IEEE P802.11
Wireless LANs

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| TGac MU-MIMO Ad Hoc Minutes |
| Date: Jan 18, 2011 |
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Abstract

This document contains the minutes from MU-MIMO ad hoc held at the Jan 2011 802.11 interim.

MU-MIMO ad hoc minutes

**Wed PM1 MU-MIMO Session**

**Session start ~1:30pm**

Chaired by Sameer Vermani (Qualcomm)

Minutes by Robert Stacey (Intel)

Chair issued call for essential patents

No response received

**11/0102r0 – Maximum dimension per stream SNR feedback**

Nir Shapira (Celeno)

Pre-Motion #1: Do you support the feedback of per-stream SNR for all dimensions in MU type feedback, to be carried in the Beamforming Report Field, regardless of the indicated dimension (Nc) value in NDPA?

Discussion:

Eldad: What exactly is changing in the spec framework?

Nir: Open to suggestions.

Youhan: I don’t think SNR is sufficient information for making rank decisions

Nir: True, but it provides basis for asking for more information. It gives an indication that something changed in the channel.

Jun: Implementation question. If you are not collecting feedback for certain streams then its an implementation burden to collect SNR.

Nir: Does require the client to do some extra calculations.

Ning: Like to see some sims on benefit this brings.

Nir: We have some sims that show how Eiden modes change with time, btu don’t have something right now.

Fails: 7/5/28

11/111r0 No-MCS Recommendation in MFB

Nir Shapera (Celeno)

Pre-motion #2: Do you agree for a No-MCS recommendation, to signal the case where no MCS can be supported, and be assigned an unused MCS index in the MFB field?

Discussion:

Hongyuan: What if the first user has the same issue? For the third user you can respond to BAR, but for the first user there is no MAC information.

Nir: For the user you can still ask for feedback on MCS afterwards. A delayed indication.

Raja: When does the STA respond with no MCS and when that it didn’t receive any MPDUs?

Nir: It is implementation dependent

Robert: The STA did not receive any MAC packets, how does it know to send No-MCS?

Nir:

Sameer: No differentiation between MU and SU?

Nir: There is no reason to restrict it to MU. It is moreuseful for MU though.

Fails: 9/8/24

11/0142r0 DL MU-MIMO Support for non-AP STAs

Nir Shapira

Discussion:

Eldad: What does time shifted mean?

Nir: Video that is recorded and stored temporarily

Sudheer: Architecurally is it direct link with MU-MIMO?

Nir: I was thinking of cases where STA would serve multiple STAs, not just direct link.

Robert: In TDLS the AP is not involved in the management. This would require it to get involved in the Group ID assignment.

Strawpoll #1: Do you agree DL MU-MIMO capability for non-AP STAs is beneficial for TGac and is worth further investigation?

Result: 9/6. Abstains not counted.

Will not do second strawpoll in presentation.

**11/0095r1 Indication of Group Address in PLCP Header**

Jarkko Knecht (Nokia)

Discussion:

Simone: We already voted in the use of Partial AID, how is this different?

Jarkko: All broadcast and multicast frames have the same Partial AID (0). Does not show the group address.

Raja: We have a MAC/PHY separation. Are we putting MAC stuff in the PHY?

Jarkko: All group addressed frames are transmitted as SU transmission. Having this indication of group addressed frame is similar to Partial AID. I must emphasise that we are getting a tangible benefit.

Pre-motion #3: Are you in favor of including the changes in 11-11-0095-01-..in the specification framework?

Fails: 10/13/21

MU-MIMO ad-hoc adjourned at 2:29pm

**Tues AM2 MU-MIMO Session**

**Session start ~10:30am**

Chaired by Brian Hart (Cisco Systems).

Minutes taken by Sameer Vermani (Qualcomm)

Chair issued Call for Essential Patents

No response received.

**11/0053r1**, **“Dimension Reduction for MU-MIMO”, presented by Sameer Vermani (Qualcomm)**

Pre-motion 1: Do you accept the following rule for sounding feedback:

 ***STA shall send a feedback frame with the “MU type” bit in the VHT MIMO control field set to the same value as the MU/SU bit in the corresponding STA’s Info field in NDPA***

Passed 33/0/4

Pre-motion 2: Do you accept the following rule for dimension reduction in MU-MIMO:

 ***When the Feedback Type field is set to MU, the STA shall send a feedback with the Nc field value in the VHT MIMO Control field equal to the Nc field value in the corresponding STA Info field in the NDPA provided the Nc requested is not larger than the number of currently active receive antennas***

Passed 32/0/5

**10/0082r0** “**Error Recovery for TXOP Sharing”, presented by Michelle Gong (Intel)**

Jarkko from Nokia : What happens when TxOP contains multiple MU-MIMO PPDUs ?

