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| Project | **IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16> |
| Title | **Clarifications for MS handover procedure among access stations with same preamble/FCH/MAP** |
| Date Submitted | **2007-07-06** |
| Source(s) | Chie Ming Chou, Tzu-Ming Lin, Fang-Ching Ren, Wern-Ho Sheen, I-Kang Fu<br>Industrial Technology Research Institute (ITRI)<br>/ National Chiao Tung University (NCTU)<br>chieming@itri.org.tw<br><br>Ray-Guang Cheng, Sheng-Shun Chang, Ping-Chen Lin<br>National Taiwan University of Science and Technology (NTUST)<br>crg@mail.ntust.edu.tw |
| Re: | IEEE 802.16j-06/019:"Call for Technical Comments Regarding IEEE Project 802.16j " |
| Abstract | This contribution describes the remedy and required messages to clarify for MS handover procedure among access stations with same preamble/FCH/MAP defined in IEEE 802.16j-06/026r4. |
| Purpose | To make IEEE Project 802.16j more maturity |
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# Remedy of MS Movement among access stations with same preamble/FCH/MAP

## 1. Problem Statement

In [1], subclause 6.3.22.5.2 specifics two operation modes for MS movement among access stations with same preamble/FCH/MAP where the access stations forms a Virtual RS group defined in subclause **6.3.9.16.3.1**. However there are two major ~~problems~~ issues to be clarified.

- ~~How to configure which mode and reporting scheme with regarding to~~ The messages required for the configuration of RS regarding to the reporting modes and the corresponding parameters ~~would be used during RS's operation have~~ are not ~~been addressed~~clearly defined.
- ~~Besides, after selecting a new target RS, how to notify original serving RS and new target RS about the decisions to release and take over associated MS~~ The notification of the change of access RS for the original serving RS and the new target RS is not specified.

## 2 Suggested Remedy

To resolve these problems, following remedies are proposed in this contribution.

*Remedy 1: Configuration of Reporting Mode & Parameters*

The configuration of the reporting mode ~~will be~~ is done during RS network entry and initialization. MR-BS shall use RS_Config-REQ message ~~may be transmitted by MR-BS~~ to configure the reporting mode and ~~employed~~ the related parameters of the RS.

*Remedy 2: Handover ~~Target~~ Notification*

A new message VGHO-RSP is defined for MR-BS to notify~~ing~~ handover results within a Virtual RS group. MR-BS shall transmit this message to original access RS and new target RS individually. Original access RS (new target RS) will ~~be indicated to release the responsibility of data~~ stop (start) relaying data for the specified MS ~~and new target RS will be recommended to perform data relaying for this MS~~at the specified time.

## 3 Proposed Text Change

----------Start text proposal----------

[*Adopt the following modifications into the P802.16j baseline document*]

### 4. Abbreviations and acronyms

[*Insert the following at the end of section 4*]

VG Virtual RS group

### 6.3.22.5.2 MS Movement among access stations with same preamble/FCH/MAP

In this case, MS is not aware of the HO. Therefore, RS and MR-BS shall perform measurement of MS signal

quality to assist MS movement among stations (RSs, MRBS) that share the same preamble/FCH/MAP.

The stations (RS or MR-BS) which share the same preamble/FCH/MAP form a ~~virtual group (~~VG~~)~~. All stations (RSs and MR-BS) in the VG shall measure the signal quality (RSSI, CINR) and the Timing Adjust (TA) for each active MS served by this VG to support MS mobility within the VG. All RSs shall use MOB_RSSCN-REP to provide MR-BS with the selected report metrics (RSSI and/or CINR and TA) for each active MS when needed.

The MOB_RSSCN-REP is sent to the MR-BS using the reporting modes specified by MR-BS. Two reporting modes shall be supported by RSs. The reporting mode and related reporting parameters is configured in RS_Config-REQ in subclause **6.3.2.3.67**

~~<Section note: the configuration of the reporting mode is specified by MR-BS during RS initiation. This is TBD.>~~

MR-BS may select a new target RS based on the measurement results and use RNG-RSP to adjust the timing and the power level of the MS, in order to fulfill the handover procedure. To update the access stations, MR-BS shall send VGHO-RSP message to notify an RS the changes of data forwarding status for specified MSs. VGHO-ACK message shall be responded by the RS to confirm the received VGHO-RSP.

**6.3.22.5.2.1 Mode 1**

In Mode 1, the access RS shall automatically report its measurement result to MR-BS in an event-triggered or periodic way.

