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Re:	IEEE 802.16j-07/007r2 : "Call for Technical Comments and Contributions regarding IEEE Project 802.16j"	
Abstract	This contribution proposes the handover procedure for MS handover with transparent RS in multi-hop relay network for IEEE 802.16 j.	
Purpose	Text proposal for 802.16j Baseline Document (IEEE 802.16j-06/026r1)	
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# MS Handover with Transparent RS in Centralized Multi-hop Relay Network

## 1 Introduction

In this proposal, we define the new MAC management message related to the MAC handover procedure with transparent RS in centralized multi-hop relay network as a response to the call for technical contributions regarding IEEE Project 802.16j. We assume in this contribution that

1. Transparent RS stand for the RS which transmit the same preamble/FCH/MAP as the MR-BS in the same MR cell.
2. There is no direct link between the MR-BS and the multi hop ( $k \geq 2$ ) MS.

## 2 Problem statement

### 2.1 Intra MR-BS Handover

In intra MR-BS handover, since all the RSs have the same preamble as the MR-BS, MS is not aware of the Handover. There is no need for MS to participate the handover procedure. Therefore, at the time the MR-BS decides to perform handover on MS, RS and MR-BS shall perform measurement of MS signal quality and select the handover target access station (RSs or MR-BS) for MS [1]. In order to terminate the MS access to current access station and start up a target access to the target access station in a timely manner, new MAC management messages are needed in 802.16j system. We define MOB-BSHO-DEL message for MR-BS to inform the current access station to stop the service to the MS and the MOB-BSHO-ADD message for MR-BS to inform the target RS to be ready to serve the MS. Such messages don't exist in legacy 802.16e system and are newly defined in our contribution for relay links between MR-BS and RSs. If there are more MS handover occurs at the same time, such messages should include a group of MS IDs. If the current access station is the MR-BS, MOB-BSHO-DEL will be omitted. If the target access station is the MR-BS, MOB-BSHO-ADD will be omitted.

Optionally, RS may have the capability to initiate the handover for the MS depending on the capability of RS during the network entry negotiation procedure. The new messages MOB-RSHO-REQ and MOB-BSHO-RSP will also be defined. After the handover, MR-BS should update its candidate target access station set for MS.

Fig.xxx shows the signaling sequence of the intra MR-BS handover procedure with transparent RS in centralized MR network. In this figure, the dashed line means multi hop ( $m \geq 1$ ) relays with transparent RS only relay the received message to and from other RSs or MR-BS. Detailed algorithm for target access station selection and updating of the candidate target access station are out of the scope of this contribution.

If the transparent RSs are subordinates RSs to an anchor station, we could regard this anchor station as MR-BS to control the intra RS handover procedure the same way as in the MR-BS controlled system.

### 2.2 Inter MR-BS Handover

For inter MR-BS handover, MS can sense the handover procedure because of the different preamble can be sensed by MS. MS shall follow the same handover procedures as described for an MS handover in section 6.3.22.2. of legacy 16e. The RS shall relay HO related management messages between MS and MR-BS [1].

After that, the topology for both MR cells should be updated and new candidate station set needs to be established in the target MR-BS for the MS.