Michelle: Error recovery rules already exist in spec which can be applied

Peter from Ralink: Past recovery proc for not receiving an ACK is that TxOP holder retransmit within PIFs

Michelle: That’s within the TxOP, this is before you get the TxOP. Once you establish the TxOP It is the same.

Jarkko: Is BA mandatory ?

Michelle: BA has to be there.

**Pre-motion 1 : Do you support updating the TGac spec framework to include the following protocol rule?**

* **For MU MIMO TXOP sharing:**
	+ If a valid response to the initial frame of a TXOP is not received, the AP shall initiate an exponential backoff for the primary AC

Passed 32/0/3

**10/0131r0, “NDP for MU Link Adaptation”, presented by T. Pare (Ralink)**

Someone from CSR: With this interference information, what is the source of this interference ?

Tom: Precoding is not perfect. In near far condition as well, it can happen, the guy at long distance, the energy from the enar user is bleeding into his sub-space , the AP can lower down power to the near user…after looking at this metric.

Ron from BRCM: Which user’s energy is leaking ?

Tom: Strong user’s energy is leaking …

Ron: I think weak user cannot be affacted.

Nir from Celeno: I don’t agree with what Ron said about weak user not being affected .

Tom: Thanks and I agree

Ning from Atheros: It will be informative to see the benefit of this feedback.

Tom: Ok, thanks

Hongyuan from Marvell: Does this mandate immediate feedback ?

Tom: Not a problem as this SIR is just based on channel estimates.

James mediatek: How would you do the calculation ?

Tom: Channel taps of own streams divided by interference channels.

**SP1: Do you support the idea of including MU interference metric feedback for .11ac?**

**Passed: 16/0/11**

**SP2: Do you support the idea of including a precoded MU-NDP mode to enable MU-DL evaluation?**

Huawei: Sending precoded NDP but you do not have channel yet?

Tom: Have an initial sounding before this MU-NDP is sent. Assumption is that there has been a sounding before this.

Ron: Can this be done using MU-MIMO MFB feedback ?

Tom: That would require expanding VHT Control field. I got resistance on that approach.

**Failed 6/11/14**

**11/0049r0 “NDP Transmission”, Hogyuan Zhang, Marvell.**

**Pre-motion 1: Do you agree to insert the following new section in the spec framework?**

6.3.xx Transmission of a VHT NDP

A STA shall transmits a VHT format NDP using the following TXVECTOR parameters:

 —        LENGTH shall be set to 0.

 —        NUM\_USERS shall be set to 1.

 —        GROUP ID shall be set to 63 (all ones).

 —        NUM\_STS shall indicate two or more space-time streams.

 The number of space time streams sounded and as indicated by the NUM\_STS parameter shall not exceed the value indicated in the Compressed Steering Number of Beamformer Antennas Supported field in the VHT Capability element of the STA that is the intended recipient of the VHT NDP. The NUM\_STS parameter may be set to any value, subject to the constraint of the previous sentence, regardless of the value of the Supported MCS Set field of the VHT Capabilities field at either the transmitter or recipient of the NDP.

 A STA shall not transmit an NDPA addressed to a STA or broadcast and including a STA’s AID in one of the STA Info fields in the frame unless it has received from that STA a VHT Capability element where the last VHT Capability element received has the SU Beamformee Capability field set to 1 or the MU Rx Capability field is set to 1 or both fields set to 1.

Sudhir: Is this for SU case ?

Hogyuan: NDP is a SU packet.

**Passes 27/0/4**

**11/0096r0, “Indication of Group Address in PLCP Header”, Jarkko (Nokia)**

**11/0095r0, “Indication of Group Address Text”, Jarkko Kneckt (Nokia)**

Brian:To get max power savings, FMSIDs should be random ?

Jarkko: Similar to AIDs , we can have guidelines.

Michelle: Isn’t essentially this a groupcast address ? Why did you chose FMSID ? In your proposal you cannot aggregate ? I am wondering what’s the motivation ? Are you considering group address ?

Jarkko: FMSID is a very nice feature to have

**Pre-motion: Include the normative text as described in 11-11-0095-00-00ac-Indication-of-Group-Address.doc to the 11-09-992-18-proposed-specification-framework-for-tgac.doc after changes (if any) arising from 1139r0 are applied ?**

**Fails : 2/11/20**

**Session Recessed at 11:54 am.**

**Pending presentations:**

**11/0102, “Maximum dimension per stream SNR feedback”, Nir Shapira (Celeno)**

**11/0111 , “No MCS recommendation in MFB for MU MIMO”, Nir Shapira (Celeno)**