For event-triggered reporting, the access RS shall report its measurement results if at least one of power, CINR, or timing requirement for the specific MS is not satisfied. The access RS may use the RS bandwidth request and allocation mechanism defined in section 6.3.6.7 to request uplink resource for sending MOB_RSSCN-REP. For periodic reporting, the access RS shall send MOB_RSSCN-REP every REP_INT which is specified in RS_Config-REQ message and the MR-BS shall periodically allocate uplink resource for the access RS to report the latest measurement result for each active

MS.

~~<Section note: REP_INT is the reporting interval specified in the RS configuration. This is TBD.>~~

In Mode 1, non-access RSs shall report their measurement results only if MOB_RSSCN-RSP message is received. The MR-BS shall send MOB_RSSCN-RSP message to request all or part of RSs in the same VG to report their measurement results for a specific MS. The MR-BS shall allocate uplink resource for the selected non-access RSs to send their MOB_RSSCN-REPs at the frame specified in MOB_RSSCN-RSP.

**6.3.22.5.2.2 Mode 2**

In Mode 2, all RSs (access RS and non-access RSs) in the same VG shall automatically report the

measurement results to MR-BS in an event-triggered way. Each RS shall send an MOB_RSSCN-REP to MR-BS if the measured RSSI/CINR going-up cross T_ADD[i] (i=0,...,max), or going-down cross the T_DEL[i] (i=0,...,max), or the difference between the current measured TA and the previous reported TA exceeds TA_DIFF where T_ADD[i], T_DEL[i] (i=0,…,max), and TA_DIEF are specified in the RS_Config-REQ message during RS initiation. The RS may use the RS bandwidth request and allocation mechanism defined in section 6.3.6.7 to request uplink resource for sending their MOB_RSSCN-REP. The MR-BS shall maintain the measurement reports for each active MS and use those information to speedup optimal target access station selection.

~~<Section note: T_ADD[i], T_DEL[i] (i=0,...,max), and TA_DIFF are threshold values specified in the configuration of the reporting mode during RS initiation. This is TBD.>.~~

~~MR-BS may select a new target RS based on the measurement results and use RNG-RSP to adjust the timing and the power level of the MS, in order to fulfill the handover procedure.~~

### 6.3.2.3.67 MR-BS configuration Request message

**Table 183f-RS_Config-REQ message format**

| Syntax | Size | Notes |
|---|---|---|
| RS_Config_REQ format { | | |
| Management message type = 67 | 8 bits | |
| Configured_para_type | 8 bits | b0= 1: preamble configuration is included;<br>b1= 1: remove multicast RSID to disassociate from the RS group;<br>b2 = 1: Unicast RSID is included;<br>b3 = 1: Multicast RSID is included;<br>b4 = 0; Do not transmit preamble; 1: transmit the assigned preamble.<br>b5 = 1: R-amble configuration is included<br>b6 – b7: reserved |
| If (b0 of Configured_para_type == 1 ) { | | |
| Preamble_index | 8 bits | Assign a preamble index value to the potential RS |
| } | | |
| If (b2 of Configured_para_type == 1 ) { | | |
| Unicast RSID | 8 bits | Unicast RSID |
| } | | |
| If (b3 of Configured_para_type == 1 ) { | | |
| Multicast RSID | 8 bits | Multicast RSID as the RS Group ID |
| } | | |

| | | |
|---|---|---|
| If ( (b3 of Configured_para_type == 1 ) ‖ (b4 of Configured_para_type == 1) ){ | | The configuration for Virtual RS group |
| Reporting mode | 1 bit | Indicate reporting mode during VG operations.<br>0b0: mode 1<br>0b1: mode 2 |
| Padding | 7 bits | |
| If (Reporting mode =0b0) { | | Mode1 configurations |
| ~~Reporting~~ Trigger type | 1 bit | ~~Indicate reporting type~~ Trigger condition in mode 1.<br>0b0: event-triggered reporting<br>0b1: periodic reporting |
| Padding | 7 bits | |
| If (~~Reporting~~ Trigger type =0b0) { | | Access ~~station~~ RS perform event-triggered reporting. |
| RSSI_threshold | 8 bits | ~~Indicate~~ The access RS shall report the measurement result of a MS if the RSSI of the MS exceeds ~~the~~ RSSI threshold. ~~for triggering the reporting.~~ The value shall be ~~interpreted~~interpreted as an unsigned byte with units of 0.24dB, such that 0x00 is interpreted as -103.75 dBm, an RS shall be able to report values in the range -103.75dBm to -40 dBm |
| CINR_threshold | 8 bits | The access RS shall report the measurement result of a MS if the CINR of the MS exceeds ~~Indicate access RS the~~ CINR threshold. ~~for triggering the reporting.~~ CINR threshold shall be interpreted as a single value from –16 dB to 47.5dB in units of 0.5dB. |
| ~~Timing~~ TA_DIFF threshold | 32 bits | The access RS shall report the measurement result of a MS if the TA difference of the MS exceeds TA_DIFF threshold. ~~Indicate access RS the timing threshold for triggering the reporting.~~ The range and units of TA_DIFF threshold are the same as specifications of Tx timing offset adjustment (signed 32-bit). ~~The amount of time required to adjust MS transmission so the bursts will arrive at the expected time instance at the MR-BS or RS. Units are PHY~~ |

