IEEE P802.11
Wireless LANs

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| Minutes for Task Group (TG) 802.11 beExtremely High ThroughputTelephone Conferences in October and November 2019 |
| Date: 2019-10-14 |
| Author(s): |
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Abstract

This document contains the meeting minutes for the 4 telephone conferences held in October and November 2019.

Revisions:

* Rev0: Added the telephone conference held the 10th of October.

**Thursday 10 October 2019, 10:00 – 12:30 ET**

**Introduction**

1. The Chair (Alfred Asterjadhi, Qualcomm) calls the meeting to order at 10:07. The Chair introduces himself and the Secretary, Dennis Sundman (Ericsson)
2. The Chair reminds that the agenda can be found in 11-19/1720r0. Today we will go through submissions related to multi-AP.
3. 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.
4. The Chair reminds about attendance, send an e-mail to the Secretary. Based on the join.me app, it appears to be around 100 people in the call.

**Recorded attendance through the join.me app and/or reported attendance through e-mail:**
	* Akira Kishida (NTT)
	* AL Petrick
	* Albert Bredewoud
	* Alfred Asterjadhi (Qualcomm)
	* Andy Wang
	* Assaf Kasher
	* Boyce Bo Yang (Huawei)
	* Carl Kain (USDOT)
	* Cheng Chen (Intel)
	* Dandan Liang (Huawei)
	* David Kloper
	* David Lopez-Perez
	* Dmitry Akhmetov
	* Edward Au
	* Gaurav Patwardhan
	* George Calcev
	* Gongsu Gwak (KNUT)
	* Hanseul Hong (Yonsei Univ.)
	* Insun Jang
	* Jarkko Kneckt (Apple)
	* Jason Yuchen Guo
	* Jia Jia
	* Jinmin Kim
	* Jinsoo Choi
	* John Son (WILUS)
	* Joseph Levy (InterDigital)
	* Junghoon Suh
	* Kazuto Yano (ATR)
	* Kosuke Aio (Sony)
	* Lei Wang
	* Lily Lyu
	* Lorenzo Galati Giordano (Nokia Bell Labs)
	* Namyeong Kim
	* Patrice Nezou
	* Ross Yu
	* Rui Yang
	* Ryuichi Hirata (Sony)
	* Sang Kim (LGE)
	* Sang Sun
	* Sebastian Max (Ericsson)
	* Sigurd Schelstraete (Quantenna)
	* Stephane Baron (Canon)
	* Steve Shellhammer (Qualcomm)
	* Sungjin Park (LGE)
	* Taewon Song
	* Thomas Handte (Sony)
	* Xin Zuo (Tencent)
	* Yan Xin
	* Yonggang
5. The Chair asks if there are any announcements. Nobody speaks up.
6. The Chair asks if there is any objection to continue with the agenda with the submission in the listed order. Nobody speaks up, agenda approved.

**Submissions**

1. **11-19/1554r1, “Data Sharing for Multi-AP Coordination” – Sungjin Park (LG)**

**Summary:** The authors consider data sharing for joint transmission using a wireless link. They introduce several methods: Method1: Unicast data sharing, Method2: Broadcast data sharing, and Method3: Multicast data sharing.

**Discussion:**
**C:** Slide4. Are STAs a and b associated with S-APs as well as the M-AP?
**A:** No.
**C:** In this scenario, if you need to share the data first. The STAs have already the opportunity to receive the data when it is shared to S-AP. Is there really a gain to use joint transmission in this case?
**A:** We can use more streams to the STA for the JT.
**C:** How would you deal with the case if the links from the M-AP to the S-AP has errors?
**A:** We haven’t considered errors at this point.
**C:** Do you believe the S-AP should be associated to the M-AP.
**A:** Yes.
**C:** Slide 7. Why do we need an announcement frame?
**A:** The announcement frame is needed for grouping the S-APs.
2. **11-19/1573, “Channel Info. Feedback Method 4 Multi-AP Coordation” – Dandan Liang (Huawei)**

**Summary:** The authors propose a scheme where STAs only reports BFR to APs if the channel is good enough. For the APs with poor channels, the STA either sends nothing or reports the CQI.

