IEEE P802.11  
Wireless LANs

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| IEEE 802.11 Technical Interest Group on Full Duplex  September 2018 San Diego Meeting Minutes | | | | |
| Date: 2018-09-10 | | | | |
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Abstract

This document contains the meeting minutes of the IEEE 802.11 Topic Interest Group on Full Duplex (FD TIG) sessions in Waikoloa, HI.

Note: Highlighted text are action items.

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# Monday September 10, 2018, PM1 Session

1. The IEEE 802.11 TIG meeting was called to order at 1:37 pm by the Chair, James Gilb (GA-ASI, GenXComm, Gilb Consulting).
   * Proposed Agenda slide deck: [FD TIG September 2018 Agenda](https://mentor.ieee.org/802.11/dcn/18/11-18-1383-01-00fd-fd-tig-agenda.ppt)

* **Meeting 1: Monday PM1**
  + Administrative: Reminders, Rules, Guidelines, Resources, Participation, Announcements
  + Approval of minutes from July 2018 and following teleconferences
    - 11-18-1348-00 (July Minutes),
    - Teleconference Minutes pending
  + Contributions for FD-TIG
    - 11-18-1222-01-00fd-system-level-simulation-results-of-full-duplex-transmission
    - 11-18-1540-00-00fd-proposed-fd-tig-report-text-on-system-level-simulation-results-of-full-duplex-transmission
    - 11-18-1588-00-00fd-Prototype-of-full-duplex-for-802-11
  + Status of FD-TIG report
    - 11-18-498-04-00fd- FD-TIG-report
* **Meeting 2: Tuesday PM 1**
  + Discussion on Other Contributions
  + Presentation and review of FD-TIG report
  + Update FD-TIG report based on comments
* **Meeting 3: Thursday AM1**
  + Update FD-TIG report based on comments received.
  + Approve FD-TIG report 11-18-0498
  + Prepare WG motions
  + Future Sessions planning

1. **Administrative: Reminders, Rules, Guidelines, Resources, Participation, Announcements**
   * The Chair reviewed the Guidelines for IEEE-SA meetings, including meeting guidelines and attendance recording procedures on slides 4 and 5 of the agenda slides.
   * He also reminded attendees to record their attendance.
   * There were 26 people in room.
   * The Chair reminded everyone that ideally, the procedure would be consensus based and would only resort to voting if there were unresolvable issues.
   * The chair updated the agenda to reflect new contributions
2. **Approval of Current Agenda and Past Minutes**

* Motion to approve agenda
  + Move: Yan Xin, Second: Allen Heberling; approved
* Motion to approve minutes for [July Meeting](https://mentor.ieee.org/802.11/dcn/18/11-18-1348-00-00fd-fd-tig-meeting-minutes-for-july-2018.docx).
  + Move: Allen Heberling, Second: Kome Oteri; approved
  + The Chair introduced the schedule for the week and the agenda was approved

1. **Discussion of Contributions**
   * [11-18/1222r1](https://mentor.ieee.org/802.11/dcn/18/11-18-1222-01-00fd-system-level-simulation-results-of-full-duplex-transmission.pptx) **system-level-simulation-results-of-full-duplex-transmission, Jason Yuchen Guo (Huawei Technologies). Presented by Jason Yuchen Guo**
     + This is an update from July where system level simulation results were compared with half duplex with varying SIC cancelation levels
     + The authors added latency improvement as a metric with non-full buffer traffic
     + Q: Does the traffic model assume equal amount of traffic in both directions?
       - Assume equal traffic although typically, downlink is more than uplink
     + Q: What is the benefit of full duplex for the hidden node and exposed node problem?
       - Problems may have occurred in the simulation but the results of this problem was not directly highlighted.
     + Q: Why graph latency gain vs self-interference cancellation on slide 11. The graph hides the actual values.
       - Latency is captured by difference between insertion of packet and decoding. We use the average values rather than actual values with EDCA latency capturing the half duplex transmission.
   * [11-18/1540r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1540-00-00fd-proposed-fd-tig-report-text-on-system-level-simulation-results-of-full-duplex-transmission.docx) **Proposed-fd-tig-report-text-on-system-level-simulation-results-of-full-duplex-transmission, Jason Yuchen Guo (Huawei Technologies). Presented by Jason Yuchen Guo**
     + Text to inserted in the document based on [11-18/1222r1](https://mentor.ieee.org/802.11/dcn/18/11-18-1222-01-00fd-system-level-simulation-results-of-full-duplex-transmission.pptx)
   * [11-18/498r4](https://mentor.ieee.org/802.11/dcn/18/11-18-0498-04-00fd-fd-tig-report.docx) **FD TIG Report, Yan Xin (Huawei Technologies), Presented by Yan Xin**
     + Discussion of updates to report since last meeting.
       - Added two figures for latency and recommendations:
         * The recommendations propose to create a SG with a PAR and 5C
2. **Discussion of Scope, timeline and plan**
   * + - Ask for SG at end of November
       - Approve report
       - Prepare WG motion
       - Run motion for formation of SG on Friday
         * Start after closing of WG plenary
         * Can start teleconferences to identify scope.
     + Items for September to November?
       - How do you define FD performance requirements at PHY layer?
       - Identify the sections of 802.11-2019 that will be affected.
       - Preamble required characteristics
       - Use cases with numbers, i.e., # of stations, type of traffic
       - Identify simulation environments, channel models to use. protocols
     + Discuss extension of the FD TIG operation till January

Recess at 2:41 pm till 1:30 pm on Tuesday

# Tuesday, September 11, 2018, PM1 Session

The session resumed at 1:30 pm with about 27 people in the room.

