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Re:	This is a response to Call for Technical Proposals regarding IEEE Project P802.16j.
Abstract	The document contains technical proposals for IEEE P802.16j that would provide an MS channel measurement and its report in RS.
Purpose	The document is submitted for review by 802.16 Working Group members.
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RS Measurements and Channel Estimation between transparent RS and MS

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1. Introduction

All the radio resources are allocated by the MR-BS and resource allocation information is broadcasted to all the RSs and MSs. When the MS moves around within cell coverage, the MR-BS should estimate the radio channel of the MS. To minimize the used radio resource for sending the data to the MS, the MR-BS shall select RSs that relay the data and are located near the MS. The relay path to the MS is calculated and known to the MR-BS. The MS has a limit of maximum power transmission in uplink. It's appropriate that the uplink path is established by the MS via the RS near the MS. The channel information about the MS shall be known to the MR-BS.

After the network entry procedure, the fixed RS within cell coverage makes a relay operation between entities. Before the MR-BS allocates the radio resource in which the RS sends or receives the data, it's important that the MR-BS gets information about radio channel between entities. The measurement of the radio channels either between RSs or between the RS and the MR-BS is required before the MR-BS selects a path between the MR-BS and the RS. Given the RS, the MR-BS has a path selection algorithm and can determine an optimal path that is calculated from the measurements of radio channels.

When the MS moves around within cell coverage, the measurements of the radio channel from the MS to either the RS or the MR-BS shall be known to the MR-BS for the purpose of resource allocation. The MS only can receive the downlink frames that do not have information about RS identification. That is, there is no explicit procedure that the MS informs the MR-BS of the measurements of the radio channel to RS or MR-BS.

2. Proposed Solution

When the MS sends fast feedback channel or PHY burst in uplink, it is required that the RSs measure its unicast data and send the measurement information to the MR-BS. The reported information is utilized to estimate the radio channel between the MS and the RS. Figure 1 shows the unsolicited Report Response (REP-RSP) message for the RS to send the received information to the MMR BS.

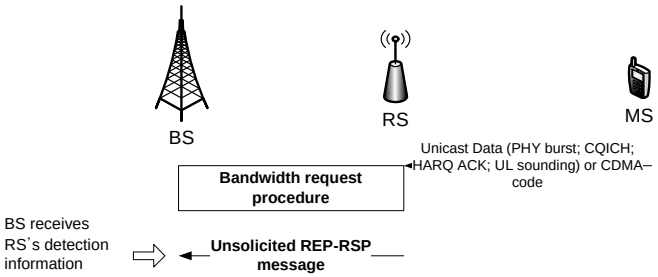

Figure 1 RS Measurement Report (RM-RPT) message.

How does the RS get the uplink allocation information used for measuring the received signals from the MSs? This contribution proposes that the UL-MAP is utilized for getting the uplink allocation information. This approach does not require additional signaling overhead for the MR-BS to notify the allocation information to the RS. Receiving UL-MAP and extracting uplink allocation information, the RS measures the received signals transmitted by the MSs. The measured value are filtered and sent by the RS. The thresholds are used for filtering the measured values and are broadcasted in the UCD messages. Figure 2 shows automatic measurement and filtering operation for the uplink allocation specified by the UL-MAP.

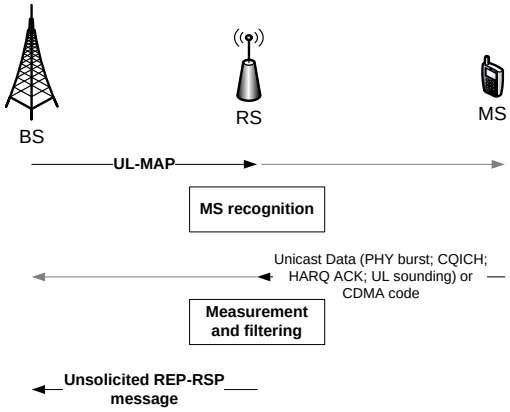

Figure 2 MAP-triggered measurement and filtering.

This filtering of the measurements is to reduce the number of report events. Figure 3 shows the thresholds that define the range of the measured value. The RS shall maintain the information about MSs including the measured values on the radio channels and the history of measurement reports during a interval. When the measurement value of the MS is in the different range compared to the range at previous report of the MS, the RS shall send the unsolicited REP-RSP message to the MR-BS and inform the MR-BS of the change of the range so that the MR-BS uses this updated channel information. The thresholds describing the ranges of measurement value are specified by “RS measurement report thresholds”, which is to minimize the number of report events.

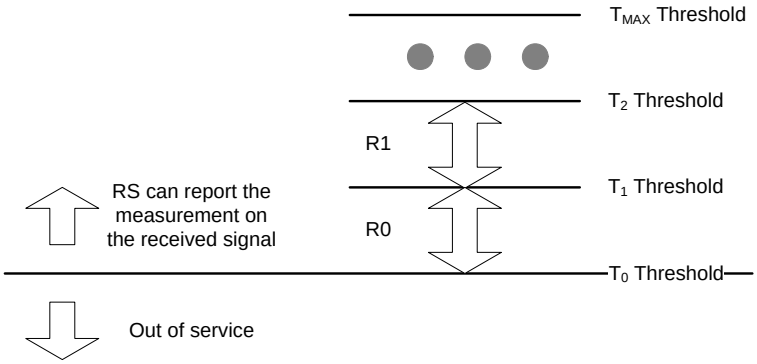

Figure 3 MS measurement report thresholds.

For an example, Figure 4 shows three reports from RSs for the MS. RS_1 and RS_2 report information that the received signal from the MS is in the range R_1. Based-on the reported information RS_1 and RS_2 can receive unicast data transmitted by the MS and relay it to the MR-BS with established relay paths. That is, the MR-BS selects RS_1 and RS_2 as relaying entities near the MS.

