	IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>
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Source(s)	Hyunjeong Kang, Sungjin Lee, Hyoung Kyu Lim, Jaeweon Cho, Jungje Son, Panyuh Joo Samsung Electronics [mail to: hyunjeong.kang@samsung.com, hk03.lim@samsung.com] Rakesh Taori Samsung Advanced Institute of Technology [mail to: rakesh.taori@samsung.com]
Re:	Call for technical proposals regarding IEEE project P802.16j
Abstract	This contribution proposes the scheme with which RS or MMR-BS as HO target informs MS handover completion.
Purpose	Discussion and Adoption in IEEE 802.16j
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HO complete indication

Hyunjeong Kang, Sungjin Lee, Hyoung Kyu Lim, Jaeweon Cho, Jungje Son, Panyuh Joo
Samsung Electronics

Rakesh Taori
Samsung Advanced Institute of Technology

Introduction

This contribution proposes handover signals to inform an old access station that MS has successfully attached itself to a new access station.

Problem Statement

In the current 802.16e, a new serving base station (BS) transmits a signal of MS Network Attachment to the old serving BS when an MS moved to the new serving BS and resumed the communication with the new serving BS. Upon receiving the MS Network Attachment signal, the old serving BS should discard MAC context and MAC PDUs associated with the MS, if it has not already done so. The access station can be a relay station (RS) or an MMR base station (MMR-BS) in 802.16j, and either of those can be a new access station. When a RS becomes a new access station, the RS may transmit a signal of MS Network Attachment to the old access station. When a RS is an old access station and receives a signal of MS Network Attachment, the RS shall release the saved MAC context and buffered MAC PDUs of the MS.

In 16j, an MS performs intra-MMR handover where the MS moves within the MMR cell served by the same MMR-BS, or does inter-MMR handover when the MS moves between cells served by different MMR-BSs. An MMR-BS should keep the information of MS in the case of an intra-MMR handover but the MMR-BS should remove the information when the MS performs an inter-MMR handover. The operation of MMR-BS which received MS Network Attachment would be different according to whether intra-MMR handover or inter-MMR handover.

Therefore we propose the way of processing MS Network Attachment in an RS or an MMR-BS as a old access station or a new access station.

Suggested Remedy

We propose a mechanism using which an RS or an MMR-BS, to which an MS has newly attached transmits MS network attachment to the old access station. Upon receipt of the handover termination from a new access station, the old access station shall remove MS context information.

The MMR-BS retains and manages all or most of the MS context information, but the RS has none or a

part of the information even though the MS may be directly attached to the RS.

When an MS performs an intra-MMR handover, the MS does handover from a RS to an MMR-BS which manages the RS or from an MMR-BS to an RS which is managed by the MMR-BS or between two RSs managed by the same MMR-BS. In case of intra-MMR handover, regardless of the signal of MS Network Attachment which indicates the MS handover completion, the MMR-BS should keep the MS's context information. A RS or an MMR-BS as HO target may transmit a signal of MS handover completion which indicates an MS is attached to a new access station. If an old access station happens to be an RS and the RS retains the context information of the MS for the duration of the resource retain time after the MS sends MOB_HO-IND with HO_IND_type=0b00 indicating serving BS release), the RS shall remove the MS context information upon receiving the signal of MS handover completion.

In inter-MMR handover, an MS moves between MMR cells managed by two different MMR-BSs. For example, the MS does handover from an MMR-BS to another MMR-BS, or from an RS controlled by an MMR-BS to an RS controlled by another MMR-BS, or from an RS controlled by an MMR-BS to another MMR-BS. An MMR-BS which previously controlled the MS shall remove the context information of MS when the MMR-BS receives a signal of MS handover completion from a new access station. If an RS is an old access station and retains the context information of MS during resource retain time, the RS shall remove the retained information when the RS receives a signal of MS handover completion which indicates the MS is attached to a new access station. An MMR-BS controlling the RS shall remove the information if the MMR-BS also keeps the context information of MS. A RS or an MMR-BS as HO target may transmit a signal MS handover completion to an old access station after the new access station resumes the communication with the MS.

