

Cisco/UDel Meeting Minutes
July 10, 2015

Attendees: Jim Seymour, Raymond Kwan, 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 a UDel website (the link will be provided).

A. As in previous meetings, the bulk of the meeting involved reviewing the slides that were provided which reviewed a paper on LAA from Ericsson presented at ICC 2015. In this paper the key idea is to evaluate LBT with some more elaborate “stuff” including a mix of uplink and downlink traffic

- Jim:

- This is the CAT4 algorithm and very close to their 3GPP report. 3GPP is converging towards adopting this (and maybe more).
- There will be other options for other countries without these specific restrictions

- Chien-Chung:

- Our current platform (QualNet/EXata) is not capable of doing this type of simulation

We had a quick overview of the paper and then went directly to the simulation starting at Slide #10.

Slide #10 – basic simulation information

Slide #11 – (a) DL – only WiFi (b) DL (80%) and UL (20%) WiFi

- Jim:

- Cisco/Real wireless has generated similar results, but they are not as optimistic as the results in this paper

Slide #12 – simulation steps

Slide #13 – results (a) object data rate per user (b) mean buffer occupancy – obviously higher buffer occupancy is not good because can't serve as quickly. So, WiFi has more trouble, and LAA is more efficient.

- Jim/Raymond:

- Their results are very optimistic

- Raymond:

- Parameters can be varied. The results can change significantly if we change the threshold. An important question is what threshold should we use.

- Chien-Chung:

- They are using 4 channels and if can find a clear channel, LAA will do better (obviously).
- We don't know how they are actually doing the channel assignment.

- Jim:

- We should stick with 1 channel. → Then you must put LAA on the same channel as WiFi.
- Chien-Chung:
 - Our simulator still cannot have LAA and WiFi co-exist. So, we have limitations.
 - In the flowchart → we don't know how to choose the right parameters to transmit (TXOP)
- A discussion then followed about how you choose the parameters
- Raymond:
 - This is a fixed number because we could have problems with coexistence.
 - TXOP is not dependent on traffic.
 - In the newer versions, there is no notion of the q parameter. This coupling is now removed, but we need to check the latest document.
 - Option A has the exponential backoff, and we need to read this carefully. The 889 document on pg. 43 – it doesn't say explicitly. Category 4 – LBT – one candidate for variation of the window is exponential (this is a political issue).
 - Option A – if followed literally would not be good in terms of hidden node. So, won't follow this (**Raymond – can you provide an explanation?**)
 - The discussion on p. 43 is based on hard feedback (e.g., HARQ). He thinks there is a lot of interesting work to be done here. Option A is based on a calculation of the number of occupied slots??
- NOTE: In this paper, the big difference is 4 channels. But Cisco's results are consistent with Ericsson's when the scenario is the same.

From this point on, the discussion focused more on what we should do next. The first important question is what simulator to use. Jim said that they just used Matlab and wanted to know if there was a plan to fix the problems with the QualNet simulator. [Len thinks that we can simply use our own Matlab code and the students have started working on it.]

- Jim:
 - 802.11ac is again about how we do channel selection. Maybe we should look at this first. When there is only one channel, we can simply measure interference. There are now multiple channels. → ***What is the probability of overlap? What are potential strategies for coexisting?***
- Raymond:
 - WiFi utilizes multiple channels to pump up the peak rate. LAA also does this but uses LBT for access to the unlicensed spectrum. LAA must have some mechanism to do this and work with WiFi.
- Jim:
 - Are the multiple channels for WiFi contiguous? ***We need to check this.*** → [The standard seems to indicate that the channels are contiguous. More explanation will be given at the next meeting.]

- For LAA/LTE, they are not required to be contiguous (there is a Cisco document on this).
- ***What rules might we put in place here? What aggregations should we propose (e.g., 80 MHz contiguous or 20 MHz anywhere)? This is something we should be able to answer simply.***
- They haven't looked at these problems at all with RealWireless (just 1 20-MHz channel), and they haven't heard much about this in the industry. He suspects that Qualcomm is looking at this since they are the LAA proponents (and Cisco are the keep-you-honest WiFi guys)

Actions Items:

- **Study 802.11ac while we wait for simulator**
- **Build better simulation**
- **Study intelligent aggregation (including questions above)**

B. Jim contacted Megan Brogan about the proposal submission. They are still in the process of making decisions.

Next meeting: Thursday July 30 10:30 am (EDT)