| | | |
|---|---|---|
| | | ~~specific (see 10.3)~~ |
| } | | |
| else { | | Access ~~station~~ RS performs periodic reporting. |
| REP_INT | 8 bits | ~~This value specifies t~~The reporting interval for periodic reporting, in unit of frame. |
| } | | |
| } | | |
| else { | | Mode 2 configurations |
| Selected triggered metrics | 3 bits | Bitmap indicating certain metrics is used for event triggered:<br>Bit 0: enable RSSI-based event-trigger<br>Bit 1: enable CINR-based event-trigger<br>Bit 2: enable TA-based event-trigger |
| If (selected triggered metrics[Bit0]==1){ | | |
| N_RSSI~~_T_ADD_DEL~~ | 8 bits | Number of reporting add/delete thresholds for RSSI |
| For (j=0; i<N_RSSI~~_T_ADD~~; i++) | | |
| RSSI_T_ADD [i] | 8 bits | This RSSI value specifies the add threshold to trigger reporting |
| RSSI_T_DEL [i] | 8 bits | This RSSI value specifies the delete threshold to trigger RS reporting |
| } | | |
| } | | |
| If (selected triggered metrics[Bit1]==1){ | | |
| N_CINR~~_T_ADD_DEL~~ | 8 bits | Number of reporting add/delete thresholds for CINR |
| For (j=0; i<N_CINR~~_T_ADD~~; i++) { | | |
| CINR_T_ADD [i] | 8 bits | This CINR value specifies the add threshold to ~~trigger reporting~~trigger reporting |
| CINR_T_DEL [i] | | |
| } | | |
| } | | |
| If (selected triggered metrics[Bit2]==1){ | | |

| | | |
|---|---|---|
| TA_DIFF | ~~8~~ 32 bits | The access RS shall report the measurement result of a MS if the TA difference of the MS exceeds TA_DIFF threshold. The range and units of TA_DIFF threshold are the same as specifications of Tx timing offset adjustment (signed 32-bit). ~~This value specifics the TA difference threshold for stations triggering the reporting~~ |
| } | | |
| } | | |
| } | | |
| If (b5 of Configuration_para_type == 1) { | | |
| R-amble_index | 8 bits | R-amble index |
| } | | |
| TLV Encoded Information | Variable | TLV specific |
| } | | |

### 6.3.2.3.91 Virtual RS group handover response message

This message is used to notify handover result within a VG to RS. This message is transmitted by MR-BS with using the RS's basic CID.

**Table xxx-VGHO-RSP message format**

| Syntax | Size | Notes |
|---|---|---|
| VGHO-RSP format { | | |
| Management message type = xx | 8 bits | |
| N_MS | 8 bits | Number of MSs needed to be update its data forwarding status |
| For (j=1; j<=N_MS; j++) { | | |
| Start_Frame | 7 bits | The action time of status changes for this MS |
| Status_changes | 1 bits | 0b0=0: this RS does not forward data for this MS<br>0b0=1: this RS forwards data for this MS |
| } | | |
| } | | |

### 6.3.2.3.91 Virtual RS group handover acknowledge message

The VGHO-ACK message shall be transmitted to MR-BS in response to VGHO-RSP. The message format is shown in Table XX.

**Table xxx-VGHO-ACK message format**

| Syntax | Size | Notes |
|---|---|---|
| VGHO-ACK format { | | |
| Management message type = xx | 8 bits | |
| ~~ACK_type~~ | ~~1 bits~~ | ~~0b0=0: this RS receives correctly the VGHO-RSP message~~<br>~~0b0=1: this RS does not receive correctly the VGHO-RSP message~~ |
| ~~}~~ | | |
| } | | |

----------End of text ----------