Agenda:

* Discussion on Other Contributions
* Presentation and review of FD-TIG report
* Update FD-TIG report based on comments

1. **Discussion of Contributions**
   * [11-18/1222r1](https://mentor.ieee.org/802.11/dcn/18/11-18-1222-01-00fd-system-level-simulation-results-of-full-duplex-transmission.pptx) **Prototype of full duplex for 802-11, Peiwei Wang (Huawei Technologies), Presented by Peiwei Wang**
     + Q: how do you train the analog canceller?
       - Offline digital tuning
     + Q: will you have any contribution / proposed text?
       - Proposed text in 1634
     + Do you expect to see the same suppression at 5 GHz (antenna cancellation?)
       - We have not tried that yet
       - Simulations show 70 dB even though we see 45-50 dB in the implementation. We are working towards 70 dB.
     + Show 2 x 2 results. Is the complexity quadratic as the number increases?
       - No, is 2 x 2 so far. We can speak offline.
     + Any discussion on putting the information into the report?
       - Yes, but may need some revision.
     + What is the resolution of your DAC/ADC?
       - 12 bit. It is commercially available 12 bit ADC/DAC**.**
   * [11-18/1632r1](https://mentor.ieee.org/802.11/dcn/18/11-18-1632-01-00fd-fullduplex-wifi-demo-description-for-fd-tig-report.docx) **FullDuplex-WiFi-Demo-Description-for FD-TIG-Report, Allen D. Heberling (GenXcomm, Inc.), Presented by Allen D. Heberling** 
     + Q: Do you have the numbers for the analog and digital cancellation?
       - No, still waiting for it but will incorporate it as soon as it is received.
     + Comment: Suggest creating a new sub-section to accommodate the multiple prototype contributions**.**
2. **FD-TIG Report Review**
   * Q: No traceability or references for statements at “small incremental costs” in economic feasibility. Can we justify that claim?
     + Clause 7: I am waiting for answer and hope to have answer by the end of the week.
     + Comments open till Thursday morning.

The meeting was recessed at 2:21 pm till AM1 on Thursday.

# Thursday, September 13, 2018, AM1 Session

Session resumed at 8:05 am. There were 31 people in the room.

Modified Agenda

* + Contributions
    - FD Live Demo
    - Update to 1632
  + Approve Minutes from Conference Call
  + Review and Approve FD TIG Report
  + Future Work

1. **Contributions**
   * **Live Bi-directional FD Prototype Demonstration from Huawei Ottawa.**
     + Q: What was the uplink? Was that also video?
       1. Showed bi-directional videos i.e. 1 uplink and 1 downlink
     + Is it a full 802.11 MAC?
       1. No, it is a full 802.11ax PHY but a basic MAC.
     + Is it LOS or NLOS
       1. NLOS. There are 4 meters between antennas with the antennas not pointed directly at each other as such there is a benefit from multipath
   * [11-18/1632r1](https://mentor.ieee.org/802.11/dcn/18/11-18-1632-01-00fd-fullduplex-wifi-demo-description-for-fd-tig-report.docx) **FullDuplex-WiFi-Demo-Description-for FD-TIG-Report, Allen D. Heberling (GenXcomm, Inc.), Presented by Allen D. Heberling** 
     + Added more information on the SIC levels and parameters
2. **Minutes for conference call:** [August 2018 Conference call minutes](https://mentor.ieee.org/802.11/dcn/18/11-18-1600-00-00fd-august-2018-conference-call-minutes.docx)
   * AI: Heberling and Xin will discuss OBSS with colleagues
     + May need to perform some additional research for more information
   * AI: Gilb will schedule an ad-hoc with Heberling, Xin and Kome to work out some figures, particularly Figs. 16 and 17.
     + Done. Figures have been updated
   * AI: Heberling to write draft recommendations paragraph.
     + Done
   * Motion to approve minutes:
     + Move: Yan Xin, Second: Harry Bims:
     + no objections: approved
3. **Review and Approve FD TIG Report :** [11-18-498rx](https://mentor.ieee.org/802.11/dcn/18/11-18-0498-08-00fd-fd-tig-report.docx)
   * Removed information on cost due to lack of data
4. **Discussion on way forward for FD TIG**
   * + Discussion on forming separate SG and amendment vs. being part of EHT.
       1. SP: Full Duplex work should be

A: A separate SG and amendment

B: A part of EHT and follow-on activities and amendment

* + - * 1. A: 13, B: 8
      1. Not conclusive: Recommend possibility of forming a SG or adding to EHT in the report.
      2. AI: Run straw poll at Friday closing meeting to identify support for SG formation. Send SP to reflector in advance for people to consider it.
         1. Put off decision on SG formation.
      3. AI: Amend report to incorporate the two possibilities and accept as final report
         1. Move: Allen Heberling
         2. Second: Harry Bims
    - Recommendation on extending the FD TIG operation to November
      1. SP: Extend operation till November

Move: Allen Heberling

Second: Alan Berkema

* + - 1. Accepted with no objections
  + Request Joint EHT/FD-TIG session in November meeting.
    1. Have early in the week e.g. Monday afternoon.

1. **Future work**
   * Conference calls: 10/11 and 11/1 – 7 am
   * Prepare presentation for the FD-TIG/EHT meeting

* Discuss requirements for Self-Interference-Cancellation (SIC)
* Identify clauses in 802.11-2019 for modification
* Discuss channel models, and simulations, for both PHY and protocol
* Request for 3 sessions in November
  + - Can start working on PAR and CSD either as part of the EHT or stand-alone.

1. The meeting was adjourned at 9:45 am
   * Note: closing report can be found here: [FD TIG Closing Report](https://mentor.ieee.org/802.11/dcn/18/11-18-1675-00-00fd-fd-tig-closing-report-september-2018.ppt)