Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**Resource retaining time and Call recovery scheme during HO**	
Date Submitted	[2004-06-21]	
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Re:	This contribution is for call for contribution IEEEP802.16e/D3-2004	
Abstract	This contribution proposes the resource retaining time and call recovery scheme during HO.	
Purpose	Propose the enhanced call recovery scheme during HO	
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Resource Retain time for Handover or Ping Pong Call Recovery

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I. Introduction

At current specification, when an MSS start actual handover process, it send HO-IND with HO_IND_type="00". And when a serving BS receive MOB-HO-IND message, the serving BS may release resource or retain it in order to transfer to a target BS when it is requested. At the case of resource retaining, handover delay may be shortened using backbone message exchange. But resource release case may occur according to the status of resource management of serving BS and traffic type.

Furthermore, if the Serving BS retains the connection information of an MSS that has moved to Target BS and the MSS knows about that, the MSS can perform quick call recovery procedures using the remaining connection information with the Serving BS under the irregular situation during handover.(e.g. drop situation, ping-pong situation, etc.)

But because of resource management problem, serving BS cannot retain the connection information of each MSS forever. Therefore it should be allowed that the Serving BS notify to the MSS whether the Serving BS will discard the MSS's connection information or retain the information for a certain time upon receiving MOB-HO-IND(HO_IND_type=00) from the MSS. And we propose the correct sentences describing BS's and MSS's actions for the serving BS to release MSS information after reception of backbone message, because the Serving BS doesn't know whether handover is completed successfully or not due to lack of feedback message from Target BS. To solve this, we modify the backbone message to inform Serving BS of the result of handover at Target BS.

II. Proposed Text Changes

We propose the following remedies in IEEE P802.16e/D3 to provide the handover enhancement method related with the fast call recovery

[Insert or correct sentences of 6.3.20.2.5 in page 51 as follows]

6.3.20.2.5 Termination with the Serving BS

After the hand-over request/response handshake has completed, the MSS may begin the actual HO. At some stage during the HO process, the MSS terminates service with the serving BS. This is accomplished by sending a MOB-HO-IND MAC Management message with the HO_IND_type value indicating serving BS release.

If the HO_IND_type field specifies Serving BS release, the BS shall start the Resource retain timer. If the timer value is set to zero, the Serving BS shall ~~may either~~ close all connections and discard MAC state machines and MAC PDUs associated with the MSS immediately, otherwise the Serving BS shall ~~or it may~~ retain the connections, MAC state machine and PDU associated with the MSS for service continuation until the reception of a successful Handover backbone message from the Target BS or the expiry of Resource retain timer~~to be forwarded to the Target BS for service continuation.~~, The Serving BS shall close all connections and discard MAC state machine and MAC PDUs associated with the MSS ~~or to be discarded~~ upon reception of ~~a backbone message~~ an I-am-host-of message with indicating a Network Attachment from the Target BS through a backbone.

[Insert or correct sentences of 6.3.20.2.5 in page 51 as follows]

6.3.20.2.3 HO cancellation

After an MSS or BS has initiated an HO using MOB_MSSHO/BSHO_REQ, the MSS may cancel HO at any time. The cancellation shall be made through transmission of a MOB-HO-IND with the HO cancel option (HO_IND_type=01).

An MSS can cancel an HO within Resource Retain Time (when Resource Retain Type=1) when the HO to the target BS fails. When Serving BS receives MOB-HO-IND with the HO cancel option (HO_IND_type=01) during Resource Retain Time (when Resource Retain Type=1), it resumes Normal Operation communication with the MSS.

6.3.20.3 Drops during HO

A drop is defined as the situation where an MSS has stopped communication with its ~~Serving~~ BS (either in the downlink, or in the uplink) before the normal HO sequence outlined in Cell Selection and Termination with the ~~Serving~~ BS has been completed.

An MSS can detect a drop by its failure to demodulate the downlink, or by exceeding the RNG-REQ retries limit allowed for the periodic ranging mechanism. A BS can detect a drop be exceeding the Number of retries on inviting Ranging Requests limit allowed for the periodic ranging mechanism.

