

Cisco/UDel Meeting Minutes
July 30, 2015

Attendees: Jim Seymour, Len Cimini, Chien-Chung Shen, Li Li, Steve Chiou
Minutes Taken By: Len Cimini

NOTE: Slides will be provided at least two days before the next meeting. They will be available on an UDel website (the link will be provided). The audio for the meetings is now being recorded. Jim sent the link to the recording in an email after the meeting.

Raymond has left Cisco. In the future, another person supporting RAN1 (Vikram) will be joining our discussions

A. We first reviewed the minutes from the previous meeting on July 10, 2015.

- Jim:

- Option A doesn't have the collision detection that CAT4 has (which uses HARQ info). **We need to figure out how to use this information.**
- In Option A, there is only energy detection for LBT

- Chien-Chung:

- This is also true in Option B.
- QualNet will have a unified PHY by August 14. (Len isn't sure why we can't use Matlab for the entire project since we focus on the MAC layer and not really above.)

B. Then, we started a detailed review of the slides on the MatLab simulation that was performed.

Slides #2 and #3 – Matlab simulation of CSMA/CA. This is not exactly what the standard is using but it is probably close enough for first-order comparison.

Slide #4 – Matlab simulation of LBT CAT4

- Jim:

- How did you set the contention window? How many UE's?

- Li:

- I fixed the contention window size as 16 in all my simulations. There is only a single UE

Slide #5 – Simulation parameters WiFi/LAA. Poisson distribution assumed and used Ericsson's parameters (from their paper discussed in the last meeting)

- Jim: Slide #6 – Performance (2 pairs) → coexist very well

- Jim:

- What is a "pair"? → one sender/one receiver

Slide #7 – Performance (4 pairs) → 4 APs and 4 clients

Slide #8 – Performance (8 pairs)

- Jim:

- What arrangement in space

- Li:

- Located in the same place

- **Will simulate later with different distance attenuation. In general, our simulation needs to add more of the intricacies of the protocol.**
- LBT CAT4 seems to be very friendly to WiFi. Cisco had also come to this conclusion that LAA and CAT4 would be fair.
- Jim:
 - Why is LAA a little better? This is because a slightly higher bit rate is being used for LAA.
 - They found that LAA can use a reuse factor of 1 (due to time multiplexing, resource scheduling) while WiFi (which uses time division) cannot
 - With 4 pairs, why is WiFi so much worse than LAA? **This needs to be checked carefully.**

Slide #9 – DCA – Channel Bonding

- The discussion here was about what needs to be contiguous
- Jim:
 - Couldn't you have two 40 MHz channels that are not contiguous?
- Chien-Chung:
 - Standard doesn't mention 40 MHz + 40 MHz as non-contiguous

Slide #10 – Channel allocation in US

Slide #11 – Effective bandwidth

- One 802.11ac node with non-fixed primary channel, and ac with dynamic 20/40/80 or static 80 MHz. Assumed 19 subchannels, and a fixed load rate (0.5 or 0.9). Random channel selection for LAA/802.11 nodes (20 MHz)

Slide #12

- One ac with ~~y~~ fixed primary channel, and 4 subchannels. Non-fixed primary means that you can move it around.
- Chien-Chung:
 - All channels based on the primary channel is. Will have impact.
 - Thinks standard uses “fixed” but not sure.
 - **Action Item for Jim: Does 802.11ac mandate that primary is fixed?**
- Jim:
 - Can't you still use WiFi?
 - When LAA is busy on a primary channel, WiFi can't use any wider band?
→ Yes, since primary channel has to be included in data transmission?

Slide #13

- Different subchannel choice for LAA gives different results

Slide #14 – Discussion of points of interest and directions for work

- Jim:
 - Vikram will help here
 - Qualcomm has included this in their evaluations

Slide #15 – Next Steps

- LAA – carrier aggregation where they use 40 MHz and 80 MHz
- Channel selection algorithm
- Jim:
 - Three scenarios are good. He will check on #3 with WiFi experts

Actions Items:

- **Continue Matlab simulation study, include more details**
- **Study intelligent aggregation (including questions above)**

C. There is still no decision on the proposal.

Next meeting: Friday August 14 10:00 am (EDT)