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Re:	This is a response to Call for Technical Proposals regarding IEEE Project P802.16j.	
Abstract	This document proposes RS-initiated handover procedures and related messages for an RS which can support handover initiation, process and decision in an IEEE 802.16j network.	
Purpose	The document is submitted for review by 802.16 Working Group members.	
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## RS-initiated Handover Procedure for Handover-manageable RS

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### 1 Introduction

This contribution covers the issues related to MAC layer handover procedures defined in Table of Contents of Task Group Working Document [1]. In [2], we have discussed the necessity of RS-initiated handover and defined RS-initiated handover procedure and related messages for handover-unmanageable RS. In this proposal, we present RS-initiated handover procedures and related messages for an RS which is capable of handover initiation, process and decision.

#### 1.1 Problem Statement

In [2], we defined two RS types according to the capability of handover initiation, process and decision; the handover-unmanageable RS and the handover-manageable RS. Between them, the handover-manageable RS can perform handover process and decision as well as handover initiation, by transmitting MOB\_BSHO-REQ to MS's of interest. Before handover process, the handover-manageable RS should negotiate with MR-BS about resource allocation and registration information. The negotiation process is performed by MOB\_RSHO-REQ and MOB\_RSHO-RSP messages which are defined in [2]. After handover is completed, the handover-manageable RS should report the new access station ID of the handovered MS to MR-BS to establish a new downlink path. The reporting process might be performed by relaying MOB\_MSHO-IND message to MR-BS. But this way increases signaling overhead as the number of handovered MS increases. For efficiency, new messages and handover procedure are required.

#### 1.2 Assumption

In this proposal, we assume the followings:

1. We follow all the handover procedures in 802.16e for backward compatibility.
2. MR-BS maintains link quality information for RS's and MS's directly connected to it. The link quality information is used for intra-cell handover decision. To obtain the information, network topology acquisition scheme can be employed.
3. RS maintains address information for MS's directly connected to it. The address information contains MAC address, SFID, CID and so on.
4. MDHO/FBSS and RS-initiated handover for MBS are not covered in this proposal.

### 2 RS-initiated Handover Procedure of Handover-manageable RS

When an MS initiates handover by transmitting MOB\_MSHO-REQ to an RS, the handover-manageable RS selects target access station and informs the result to the MS by transmitting MOB\_BSHO-RSP. When MS

handover is required, the handover-manageable RS can initiate and perform handover. Using MOB-RSHO-REQ and MOB-RSHO-RSP messages, the RS initiates handover and perform negotiation with MR-BS. And, the RS performs handover process by transmitting MOB\_BSHO-REQ to the MS of interest. When MOB\_HO-IND is received from the MS, the RS acquires new access station ID of MS from the received message. The RS should report this information to MR-BS to establish downlink path. For reporting, we define MOB\_RSHO-IND message. MOB\_RSHO-IND includes address information of the new access station of MS's of interest. Figure 1 shows an example of RS-initiated handover procedure for handover-manageable/asynchronous RS. The general RS-initiated handover procedure for handover-manageable/asynchronous RS is described as follows:

1. An RS shall transmit MOB\_RSHO-REQ to an MR-BS so that it initiates handover of specific MS subsets. MOB\_RSHO-REQ contains ID's of MS subset.
2. Upon receiving MOB\_RSHO-REQ, the MR-BS shall transmit MOB\_RSHO-RSP to the RS in response to the request: accept or reject.
3. Upon receiving MOB\_RSHO-RSP, the RS acts differently according to the response. When its request is accepted, the RS transmits MOB\_BSHO-REQ to each MS of interest. And the RS starts handover procedure with the MS. When its request is rejected, the RS modifies MOB\_RSHO-REQ messages according to MOB\_RSHO-RSP, and retransmits the modified MOB\_RSHO-REQ to the MR-BS.
4. After handover procedure between the RS and all MS of interest is completed (or the RS receives MOB\_HO-IND from all MS of interest), the RS transmits MOB\_RSHO-IND to the MR-BS.
5. Upon receiving MOB\_RSHO-IND, the MR-BS updates access station information and downlink path of the handovered MS subset.