When the MSS has detected a drop, it shall resume communication with the serving BS by sending MOB-HO-IND message with HO_IND type = 01 (HO cancel). If resuming communication fails with the serving BS then the MSS shall attempt network re-entry with its preferred target BS as outlined in Section 6.4.18.4. When the Serving BS has detected a drop, it shall react as if a MOB-HO-IND MAC Management message has been received with HO_IND_type indicating Serving BS release
When the target BS has detected a drop, it may inform the previous serving BS of HO failure through backbone (I-am-host-of message indicating Handover Failure).

[Add the following after line 23 page 47]

If the Serving BS determines to retain the connection information of an MSS which has sent MOB-HO-IND with HO_IND_type=00 and begun the actual HO, this connection information may be used by the MSS in order to perform quickly re-entry operation with Target BS or the former Serving BS.
Whether the Serving BS retains or discards the connection information of the MSS, it shall be informed by the Serving BS with Resource Remain Type in MOB-BSHO-RSP message or MOB-BSHO-REQ message during handover request/response handshake operation. The Serving BS also determines Resource Retain Time in those messages and if Resource Retain Time is not included in MOB-BSHO-REQ or MOB-BSHO-RSP message, the predefined value by the Serving BS is used.

[Add the following after "Authoization Policy Support(see 11.4.2.11)" in Line 28, Page 14]
HO Support (see 11.8.x)

[Add the following paragraph after Line 50 on Page 89]
11.8.x HO Support
11.8.x.1 Resource_Retain_Time
The Resource_Retain_Time is the duration for MSS's connection information that will be retained in Serving BS. The unit of this value is 100msec.

Type	Length	Value	Scope
X	1	multiple of 100msec. 200msec is recommended as default	SBC-RSP

[Change the table 92g in page 23]

Table 92g – MOB-BSHO-REQ Message Format

Syntax	Size	Notes
MOB-BSHO-REQ_Message_Format(){		
Management Message Type = 52	8bits	
For(j=0;j<N_Recommended;j++){		N_Recommended can be derived from the known length of the message
Neighbor BS-ID	48bits	
Service level prediction	8bits	
}		
Resource Remain Type	8bits	0 : MSS resource release 1: MSS resource retain 2~255 : reserved
TLV encoded information	Variable	TLV Specific
}		

[Add the following parameter descriptions in line 32 page 23]

Resource Remain Type

This flag indicates whether the Serving BS will retain or delete the connection information of the MSS upon receiving MOB_HO-IND with HO_IND_type=00. If the flag is set to 1, the Serving BS will retain the MSS's connection information during the time in Resource Retain Time field. If the flag is set to 0, the Serving BS will discard the MSS's connection information.

The MOB-BSHO-REQ may contain the following TLVs :

Resource Retain Time(11.14.1)

[Change the table 92i in page 24]

Table 92i – MOB-BSHO-RSP Message Format

Syntax	Size	Notes
MOB-BSHO-RSP_Message_Format(){		
Management Message Type = 54	8bits	
Estimated HO Start	8bits	
For(j=0;j<N_Recommended;j++){		Neighbor base stations shall be presented in an order such that the first presented is the one most recommended and the last presented is the lease recommended. N_Recommended can be derived from the known length of the message
Neighbor BS-ID	48bits	
Service level prediction	8bits	

}		
Resource Remain Type	8bits	0 : MSS resource release 1: MSS resource retain
TLV encoded information	Variable	TLV Specific
}		

[Add the followings after parameter description of "Estimated HO start" in page 25]

Resource Remain Type

This flag indicates whether the Serving BS will retain or delete the connection information of the MSS upon receiving MOB_HO-IND with HO_IND_type=00. If the flag is set to 1, the Serving BS will retain the MSS's connection information during the time in Resource Retain Time field. If the flag is set to 0, the Serving BS will discard the MSS's connection information.

The MOB-BSHO-REQ may contain the following TLVs :

Resource Retain Time(11.14.1)

[Add the following parameter descriptions in line 65 page 93]

11.14 Handover management encodings

11.14.1 Resource_Retain_Time

The Resource_Retain_Time is Time duration for MSS's connection information that will be retained in Serving BS. This value is measured in sec. If this value is set to 0, the Serving BS will retain the MSS's connection information during Resource Retain Time negotiated at early registration stage.

