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Wireless LANs

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| Spatial Reuse ad hoc group March 2016 minutes |
| Date: 2016-04-15 |
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Abstract

This document contains the meeting minutes of the IEEE 802.11ax ad hoc group on spatial reuse (SR) that met on 2016-03-14 and 2016-03-15 during the IEEE 802 Plenary meeting in Macao, China.

# Monday

At 2016-03-14T19:33+08:00 Jason Lee, the beloved Chairman of the 802.11ax Spatial Reuse (SR) ad hoc group, calls the meeting to order. The Chairman identifies himself and announces that he is affiliated with ETRI. The Chairman introduces Guido R. Hiertz (Ericsson) who acts as secretary and vice-chairman this week.

The Chairman reminds all attendees to record attendance for this session. The Chairman reviews the IEEE IPR patent policy. The Chairman calls for potentially essential patent claims. There is no response to his question. The Chairman reminds all attendees to identify themselves and their affiliations each time they speak for the first time on a meeting day.

The Chairman reviews the agenda for this week’s IEEE 802.11ax Spatial Reuse ad hoc group meeting sessions. The agenda is contained in 11-16/422r0. Graham Smith asks for item two and three in the agenda to be swapped. Nobody appeals to this change. Afterwards, the agenda is approved by unanimous consent. The Chairman announces that he will upload a revised version of the agenda.

At 2016-03-14T19:39+08:00 Graham Smith presents 11-16/212r4. At 2016-03-14T20:01+08:00 Graham concludes his presentation and attendees form a queue to ask questions.

COMMENT: What is the unwanted signal from BSS AP on slide 9?

RESPONSE: The distance between these is the SNR. The curve tries to display the SNR for all stations in the scenarios.

COMMENT: So the unwanted signal is measured at the transmitter?

RESPONSE: Yes. Because of reciprocity assumptions this is also valid for receive end.

At 2016-03-14T20:07+08:00 Graham Smith presents 11-16/350. At 2016-03-14T20:20+08:00 Graham concludes his presentation and attendees form a queue to ask questions.

COMMENT: I believe that it’s not fair to compare different scenarios.

RESPONSE: More rules are needed on when to apply TPC.

COMMENT: Can you explain on the issues with TPC you identified?

RESPONSE: Because of reduction of power the received power level of the stations furthest away and closest are equalized. That reduces levels for all.

At 2016-03-14T20:29+08:00 Graham Smith presents 11-16/310. Graham explains that the according text was designed for 802.11mc. However, he was asked to take it to 802.11ax.

At 2016-03-14T20:37+08:00 Graham asks the following straw poll:

“Text describing DSC may be considered for inclusion into the 11ax amendment.”

Attendees form a queue to ask questions.

COMMENT: Is this to exclude other solutions?

RESPONSE: No this is an attempt to propose text for further discussion and one possible solution.

Straw Poll result: Yes/No/Abstain: 2/1/29

This Straw Poll is recorded as A20160314001 and records the opinion of the Spatial Reuse ad hoc group.

At 2016-03-14T20:45+08:00 Junichi Iwatani presents 11-16/360. Junichi concludes his presentation at 2016-03-14T20:54+08:00. Attendees form a queue to ask questions.

COMMENT: It would be interesting to see scenarios that use unplanned deployments too.

COMMENT: With fixed threshold these simulations do not qualify as DSC. Also, there are too few channels considered in this simulation. DSC won’t help then. DSC helps if more channels are available.

RESPONSE: We did consider only downlink transmissions here.

COMMENT: If in this scenario everybody just reduces power this is not a dynamic behavior this is just a coordinated management of the network.

COMMENT: How did you model the capture effect in the PHY?

RESPONSE: We consider a 9 dB difference in preamble power to switch over.

COMMENT: Do you assume only HE STAs in your simulations?

RESPONSE: Yes, all STAs are 802.11ax STAs. There are no legacy STAs.

At 2016-03-14T21:05+08:00 Jun Luo presents 11-16/382. Jun Luo concludes his presentation at 2016-03-14T21:10+08:00. Attendees form a queue to ask questions.

COMMENT: What is the incentive for APs to set “SR allowed”?

RESPONSE: Especially in an Enterprise scenario there are many reasons why this is advantageous.

COMMENT: So with SR disallowed the use of COLORING is prohibited?

RESPONSE: Yes.

COMMENT: What if there are multiple APs having different settings?

RESPONSE: The setting is per PPDU. It’s not a global setting per BSS.

At 2016-03-14T21:23+08:00 Jun Luo asks the following Straw Poll:

“Do you support to add the following to the SFD?

* Include the ‘SR\_allowed’ signaling in HE-SIGA to indicate whether SR operation is allowed or not.
	+ use a value of Spatial Reuse field to indicate SR is disallowed
	+ The conditions to disallow SR are TBD”

Straw Poll result: Yes/No/Abstain: 21/0/17

This Straw Poll is recorded as R20160314001. The approval rate of this straw poll exceeds 75%. As a consequence the straw poll and the result will be reported to the 802.11ax TG.