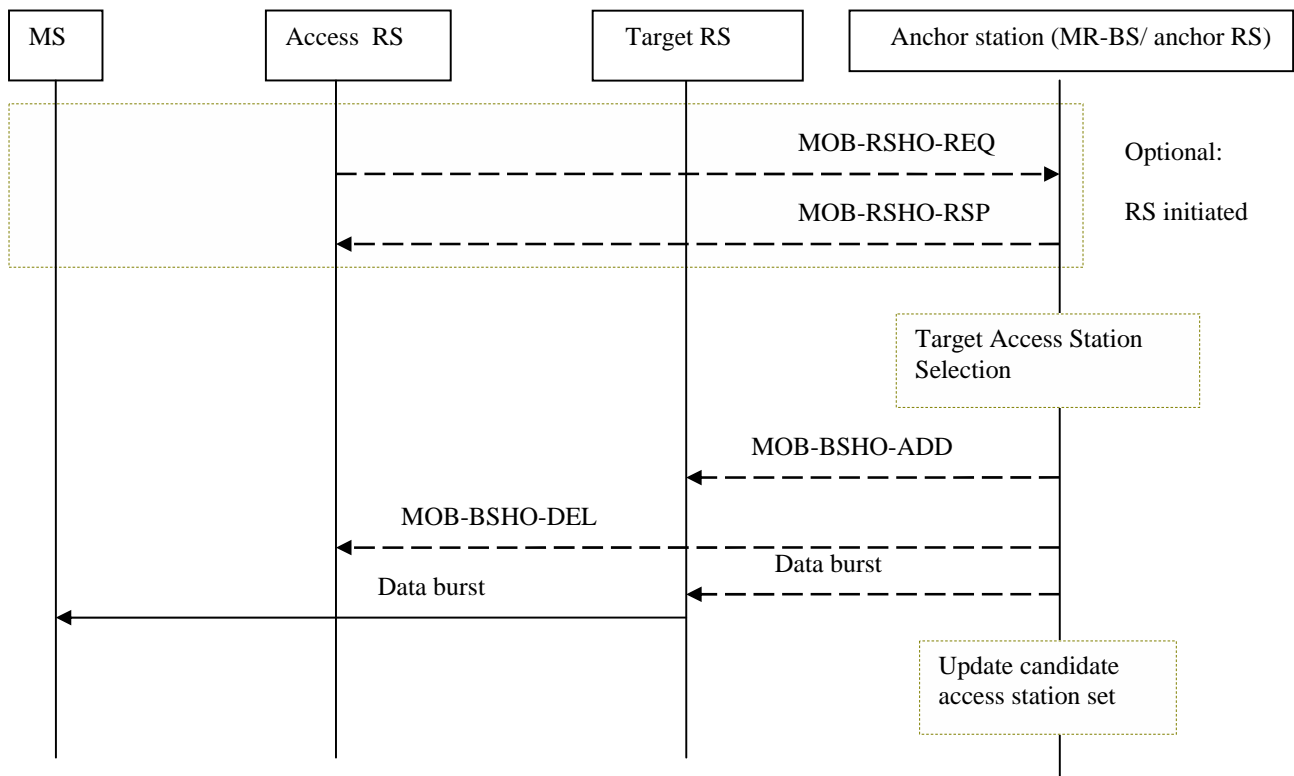


Figure xxx Intra MR-BS Handover procedure with transparent RS in centralized MR network.

### 3 Text Proposals

**[Insert the following and figure as section 6.3.22.5.2.x]**

[6.3.22.5.2.x Handover process with transparent RS in multi-hop relay network](#)

[6.3.22.5.2.xx Intra MR-BS Handover process with transparent RS in multi-hop relay network](#)