If this value is set to non-zero, it is the proposed Resource Retain Time by serving BS and the serving BS will retain the MSS's connection information during that time after reception of MOB-HO_IND message.(HO_IND_type=00)

Type	Length	Value	Scope
[XXX/YYY].z	1	0 : The Serving BS will retain the MSS's connection information during Resource Retain Time negotiated at registration stage. 1~255: Resource Retain Time [100msec unit]	MOB-BSHO-REQ MOB-BSHO-RSP

[Modify the table D5 and D.2.2]

D.2.2 I-am-host-of message

This message is sent by a BS to notify other BS (or the ASA server) that a certain MSS is registered with it. The message shall be sent upon MSS registration, and periodically (TBD period). The message might trigger a neighbor BS to request more information on the MSS (either directly from the sender BS, or from the ASA server). This message may be sent by a BS to notify the former Serving BS of handover results. The message contains the following information

Table D.5 I-am-host-of Message

Field	Size	Notes
Global Header	152-bit	
For(j=0; j<Num Records; j++) {		
MSS Unique Identifier	48-bit	48-bit unique identifier used by MSS (as provided by the MSS or by the I-am-host message)
Reason	8-bit	#0 : Network Attached #1 : Successful Handover #2 : Handover Failure #3 ~ 7 : Reserved
}		
Security field	TBD	A means to authenticate this message

[Modify the table D6]

Table D6 – MSS-info-request Message

Field	Size	Notes
Global Header	152-bit	
For(j=0; j<Num Records; j++) {		
MSS unique identifier	48-bit	48-bit unique identifier used by MSS (as provided by the MSS or by I-am-host-of message)
Action Flag	8-bit	0 – Request information 1 – MSS arrived form Idle mode 2 – MSS has transmitted to another paging group 3 – MSS request handover
}		
Security field	TBD	

