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| Title                        | <b>Resource Remain type for Drop or Ping Pong Call Recovery</b>   |  |
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| Re:                          | This contribution is for call for contribution IEEE802.16e/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  |  |
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# 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.

Whether the Serving BS will remain or delete the connection information of the MSS and how for a long time the BS can retain the information depend on the BS's capacity. Therefore 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 early registration stage or newly proposed 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 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+ + )<br>{  |                       | N_Recommended can be derived from the known length of the message                  |
| Neighbor BS-ID                       | 48bits                |  |
| Service level prediction             | 8bits                 |  |
| }                                    |                       |  |
| <a href="#">Resource Remain Type</a> | <a href="#">1bits</a> | <a href="#">0 : MSS resource release</a><br><a href="#">1: MSS resource retain</a> |
| <a href="#">Resource Retain Time</a> | <a href="#">8bits</a> | <a href="#">time duration for case where Resource Remain Type value is 1.</a>      |
| <a href="#">Reserved</a>             | <a href="#">7bits</a> | <a href="#">reserved; shall be set to zero</a>                                     |
| }                                    |                       |  |

*[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 early 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 Starttime               | 8bits                 |  |
| For(j=0;j<N_Recommended;j+ + )<br>{  |                       | 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 least recommended. N_Recommended can be derived from the known length of the message |
| Neighbor BS-ID                       | 48bits                |  |
| Service level prediction             | 8bits                 |  |
| }                                    |                       |  |
| <a href="#">Resource Remain Type</a> | <a href="#">1bits</a> | <a href="#">0 : MSS resource release</a><br><a href="#">1: MSS resource retain</a>   |
| <a href="#">Resource Retain Time</a> | <a href="#">8bits</a> | <a href="#">time duration for case where Resource Remain Type value is 1.</a>  |
| <a href="#">Reserved</a>             | <a href="#">7bits</a> | <a href="#">reserved; shall be set to zero</a>   |
| }                                    |                       |  |

[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 field 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 early 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.](#)