means no LLT sent
  + A: Yes
  + C: Slide 7. What does it mean that i as a STA receives MU-RTS and not getting served having implications on power save. What does that mean?
  + A: The assumption is that if you have low-latency traffic then you will not do power save
  + C: Comment on options 1 and 2. The situation is not with preemption. Even today an AP can send data to STA1 and then continue on with STA2 in the same TXOP. Protecting the TXOP is working and not a problem and how it is working today and is not specific to preemption
  + C: What is our design target for such a packet preemption. We can hardly guarantee low-latency if we have OBSS and is an occupied channel with TXOP of 3 ms. In the worst case, we will have long latency which is longer than TXOP duration. Are we looking for some opportunistic low-latency or guaranteed low-latency
  + A: We will handle it by having maximum PPDU transmission and we can improve the latency in general, but did not understand the question
  + C: Even if we ahve a way to stop our low priority traffic and switch to high priority traffic we can not do that if a STA is strongly impacted by OBSS, then we cannot target the STA as LLT receiver. This target is never achievable
  + A: problem cannot always be solved
  + C; What if OBSS transmissions are latency and you may be preventing from transmitting
  + A: Yes, that also happens

Meeting is adjourned at 6;00 PM

# Monday, 6 February 2024, 07:00pm – 09:00pm ET (TGbn MAC ad hoc conference call)

Chairman: Jeongki Kim (Ofinno)

Secretary: Srinivas Kandala (Samsung)

This meeting took place using a webex session.

**Introduction**

1. The Chair (Jeongki, Ofinno) calls the meeting to order at 07:01pm EDT. The Chair introduces himself and the Secretary, Srini (Samsung)
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   * If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to Jeongki Kim ([jeongki.kim.ieee@gmail.com](mailto:jeongki.kim.ieee@gmail.com)), Xiaofei Wang ([xiaofei.wang@interdigital.com](mailto:xiaofei.wang@interdigital.coma)) and Srinivas Kandala ([srini.k1@samsung.com](mailto:srini.k1@samsung.com))

**Recorded attendance through Imat and e-mail:**

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TGbn (MAC) 2/5 Fang, Yonggang MediaTek Inc.

TGbn (MAC) 2/5 Fischer, Matthew Broadcom Corporation

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TGbn (MAC) 2/5 Morioka, Hitoshi SRC Software

TGbn (MAC) 2/5 Motozuka, Hiroyuki Panasonic Holdings Corporation

TGbn (MAC) 2/5 Mutgan, Okan Nokia

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TGbn (MAC) 2/5 Wang, Qi Apple Inc.

TGbn (MAC) 2/5 Wang, Ying InterDigital, Inc.

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TGbn (MAC) 2/5 Zhou, Pei TCL

1. The Chair reminds that the agenda can be found in 11-24/0201r3. The Chair asks for the comments about the agenda.
   * 23/2006 is deferred
   * Agenda is approved
2. Technical submissions – NPCA/DSO:
3. [23/1891](https://mentor.ieee.org/802.11/dcn/23/11-23-1891-00-00bn-nonprimary-channel-access-follow-up.pptx) Nonprimary channel access – follow up Gaurang Naik (Qualcomm)