**Discussion:**
**C:** Can we do the same thing with RSSI? So that the STA selects APs before sounding procedure.
**A:** Yes, I think that may work.
**C:** In Option 2. If we are going to have CQI and not BFR information, is this really useful?
**A:** It is good to tell the AP so it knows how bad the channel is.
**C:** What is this information supposed to be used for? Joint transmission, coordinated beamforming…?
**A:** It could be any underlying method.
3. **11-19/1588r0, “Multi-AP backhaul analysis” – Sigurd Schelstraete (Quantenna)**

**Summary:** The authors provide some analysis on impact of backhaul rate. They consider in-channel and off-channel backhauls, where in-channel shares the resources with the primary transmission. In-channel backhaul on effective throughput evaluations suggest that all gains from joint transmissions is lost due to the backhaul. For off-channel backhaul, the authors look at two scenarios: using the same antennas (same antennas as main transmission) for backhaul, or separate antennas for the backhaul. For separate antennas in the backhaul, with high backhaul rate, we can see that the JT is useful. Note that off-channel transmission is not “free”, spectrum resources are being used that could have been used otherwise. The author’s conclusion is that the only backhaul option that seems practical is off-channel wireless with dedicated resources, or wired backhaul.

**Discussion:**
**C:** Are you assuming that the S-AP is receiving backhaul data and transmitting to the STA simultaneously? In the dedicated antenna case.
**A:** I assumed they could operate simultaneously.
**C:** Do you have any assumptions on the fronthaul? For example if the STA is very poorly placed so only very low data rate could be used.
**A:** I didn’t change any settings in the fronthaul. So, this could be studied further.
4. **11-19/1592r1, “Simulation Results for Coordinated OFDMA in multi-AP operation” – Jason Yuchen Guo (Huawei)**

**Summary:** The authors have performed coordinated OFDMA simulations on system level. The coordinated OFDMA chooses resources in a random manner, which may not be optimal. Although they don’t see much gain with coordinated OFDMA they encourage other people to perform simulations.

**Discussion:**
**C:** Slide3. What’s the assumption on the path loss model between the APs and STAs?
**A:** I used the model in simulation document in 802.11ax.
**C:** Why did you choose this scenario with bursty intervals?
**A:** I believe this is how data appears in practice.
**C:** How do you consider collision between APs?
**A:** There are some collisions between the two APs. Since they are competing on the same channel, they sometimes collide.
**C:** With probability p = 0, both BSSs can use the full 160 MHz? This does not really make sense to me. It would make more sense to allocate based on traffic. I think we should dynamically allocate the BW in cooperative OFDMA.
**A:** Good comment.
5. **11-19/1593r0, “Joint Sounding for Multi-AP Systems” – Jianhan Liu (MediaTek)**
**Summary:** The authors investigate different channel sounding techniques for multi-AP. They claim that a sequential sounding can not enable joint transmissions, so a joint feedback is required. They provide two options. Option 2a: global antenna indexing, so you potentially need a very large “P-matrix”. Option 2b: interleaving subcarriers from different APs to reduce size of P-matrix. The interleaved scheme seems to provide similar performance as the baseline (large P-matrix).

**Discussion:**
**C:** Slide3. Sequential channel sounding is not appropriate for several reasons, but you claim on this slide that you cannot use sequential channel sounding.
**A:** In sequential channel sounding, the STA will feedback the V1 matrix between the AP1 and STA1, then you will get the V2 from AP2 and STA1. When you want to do the encoding you put V1 and V2 together. It has to do with the compressing. What you need to do is to stack the H matrices together and then calculate one big V-matrix.
**C:** You mention that the large P matrix increases CFO estimation and correction.
**A:** I will go through the maths next time.
**C:** Which sequence did you use for LTF interleaving?
**A:** We took the .11ax 2x LTF.

**Concluding remarks**

1. **AoB.** Nobody speaks up.

**Adjourned.**