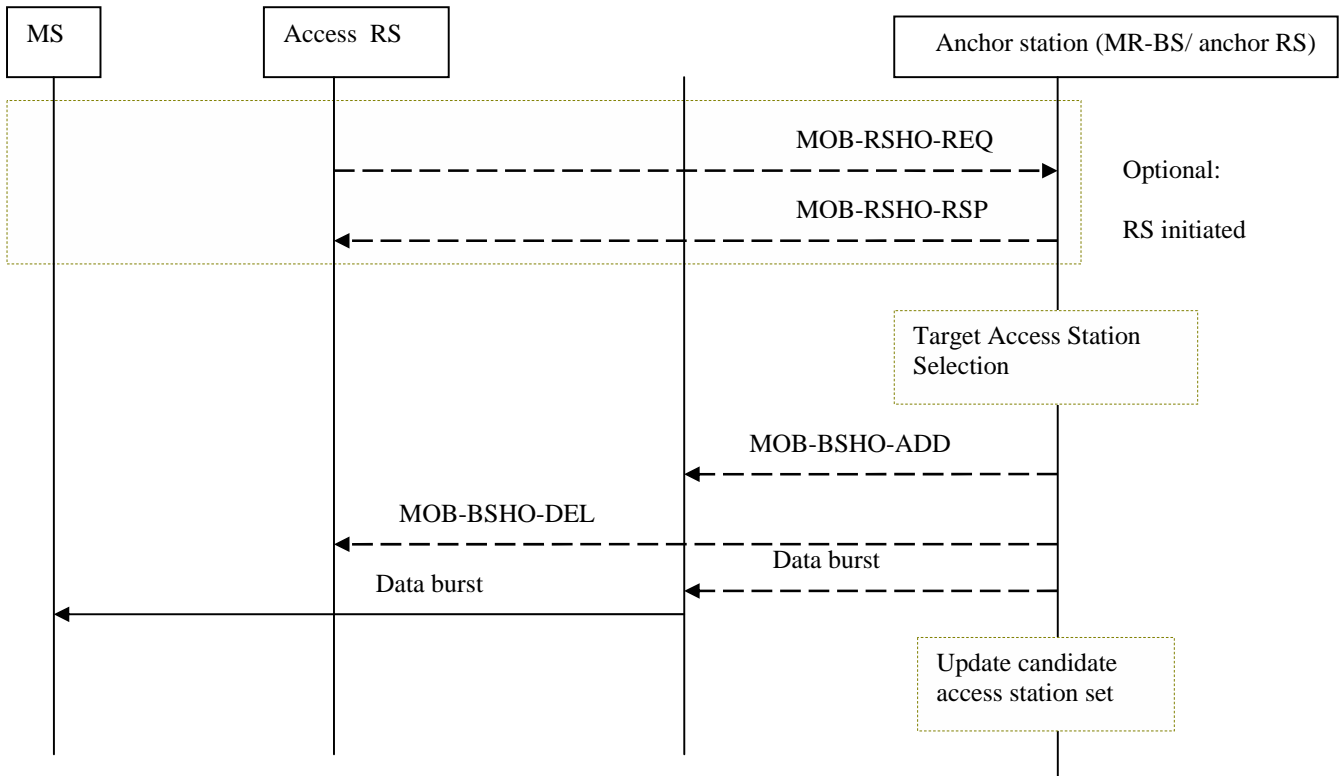
[At the time MR-BS decides to perform handover on MS, RS and MR-BS shall perform measurement of MS signal quality and select the handover target access station \(RSs or MR-BS\) for MS \[1\]. In order to terminate the MS access to current access station and start up a new access to the target access station in a timely manner, new MAC management messages are needed in 802.16j system. We define MOB-BSHO-DEL message for MR-BS to inform the current access station to stop the service to the MS and the MOB-BSHO-ADD message for MR-BS to inform the target RS to be ready to serve the MS. Such messages don't exist in legacy 802.16e system and are newly defined in our contribution for relay links between MR-BS and RSs. If there are more MS handover occurs at the same time, such messages should include a group of MS IDs. If the current access station is the MR-BS, MOB-BSHO-DEL will be omitted. If the target access station is the MR-BS, MOB-BSHO-ADD will be omitted.](#)

[Optionally, RS may have the capability to initiate the handover for the MS depending on the capability of RS during the network entry negotiation procedure. The new messages MOB-RSHO-REQ and MOB-BSHO-RSP will also be defined. After the handover, MR-BS should update its candidate target access station set for MS.](#)

[Fig.xxx shows the signaling sequence of the intra MR-BS handover procedure with transparent RS in a centralized MR network. In this figure, the dashed line means multi hop \( \$m \geq 1\$ \) relays with transparent RS only relay the received message to and from other RSs or MR-BS. Detailed algorithm for target access station selection and updating of the candidate target access station are out of the scope of this contribution.](#)

[If the transparent RSs are subordinates RS to an anchor station, we could regard this anchor station as MR-BS to control the intra RS](#)

[handover procedure by the same way as in the MR-BS controlled system.](#)



**Figure xxx** Intra MR-BS Handover procedure with transparent RS in centralized MR network.

[6.3.22.5.2.xx Iner MR-BS Handover proress with transparent RS in multi-hop realy network.](#)

[For inter MR-BS handover, MS can sense the handover procedure because of the different preamble can be sensed by MS. MS shall follow the same handover procedures as described for an MS handover in section 6.3.22.2.of legacy 16e. The RS shall relay HO related management messages between MS and MR-BS \[1\].](#)

[After that, the topology for both MR cell should be updated and new candidate station set needs to be established in the target MR-BS for the MS.](#)

