Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Resource retain time for handover or Ping Pong Call Recovery**
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Re:	This contribution is for call for contribution IEEEP802.16e/D2-2004

Abstract	This contribution proposes the newly added Resource Remain type in the existing handover MAC management messages for fast call recovery of drop-experienced MSS or ping pong-experienced MSS during handover.

Purpose	Propose the type field in handover MAC management message for drop or ping pong call recovery for the IEEE802.16e Handoff Ad hoc group

Resource Retain time for Handover or Ping Pong Call Recovery

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Introduction

At current IEEE802.16e/D2 draft, 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 which has moved to Target BS and the MSS knows about that, the returning MSS, because of ping pong effect, can perform quick call recovery procedures using the remaining connection information with the Serving BS.

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.

Especially, the proposed scheme can be applied to the dropped call recovery, in terms of avoiding unnecessary re-entry procedures and prompt call recovery.

Proposed Mechanism

For the purpose, we propose mechanisms by which MSS can know that the Serving BS remains the connection information of the MSS trying to move to other BS. By setting Resource_Remain_Type in SBC-RSP message, MOB-BSHO-REQ message or MOB-BSHO-RSP message, the Serving BS notifies to the MSS whether the Serving BS will retain the connection information or release it. The MSS, upon receiving these messages, can recognize connection information's status after sending MOB-HO-IND(HO_IND_type=00) and beginning the actual HO. And when the MSS transmit RNG-REQ to target BS, it may include serving BS ID according to Resource_Retain_Time.

When ping pong-experienced MSS returns to the former Serving BS and tries to resume the normal communication with the Serving BS, the MSS can perform initial ranging procedure according to the status of the connection information. If the MSS finds out that the connection information remains in Serving BS, the MSS sends the ranging request containing its Basic CID previously allocated from the BS. The Basic CID can be used for notifying that the Serving BS retains the connection information of the MSS. And then the MSS and the Serving BS can quickly resume the normal communication with the remaining connection

information.

In the case that the MSS experiences drop during handover procedure and knows the status of connection information, the drop-experienced MSS can also perform initial ranging procedure with newly found Target BS using the status information. If the drop-experienced MSS knows that the Serving BS will retain the MSS's connection information, the MSS sends ranging request with serving BS ID. The Target BS, upon receiving the ranging request with serving BS ID from the MSS, can recognize that the Serving BS retains the dropped MSS's connection information. And the Target BS can request the Serving BS to transfer the MSS's connection information and quickly enter the call recovery procedure using the forwarded connection information.

The decision the Serving BS will remain or delete the connection information of the MSS and how long it can retain the information depends on the BS's capacity and may vary from time to time. Therefore the time during which the resource remains for the MSS moving to other BS should be determined by the Serving BS during handover request/response handshake according to the condition of the Serving BS. If the Serving BS can grant the MSS more or less time than that of negotiated at the registration stage, the BS notifies its preferred time using Resource Retain Time in BS-generated handover messages.

Therefore we propose the remedies as followings:

- Add the following TLV encoding to SBC-RSP after Line 49 on page 89.
  - Resource_Retain_Time
- Add "the operation that the Serving BS informs MSS of the status of connection information which is determined upon receiving MOB-HO-IND message, by sending modified MOB-BSHO-REQ or modified MOB-BSHO-RSP" to section 6.3.20.2.5, page 47
- Modify MOB-BSHO-REQ message in page 23 and MOB-BSHO-RSP message in page 24 by adding the following parameter.
  - Resource_Remain_Type
  - Resource_Retain_Time

Proposed Text Changes

We propose the following remedies in IEEE P802.16e/D2 to provide the handover enhancement method related with the fast call recovery

[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 at the ping pong case. Whether the Serving BS retains or discards the connection information of the MSS 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.

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 early registration stage. 1~255: Resource Retain Time [100msec unit]	MOB- BSHO- REQ MOB- BSHO- RSP