Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Resource Remain type for Drop 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 Retain 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
Notice	
Release	
Patent Policy and Procedures	

Resource Remain type for Drop or Ping Pong Call Recovery

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Introduction

MSS, during the network re-entry procedures with the Target BS, may return to its Serving BS by ping pong effect. After returning to its Serving BS, the MSS should perform the complex call recovery procedures like a normal initial entry call.

If the Serving BS retains the connection information of MSS which has moved to Target BS and the MSS knows about that, the returning ping pong-experienced MSS can perform quick call recovery procedures using the remaining connection information with the Serving BS.

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 for the ping pong call recovery 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 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 delete 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 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 knows that the connection information remains in Serving BS, the MSS sends 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 its Basic CID allocated from the Serving BS. The Target BS, upon receiving the ranging request with the Basic CID 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 time during which the resource remains for the MSS moving to other BS can be negotiated between the Serving BS and the MSS at the registration stage or newly proposed by the Serving BS during handover request/response handshake according to the condition of the Serving BS.

Therefore we propose the remedies as followings:

- ◼ 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 fields.
  - ◼ 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 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, after experiencing drop or ping pong, to perform quickly re-entry operation with a newly found Target BS or the former Serving BS. 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 this timer is a predefined value or a proposed value by the Serving BS. This proposed value is determined according to the Serving BS's condition.

[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	1bits	0 : MSS resource release 1: MSS resource retain
Resource Retain Time	8bits	time duration for case where Resource Remain Type value is 1.
Reserved	7bits	reserved; shall be set to zero
}		

[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.

Resource Retain Time
Time duration for MSS's connection information retaining in Serving BS. This value is measured in frame.
If this value is set to 0, the Serving BS will retain the MSS's connection information during Resource Retain Time negotiated at registration stage.
If this value is set to non zero, the Serving BS will propose a new Resource Retain Time and retain the MSS's connection information during that time.

[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~~time~~	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	1bits	0 : MSS resource release 1: MSS resource retain
Resource Retain Time	8bits	time duration for case where Resource Remain Type value is 1.
Reserved	7bits	reserved; shall be set to zero
}		

[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.

Resource Retain Time
Time duration for MSS's connection information retaining in Serving BS. This filed is measured in frame.
If this value is set to 0, the Serving BS will retain the MSS's connection information during Resource Retain Time negotiated at registration stage.
If this value is set to non zero, the Serving BS will propose a new Resource Retain Time and retain the MSS's connection information during that time.