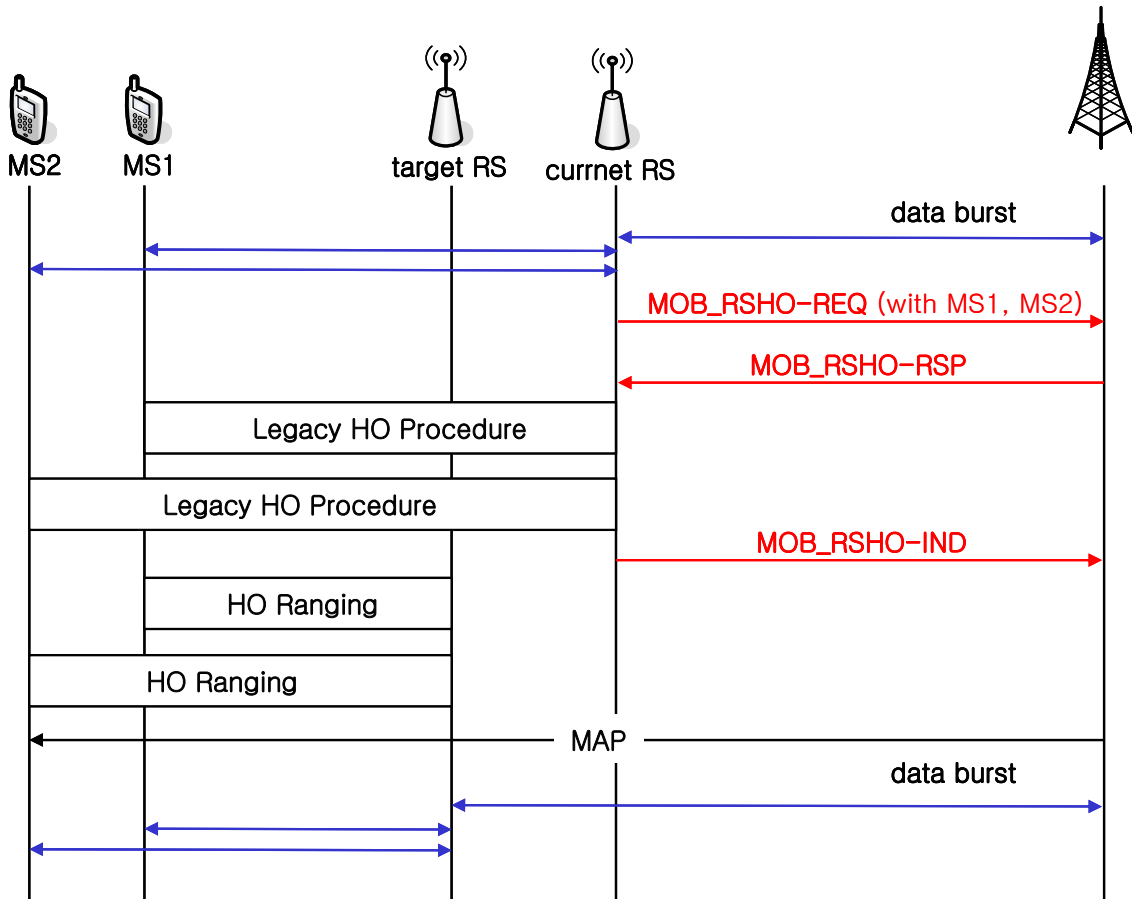


Figure 1 Example of RS-initiated handover procedure with handover-manageable RS

### 3. Text Proposals

*[Insert the following at the end of subclause 6.3.22.2.2]*

If an RS can initiate, process and decide handover, handover initiation, process and decision are performed between RS and MS with permission of the MR-BS. In this situation, the RS initiates handover and perform negotiation with MR-BS using MOB-RSHO-REQ and MOB-RSHO-RSP. And, the RS starts handover process by transmitting MOB BSHO-REQ to the MS subset of interest. After handover process is completed, the RS shall report address information of the new access station of the handovered MS subset to MR-BS using MOB RSHO-IND. MOB RSHO-IND is generated based on the MOB HO-IND received from the handovered MS subset. Upon receiving MOB RSHO-IND, the MR-BS updates access station information and downlink path of the handovered MS subset.

*[Insert the following text after 6.3.2.3.XX]*

### **6.3.2.3.XX MOB\_RSHO-IND**

After handover of specific MS subset is completed, an RS shall transmit MOB\_RSHO-IND message to MR-BS for reporting address information of the new access station of MS's of interest. Upon receiving this message, the MR-BS updates downlink path information of MS's of interest. The message shall be transmitted on the basic CID.

Table XX-MOB\_RSHO-IND message format

<u>Syntax</u>	<u>Size (bits)</u>	<u>Notes</u>
<b><u>MOB-RSHO-IND Message Format() {</u></b>		
<b><u>Management Message Type=XX</u></b>	<b><u>XX</u></b>	
<b><u>MS Number</u></b>	<b><u>XX</u></b>	<b><u>Number of handovered MS</u></b>
<b><u>For(i=0; i&lt;MS Number; i++) {</u></b>		
<b><u>Mobile Station ID</u></b>	<b><u>48</u></b>	
<b><u>Access Station ID</u></b>	<b><u>48</u></b>	
<b><u>}</u></b>		
<b><u>TLV Encoding Information</u></b>	<b><u>variable</u></b>	<b><u>optional</u></b>
<b><u>}</u></b>		

A RS shall generate MOB\_RSHO-IND messages in the format shown in Table XX. The following parameters shall be included in the MOB\_RSHO-IND message:

#### **MS Number**

Indicate the number of handovered MS

#### **Mobile Station ID**

Indicate the ID of mobile station

#### **Access Station ID**

Indicate the ID of new access station

## **4. Reference**

- [1] IEEE 802.16j-06/017r2, "Table of Contents of Task Group Working Document"
- [2] IEEE 802.16j-07/151r1, "RS-initiated Handover Procedure for Handover-unmanageable RS"