**[Insert the following at the end of subclause 6.3.2.3]**

[6.3.2.3.xx MOB-BSHO-DEL](#)

[An MR-BS/Anchor station shall transmit MOB-BSHO-DEL to inform the current access station to stop the service to the MS. After receiving this message, RS stops the service to the MS indicated by the MS ID in the message. The message shall be transmitted on the basic CID.](#)

[Table X— MOB-BSHO-DEL message format](#)

<a href="#">Syntax</a>	<a href="#">Size (bits)</a>	<a href="#">Notes</a>
<a href="#">MOB-BSHO-DEL message format()</a>		
<a href="#">Management Message Type=TBD</a>	<a href="#">TBD</a>	
<a href="#">N MS</a>	<a href="#">XX</a>	<a href="#">Number of MS to terminate the service with RS</a>

<u>For (j=0;j&lt;N MS; j++) {</u>		
<u>MS_ID</u>	<u>48</u>	<u>MS to be deleted the service with the RS</u>
<u>_reserved</u>	<u>TBD</u>	
<u>_}</u>		
<u>}</u>		

### 6.3.2.3.xx MOB-BSHO-ADD

An MR-BS shall transmit the MOB-BSHO-ADD message to inform the target RS to be ready to serve the MS. After receiving this message, this target RS start to serve the MS by relaying the data between MR-BS and RS. The message shall be transmitted on the basic CID.

Table X— MOB-BSHO-ADD message format

<u>Syntax</u>	<u>Size (bits)</u>	<u>Notes</u>
<u>MOB-BSHO-ADD message format(){</u>		
<u>Management Message Type=TBD</u>	<u>TBD</u>	
<u>N MS</u>	<u>XX</u>	<u>Number of MS to start the service with RS</u>
<u>For (j=0;j&lt;N MS; j++) {</u>		
<u>MS_ID</u>	<u>48</u>	<u>MS to be added the service with the RS</u>
<u>reserved</u>	<u>TBD</u>	
<u>_}</u>		
<u>}</u>		

### 6.3.2.3. xx MOB-RSHO-REQ

RS may send the messages MOB-RSHO-REQ to MR-BS to request the handover for MS. After the reception of the message, MR-BS/Anchor RS determines whether to start hand over process for MS or not. The message shall be transmitted on the basic CID.

Table X— MOB-RSHO-REQ message format

<u>Syntax</u>	<u>Size (bits)</u>	<u>Notes</u>
<u>MOB-RSHO-REQ message format(){</u>		
<u>Management Message Type=TBD</u>	<u>TBD</u>	
<u>N MS</u>	<u>XX</u>	<u>Number of MS needed to handover</u>
<u>For (j=0;j&lt;N MS; j++) {</u>		
<u>MS ID</u>	<u>48</u>	<u>MS needed to handover</u>

<u>reserved</u>	<u>TBD</u>	
<u>↓</u>		
<u>↓</u>		

### 6.3.2.3.xx MOB-RSHO-RSP

The MR-BS/Anchor station may send the messages MOB-RSHO-RSP to RS upon reception of MOB-RSHO-REQ to indicate the handover request is rejected or not..

The message shall be transmitted on the basic CID.

Table X- MOB-RSHO-RSP message format

<u>Syntax</u>	<u>Size (bits)</u>	<u>Notes</u>
<u>MOB-RSHO-RSP message format()</u> {		
<u>Management Message Type=TBD</u>	<u>TBD</u>	
<u>N_MS</u>	<u>XX</u>	<u>Number of MS be rejected handover</u>
<u>For (j=0;j&lt;N_MS; j++) {</u>		
<u>MS ID</u>	<u>48</u>	<u>MS be rejected handover</u>
<u>reserved</u>	<u>TBD</u>	
<u>↓</u>		
<u>↓</u>		

## 4 References

- [1] Baseline document for Draft Standard for Local and Metropolitan Area Networks, IEEE 802.16j-06/026r2.
- [2]“Harmonized definitions and terminology for 802.16j Mobile Multihop Relay,” IEEE 802.16j-06/014r1 <http://www.ieee802.org/16/relay/index.html>, October 2006.