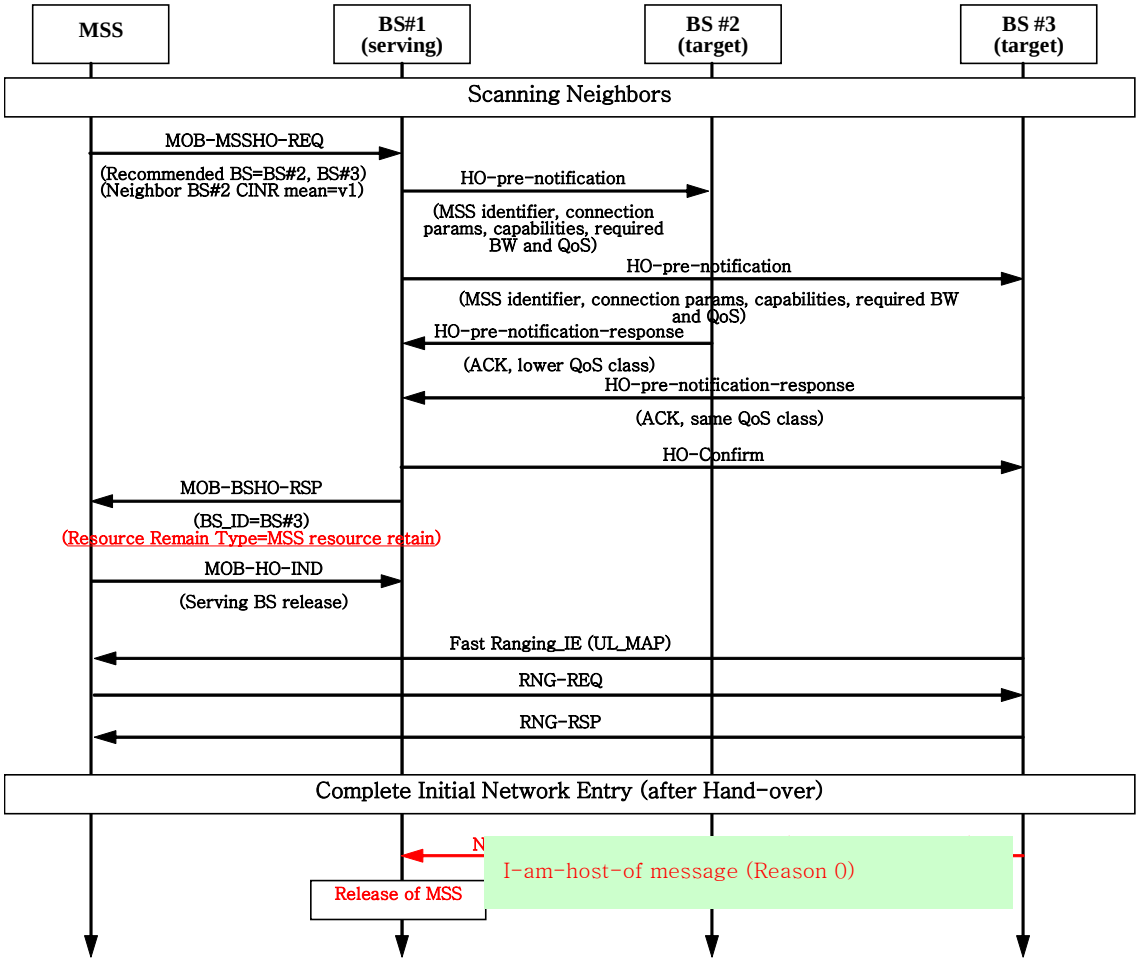

Figure E.X – Example HO process with MSS's Resource Retain by MSS request

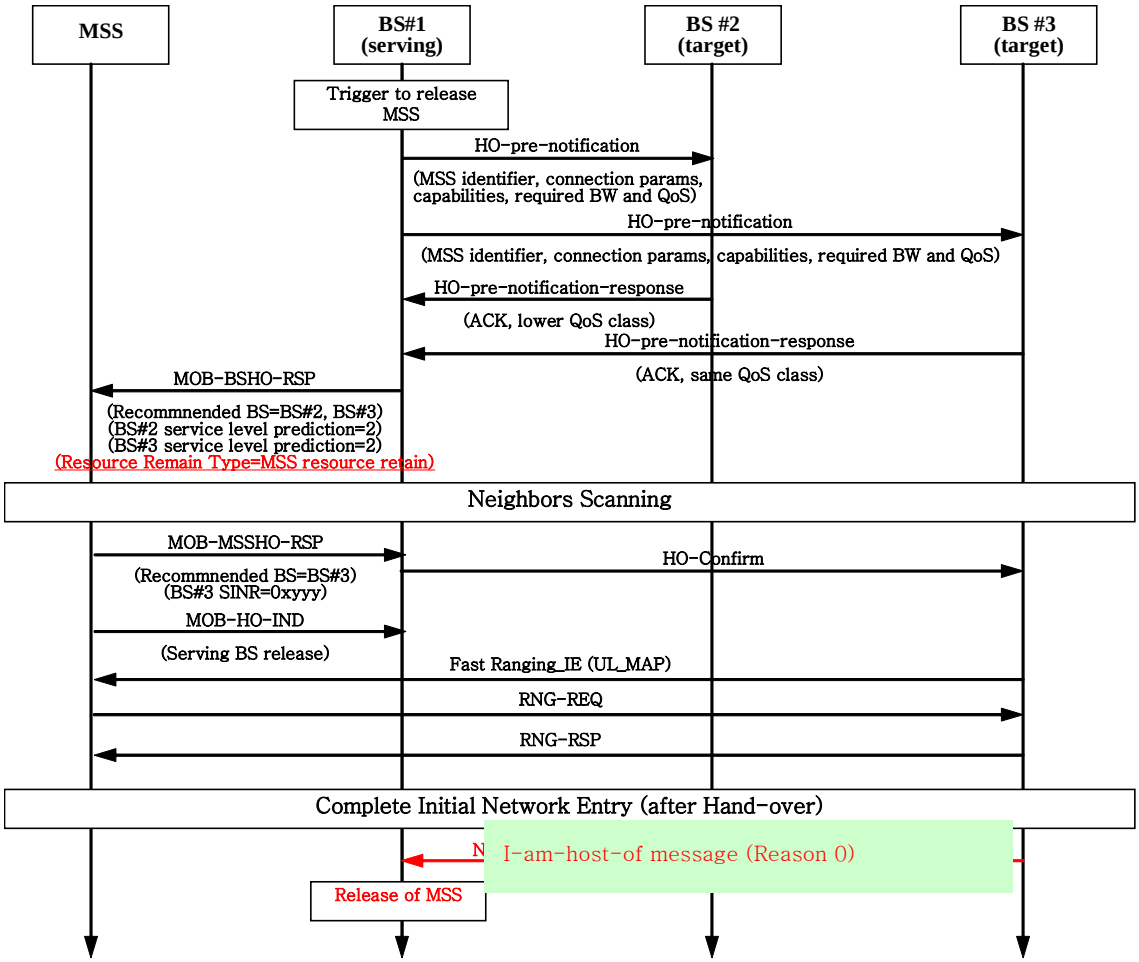