Discussion

* + C: Question on the backoff mechanism. Assuming that you have used CCA before the control frame and used EDCA and MU-EDCA?
  + A: Inclined to say yes, but need to check the details
  + C: If you are using the same backoff state, if the client is triggered often enough, can we make this AP initiated on the non-primary, just liek primary?
  + A: For uplink, the assumption has been that it is trigger-based, so the answer is yes. It minimizes issues with coordination issues and such
  + C: Slide 4. You are assuming that both AP and STA will switch to non primary channel. But the OBSS could be different from each device point of view?
  + A: Essentially the OBSS is hidden to one STA. It is recognized that it will happen and the solution could be trigger based with having frame exchanges on non-primary channel. But still it can happen and one of the mitigation techniques is to use only one non-primary channel
  + C: But even with two STAs that may not detect and with TB it may still not work
  + A: Yes there are other scenarios that need to be analyzed. But if the primary channel is busy, today non primary channel is not used, so can be seen as improvement and being opportunistic
  + C: Base direction aligns with our presentation. On staggering configuraiton in the simulations, do you mean to say that staggering is better if the signal strength is between -82 and -62 dBm. But if the STAs are closer, the staggering may hurt each other and see higher packet drops
  + A: Staggering has its own issues and there are cases that it might not give any performance gain and could be lower than NPCA and baseline configuration
  + C: If signal strengths are also above -62 dBm then NPCA is better than staggering. Can we work offline and work on the SP and bring one as our SP is very similar
  + C: Slide 5. Second bullet, you mention that there is delay from switching to primary and secondary channel. Why should this be? Because the switching should be minimal
  + A: This will depend on the implementation and we expect certain amounts of delay as there will be switching as you temporarily move your operations from one part of bandwidth to another
  + C: Slide 3. Assumption that you should limit TXOP to less than the primary channel. But what if that information is not known due to noise or others. So what should be the assumption for nonprimary channel
  + A: That is possible, and we need to have more discussion on this case. But my personal opinion is that to allow legacy to operate we should limit the operation. If there is noise or such which will not allow the length to be known, it is better not to allow non primary channel optional
  + C: On signaling, if the AP and STA do not negotiate the TXOP limit thresholds and the two devices may end up with different values and this may not be good
  + A: I agree that we may need more signaling
  + C: Perhaps we should figure out a way to protect the entire TXOP but if the OBSS protection is incremental, ie frame by frame, then the devices may not be able to transmit on the primary
  + A: Agree that incremental protection will create issues. The NPCA protocol should somehow handle it
  + C: Slide 9. How do you explain the differences between NPCA and staggering
  + A: It is scenario specific and each configuration works better in one scenario
  + C: Need more explanation on the difference?
  + C: Really depends on the signal stregngth and whether it is between PD to ED range then you will have UHR devices transmitting in parallel and you will have scenarios with good performance or a bad performance
  + C: You would observe the frame transmission on primary and then decide to switch the other one. Why would you use Medium synch as opposed to NAV synch.
  + A: I would like to understand why NAV synch is more stringent and would like to understand the difference
  + C: NAV synch is stringent and you have to wait until a certain duration or you receive a frame that sets your NAC
  + A: Will discuss it offline
  + C: Say AP and STA are 160 MHz and primary 80 is busy then the STA doesnt have to switch but if there is another STA it has to switch
  + A: It is still a switch even if the STA and AP are 160 MHz
  + C: But if the operating bandwidth doesnt change would the amount of delay the same ? Potentially the AP and STA may have different switching delays/requirements and it may cause ambiguity
  + A: Singaling should work out for these situations. May be we should talk offline
  + C: On simulation slide, slide 9 & 10, did you take into account these factors (like adjacent channel and medium sync)
  + A: No for adjacent channel. Not specifically set for transmit and receiver switches
  + C: Question of simulation on staggered channel. This is we try to avoid in some deployments, where as your simulation states that it is more optimal. We think it will greatly hurt the legacy.
  + A: It depends on the topology. In this topology, if the legacy AP is an adjacent AP then the UHR may not transmit on top of it, otherwise if it is far, it could. It is also a function of other factors such as rate adaptation. I think there is no rule that the primary must not be staggered but we see in many deployments.

1. [23/1951](https://mentor.ieee.org/802.11/dcn/23/11-23-1951-00-00bn-concurrent-cca-for-non-primary-channel-access.pptx) Concurrent CCA for Non-Primary Channel Access Leonardo Lanante (offino)

Discussion

* + C: Core of hte problem is having concurrent CCA and non-concurrent CCA coexistence. Can we disallow the concurrent CCA?
  + A: The concern is that the medium synch will reduce the benefits that we can get
  + C: There are a couple of solutions to minimize such as control frame etc. Probably we can have rules to find out the right balance. But concurrent CCA will also mean additional complexity on the STA side and probbly something that we may want to avoid
  + C: Figure shows that synch frame is sent immediately after the PHY header on primary. Will there not be a contention with EDCA?
  + A: IT does not have to be immediately after the header and this is something that can be discussed
  + C: So if there is a contetion with EDCA is TBD?
  + A: Yes, I did not show but we can have backoff here too, but it may not be needed
  + C: But it is possible that multiple APs send the synch frames
  + A: But it is fine as long as the synch frames are identical
  + C: Non-concurrent CCA STA will not be able to send the synch frame. How will the unfairness be solved
  + A: If the synch frame is received by non-concurent STA would do a back off and there would not be an issue
  + C: But this means that the concurrent CCA STA will always be able to transmit
  + A: No, even the concurrent CCA STAs should do a backoff
  + C: There are several risks with this and there may be advantage to have only the APs do this and probably better the APs coordinate
  + A: I agree that if only the AP transmits there will be advantages
  + C: This is nothing new that is created by the off-channel access
  + C: Better to be coordinated and this off-channel stuff fits in this architecture
  + C: Do you assume that the concurrent CCA means that there is a way to track it concurrently, but this probably means that a separate radio is needed
  + A: It is possible not to have a separate radio. For example, the preamble should have TXOP information