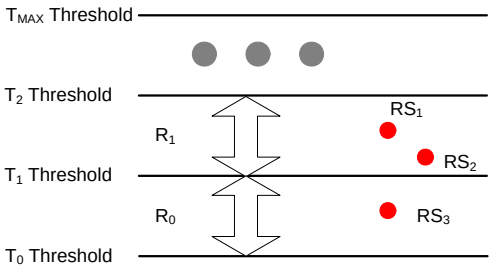

Figure 4 MS measurement report thresholds.

3. Text Proposals

[Insert the text at the section 6.3.2.3.33 before the Table 63]

If the RS is required to report MS channel measurements, it ~~shall~~ may send the unsolicited Report Response (REP-RSP) message with the RS Measurement Report TLV.

[Change the text at the section 6.3.2.3.33 after the Table 63]

The REP-RSP ~~shall~~may contain the following TLV encoding parameters:

Report

Compound TLV that shall contain the measurement Report in accordance with the Report Request (see 11.11).

RS Measurement Report

Compound TLV that ~~shall~~ may contain one Frame Number TLV. The measured values of the received signals from MSs are reported in the form of CINR threshold index or CINR.

The following parameters in the RS Measurement Report TLV may be included in the unsolicited REP-RSP message:

Frame Number

8 LSB of the frame number in which this message is transmitted by the RS.

CINR Threshold Index

This is an index of "RS measurement report thresholds". The CINR of received signal from the MS with Basic CID is in the range from the threshold value of "RS measurement report thresholds" indexed by "Threshold index" to the threshold value indexed by next index, "Threshold index" plus one. 0xff means that the RS cannot maintain the communication link to the MS. This TLV may appear multiple times.

~~**CINR**~~

~~This parameters indicates the CINR measured by RS from the MS. It shall be interpreted as a signed value in units of 0.25 dB. This TLV may appear multiple times~~

[Change the text at the section 11.12]

11.12 REP-RSP management message encoding

Name	Type	Length	Value
Report	1	*Variable*	Compound
Channel Type Report in Wireless MAN OFDMA PHY	2	*Variable*	Compound
Channel transmitted power	147	1	See 8.3.7.4. and 11.1.1
RS Measurement Report	3	*Variable*	Compound

The RS Measurement Report TLV consists of the following parameters (see 6.3.2.~~53.1~~ 33 for detail).

Name	Type	Length	Value
Frame Number	3.1	1	8 LSB of the frame number
CINR Threshold Index	3.2	3	2 bytes: Basic CID of reported MS 1byte: The index of the field, "RS measurement report thresholds", that the measured CINR value is in the range from the threshold value of this index to the threshold value of next index.
~~CINR value~~	~~3.3~~	~~3~~	~~2 bytes: Basic CID of reported MS~~ ~~1byte: Signed integer, in units of 0.25dB~~

[Insert the following entries into table 353-UCD PHY-specific channel encodings-WirelessMAN-OFDMA:]

Name	Type (bytes)	Length	Value
RS measurement information maintain time	???	2	Maximum time, in units of seconds, in which the RS maintains the source information without measuring any received signal from the source.
RS measurement report thresholds	???	Variable	This is a list of signed integer numbers, where each number is encoded by one byte. The values are sorted in increasing order. The number encoded by each byte represents the signed threshold value in normalized C/N of received signal, in units of 0.5dB. The RS can start to report the measurement of the MS only when the received signal is greater than the first threshold.

[Insert the text after 6.3.25:]

6.3.25.1 MS channel measurement triggered by MAP for transparent RS

The RS shall receive the MAP message which includes all the resource allocations to the MSs. All the received signals of uplink unicast data sent by the MSs ~~shall~~ may be measured according to the information about uplink resource allocations. The RS ~~shall~~ maintains the information about MSs including the measured values on the radio channels and the history of measurement reports during a interval. When the measurement value of the MS is in the different range compared to the range at previous report of the MS, the RS ~~shall~~ sends the unsolicited REP-RSP message to the MR-BS and inform of the change of the range so that the MR-BS uses this updated channel information. The thresholds describing the ranges of measurement value are specified by "RS measurement report thresholds", which is to minimize the number of report events. Figure ??? shows RS's measurement operation and its report event. The unsolicited REP-RSP message includes the RS Measurement Report compound TLV that ~~"Basic CID" and~~ "CINR Threshold Index" TLVs identify ~~the MS and~~ the ranges of the measured CINR values~~, respectively~~.

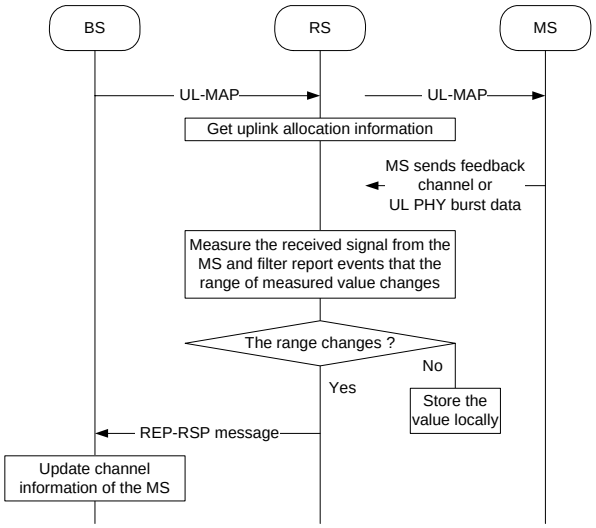

Figure ??? – MAP-triggered measurement and threshold-based report~~.~~

서식 있음: 가운데