Figure E.X – Example HO process with MSS's Resource Retain by BS request

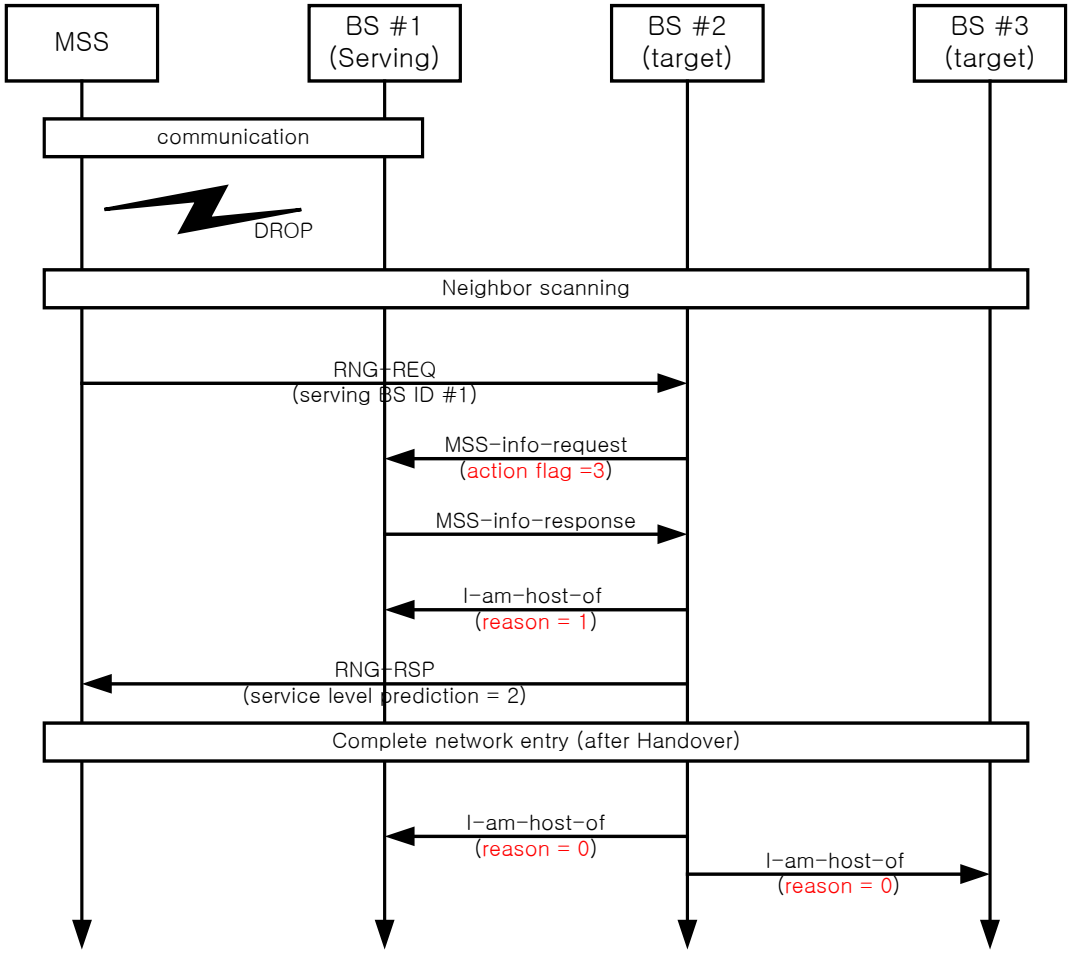

Figure E.X – Example HO process after drop