1. [23/2005](https://mentor.ieee.org/802.11/dcn/23/11-23-2005-01-00bn-non-primary-channel-access-npca.pptx) Non-primary channel access (NPCA) Minyoung Park (Intel)

Discussion:

* + C: On straw poll, there should be some discussions on the OBSS AP access has to be TBD.
  + C: You mention of identifying the OBSS APs. Do you mean identifying BSSID?
  + A: Yes
  + C: How do identify the BSSID. It may be unreliable and in high MCS, the data rates may be unreliable
  + A: We should use what we have. RTS/CTS, MU-RTS etc. Expect most frame exchanges which will make the information reliable. IF we have to rely on non-control frames, then we have to rely on color to identify OBSS APs
  + C: Slide 9. How thing this would scale with Mobile OBSS, STAs?
  + A: For the infrastructure APs, it will work as they dont move. If you are talking about mobile APs, you have to do the updates.
  + C: Do you think the list would be more static?
  + A: Yes. We do see mobile APs, but they are not that dense and do not expect lot of them moving around
  + C: Slide 9. Do you think there should be a periodic neighbor report
  + A: Yes, if there are mobile devices, it has to update its OBSS report while moving. But for static kind of situation, we should not see that much of an issue. But in general it has to be updated. The other option is to simplify further and the STA not report but that will limit the operation, but the AP will not know if the STA will be seeing the activity
  + (Discusses various scenarios on how it can be improved but points out that there will be issues with scalability)
  + C; Slide 6, what is the motivation to define NPCA bandwidth?
  + A: Just to give STAs an idea of what bandwidth they should operation
  + C: Can we use all idle channels?
  + A: Yes
  + C: With regard to NAV Synch delay and Media Synch delay, it is true that the NAVsynch delay does not have a default value, but that does not answer the question on if the NAV synch delay and Media Synch delay are applicable
  + A: We will still need to discuss the channel access. Basically my idea is that we should not become too conservative because the benefits would be low, but becoming too agressive will also hurt. So, we need to find the right balance

1. [23/1892](https://mentor.ieee.org/802.11/dcn/23/11-23-1892-00-00bn-thoughts-on-dynamic-subchannel-operation.pptx) Thoughts on Dynamic Subchannel Operation Gaurang Naik (Qualcomm)

Discussion

* + C: Motivation for having an anchor channel. We did not have it for SST in .11ax. You can ask the STAs to just switch to the appropriate subchannels. If you do not hae dynamic puncturing, why do you need the anchor channel in the design
  + A: Essentially with the anchor channel, the bandwidth associated with that channel becomes clear
  + C: The only motivation is dynamic puncturing then? Is there any other motivation?
  + A: In the cases, where the STA is monitoring the secondary channel, if there are subsequent PPDU from the AP, the STA does not have to monitor the entire channel but the anchor channel
  + C: if there is no dynamic puncturing then you can monitor any 20 MHz channel without the anchor channel
  + A: That is correct
  + C: A STA indicating on which channel it can switch to it may make sense from a coexistence perspective, but an AP indicating an anchor channel it is not clear what the motivation. Second question for downlink transmission why BSRP trigger frame is being shown. Is there a specific reason?
  + A: We can discuss further but there are advantages in having them in the legacy frames
  + C: Similar question as before. If the first 20 MHz channel is used it wont be punctured, there should not be an issue in dynamically puncturing. Secondary channel announcmeent may be beneficial if the STA does not want to use that channel
  + C: An example. 160 MHz, if primary is busy, then the AP can use the secondary, but the STA may not be able to use the secondary and AP should not schedule that STA
  + A: Here the main point is to how many one should switch to. But we can discuss further
  + C: It is better not to limit to BSRP trigger

Meeting is adjourned at 6;00 PM