MS Network Attachment signal between MMR-BSs may be the same as that of the legacy 16e, but a new control message between MMR-BS and RS needs to be defined to indicate MS Network Attachment.

Therefore we propose the remedies as follows:

- Define the operation of processing MS Network Attachment in a new access station and an old access station.
- A new control message to indicate MS handover completion
  - MOB_HO-CLT message transmitted from RS to MMR-BS or vice versa.

Proposed Text Change

[Remedy1: Insert the followings at the end of section 6.3.22.2.5 in page 243]

[Insert the followings:]

When MMR-BS as an access station receives MOB_HO-IND message with the HO_IND_type value indicating

serving BS release, the MMR-BS shall start the Resource retain timer from value Resource_Retain_Time provided by the MMR-BS in REG-RSP, BSHO-REQ, or BSHO-RSP messages. The MMR-BS shall retain the connections, MAC state machine, and PDUs associated with the MS for service continuation until the expiration of Resource retain timer. Regardless of Resource retain timer, the MMR-BS shall remove the MAC context and MAC PDUs associated with the MS when it receives a backbone message indicating MS Network Attachment from another MMR-BS which is a new access station or a new serving station.

If an MMR-BS receives a backbone message indicating MS Network Attachment and the MS's old access station is a RS which is controlled by the MMR-BS, the MMR-BS may send the MOB_HO-CLT message to the RS. Upon receiving the MOB_HO-CLT message, the RS shall become aware of the MS handover completion and remove the MS context information.

When an MMR-BS receives MOB_HO-CLT message from a RS controlled by the MMR-BS, the MMR-BS recognizes that the MS is attached to the RS as a new access station and shall keep the MS context information. If the MS's old access station is an RS controlled by the MMR-BS, the MMR-BS may send the MOB_HO-CLT message to inform the RS of MS Network attachment and to make the RS discard MS context information. If the MS's old access station is another MMR-BS or an RS which is controlled by another MMR-BS, the MS's new serving MMR-BS may send a backbone message indicating MS Network Attachment.

If an access RS receives MOB_HO-IND message with the HO_IND_type=0b00 and the RS keeps MS context information until the expiration of the Resource retain timer, regardless of Resource retain timer the RS shall discard MS context information upon receipt of MOB_HO-CLT message.

If an MMR-BS as HO target completes the MS network re-entry and the MS's old access station is an RS which is managed by the MMR-BS, the MMR-BS may send MOB_HO-CLT message to the RS to indicate MS Network Attachment.

[Remedy 2: Insert the followings after section 6.3.2.3.61 at page 172]

[Insert new subclause 6.3.2.3.xx after section 6.3.2.3.61:]

6.3.2.3.xx MS Handover Complete (MOB_HO-CLT) message

A MOB_HO-CLT message may be generated by an RS or an MMR-BS as HO target to indicate an MS is attached to the RS or the MMR-BS. In some instances, an MMR-BS may transmit a MOB_HO-CLT message to an RS which is the old access station and controlled by the MMR-BS when the MMR-BS receives another MOB_HO-CLT or a backbone message indicating MS Network Attachment.

A MOB_HO-CLT message sent from a new access RS may include the old access station's MAC address.

An RS or an MMR-BS shall generate MOB_HO-CLT messages in the format shown in Table x.

Table x – MOB_HO-CLT message format

Syntax	Size	Notes
MOB_HO-CLT_Message_format() {		
_Management Message Type=TBD	8 bits	-
_Old access station ID included	1 bit	Indicates that the old access station ID is included in this message
_If(Old access station ID included==1){		
__Old access station ID	48 bits	MAC address of old access station
_}		
_MS ID	48 bits	MS MAC address
_Reserved	7 bits	Shall be set to zero
}		