At 2016-03-14T21:24 the beloved Chairman recesses the meeting.

At 2016-03-14T20:30+08:00 fifty-three attendees (including the Chairman and the secretary) were in the meeting room.

# Tuesday

At 2016-03-15T16:01 the beloved Chairman calls the meeting to order. The Chairman asks for any changes to the agenda. No changes are proposed.

At 2016-03-15T16:02 James Wang presents 11-16/414r0. At 2016-03-15T16:18 James Wang concludes his presentation and attendees form a queue to ask questions.

COMMENT: You may want to have a different value for start of the curve for AP.

RESPONSE: This is still open to decide.

COMMENT: Do you want to communicate a min and max value through the AP?

RESPONSE: This is still open.

COMMENT: Is this PD or ED?

RESPONSE: This is carrier sense from OBSS, PPDU detection.

COMMENT: What is the relationship between transmit power and sensing threshold? Why do you link them together? These values are not connected.

RESPONSE: This is a natural, conservative behavior. If you lower your voice you can talk to your neighbor.

COMMENT: This doesn’t solve the problem. Lowering your power to increase your sensing threshold doesn’t help.

RESPONSE: This is meant to introduce freedom to in selecting thresholds.

COMMENT: Can you explain to me how this is better than DSC?

RESPONSE: This rule does not preclude you from setting your threshold from basing on beacon power reception level.

COMMENT: No, this scheme does limit a station to a fixed rule.

COMMENT: If you are sharing with legacy networks they are not going to lower their transmit power.

COMMENT: But if we accept this we enforce that both are linked together.

COMMENT: I don’t think that DSC and this technology conflict with each other.

At 2016-03-15T16:23+08:00 James Wang asks the following Straw Poll:

“Do you support to replace the text in 5.1 of SFD P35L1 ‘and a reduction in the TXPWR may be accompanied by an TBD increase in the OBSS\_PD threshold value’ with the following adjustment rules:

Adjustment Rule for OBSS\_PD

$$OBSS\\_PD\_{Threshold}=max\left[\begin{array}{c}OBSS\\_PD\_{threshold\\_min}\\min\left(\begin{array}{c}OBSS\\_PD\_{threshold\\_max}\\OBSS\\_PD\_{threshold\\_min}+(TX\\_PWR\_{ref}-TX\\_PWR\end{array}\right)\end{array}\right]$$

where TX\_PWRref is an absolute powerlevel.

$$OBSS\\_PD\_{Threshold\\_max}=OBSS\\_PD\_{Threshold\\_max}(20 MHz)+10×log⁡(^{BW}/\_{20 MHz})$$

$$OBSS\\_PD\_{Threshold\\_min}=OBSS\\_PD\_{Threshold\\_min}(20 MHz)+10×log⁡(^{BW}/\_{20 MHz})$$

* Preserves fairness for the lower devices
* TX\_PWRref can be a TBD level (preferred value is 23 dBm)
* Class A: TX\_PWR=transmit power
* Class B: TX\_PWR=transmit power+TBD dB”

Attendees form a queue to ask questions.

COMMENT: Is this a shall or a may condition?

RESPONSE: There are two TBDs in this. So it still gives some freedom.

Straw Poll result: Yes/No/Abstain: 22/1/8

This Straw Poll is recorded as R20160315001. The approval rate of this straw poll exceeds 75%. As a consequence the straw poll and the result will be reported to the 802.11ax TG.

At 2016-03-15T16:30+08:00 Frank Hsu presents 11-16/403r1. At 2016-03-15T16:45+08:00 Frank Hsu concludes his presentation and attendees form a queue to ask questions.

COMMENT: What is nAx?

RESPONSE: This is probability to use the new scheme.

COMMENT: What is is the x-axis.

RESPONSE: This is provided in dB.

COMMENT: Is the traffic up- and downlink?

RESPONSE: I believe all stations are full buffer. I don’t remember if it was UL and DL.

COMMENT: The results are not telling us enough. More details on the simulation assumptions are needed. It’s a nice start but more information is needed.

RESPONSE: I will try to revise the slide set to provide more details.

COMMENT: So with first case the threshold is changed for everybody by a fixed amount?

RESPONSE: Yes.

COMMENT: So with the second case the threshold is changed and TPC is changed?

RESPONSE: Yes.

COMMENT: What is the throughput distribution in this network? Are STAs starved?

RESPONSE: We have not changed the 5%tile data.

COMMENT: Do you have a reference of the performance if you wouldn’t do any of the proposed changes?

RESPONSE: We do not have this data. We will check with our colleagues.

COMMENT: Did you run traffic or did you just estimate SINR?

RESPONSE: All stations had traffic.

COMMENT: You state that there is no MAC overhead and there are no collisions.

RESPONSE: Yes, our simulation tool doesn’t have these details, just an abstraction.

At 2016-03-15T16:55+08:00 the beloved Chairman adjournes the SR ad hoc group sessions for this week.

At 2016-03-15T16:33+08:00 61 participants were in the room.