Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Initial Ranging Overhead Reduction
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Re:	IEEE P802.16e/D3-2004
Abstract	In this contribution, a method of reducing initial ranging overhead is proposed
Purpose	Review and Adopt the suggested changes into P802.16e/D3
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1   Introduction

In 802.16e/D3, to accelerate the HO procedure, a Fast_Ranging_IE was introduced to provide non-contention based initial ranging when a MSS handovers to a selected target BS. The Fast_Ranging_IE is placed in the UL-MAP message. Since the UL-MAP message is a broadcast message which must be transmitted with high robustness to the MSS, the over-the-air resource required by a broadcast message is usually high. Careful design of broadcast messages is necessary to ensure the overhead can be minimized. Here we propose a method to reduce the UL and DL overhead incurred by a MSS who is performing initial ranging with the target BS.

This proposed method includes the following steps:

- After receiving HO-pre-notification-request message, the target BS assigns a HO_ID (8 bits) to the MSS if the target BS is able to support the requested HO.

- The target BS indicates the assigned HO_ID in the HO-pre-notification-response message

- The serving BS then indicates this assignment to the MSS in MOB-BSHO-RSP (if the HO is initiated by the MSS) or MOB-BSHO-REQ (in the HO is initiated by the BS)

- After the estimated HO start time, the target BS can use HO_ID, instead of the MSS' 48-bit MAC address in Fast_Ranging_IE to provide a contention-free ranging opportunity

- The subsequent procedure is the same as in the current D3 text with one exception that the MAC address shall be replaced by the HO_ID in the RNG_REQ and RNG_RSP messages

2   Proposed Text Change

The proposed text change is based on p802.16e/D3. The text change is on the following messages: Fast_Ranging_IE, RNG_REQ, RNG_RSP and MOB_BSHO_REQ/RSP.

[Modify the Fast Ranging Information Element]

8.4.5.4.15 Fast ranging Information Element

[…]

Table 300a – OFDMA Fast Ranging IE format IE

Syntax	Size	Notes
Fast_UL_ranging_IE() {		
Extended UIUC	4 bits	
~~MAC Address~~ HO_ID	~~48 bits~~8 bits	
UIUC	4 bits	
OFDM Symbol offset	10 bits	
Subchannel offset	6 bits	
No. OFDM symbols	10 bits	
No. subchannels	6 bits	
Reserved	4 bits	
}		

[…]

HO_ID – An identifier assigned to a MSS for use during initial ranging to the selected target BS

[…]

[Modify BS-BSHO-RSP message]

6.3.2.3.56 BS HO Response (MOB-BSHO-RSP) message

[…]

Table 92j- MOB-BSHO-RSP Message Format

Syntax	Size	Notes
MOB-BSHO-RSP_Message_Format() {		
Management Message Type = 54	8 bits	
Network Assisted HO supported	1 bit	Indicate that the BS supports Network assisted HO
For (i= 0;i<N_Recommended; i++) {		
Neighbor BS_ID	48 bits	Base station ID
Service level prediction	8 bits	
HO_ID_included_indicator	1 bit	To indicate if the field HO_IND is included
If (HO_ID_included_indicator == 1) {		
HO_ID	8 bits	ID assigned for use in initial ranging to the target BS once this BS is selected as the target BS
}		
}		
Reserved	Variable	As required
HMAC tuple	21 bytes	
}		

[…]

HO_ID - ID assigned for use in initial ranging to the target BS once this BS is selected as the target BS

[Modify MOB_BSHO_REQ message]

6.3.2.3.54 BS HO Request (MOB-BSHO-REQ) message

[…]

Table 92h- MOB-BSHO-REQ message Format

Syntax	Size	Notes
MOB-BSHO-REQ_Message_Format() {		
Management Message Type = 52	8 bits	
Network Assisted HO supported	1 bit	Indicate that the BS supports Network assisted HO
For (i= 0;i<N_Recommended; i++) {		
Neighbor BS_ID	48 bits	Base station ID
Service level prediction	8 bits	
HO_ID_included_indicator	1 bit	To indicate if the field HO_IND is included
If (HO_ID_included_indicator == 1) {		
HO_ID	8 bits	ID assigned for use in initial ranging to the target BS once this BS is selected as the target BS
}		

}		
Reserved	Variable	As required
HMAC tuple	21 bytes	
}		

[…]

HO_ID – Assigned an identifier to a MSS for use during initial ranging to the selected target BS

[…]

[Insert the following to the end of section 6.3.2.3.5]

6.3.2.3.5. Ranging Request (RNG_REQ) message

[…]

The following TLV parameter may be included in RNG_REQ message when a MSS is performing initial ranging to the selected target BS:

          HO_ID.

[Insert the following to the end of section 6.3.2.3.6]

6.3.2.3.6 Ranging Response (RNG_RSP) message

[…]

When a BS sends RNG-RSP message as a reply to the RNG-REQ message from a MSS who is performing initial ranging during HO, the RNG-RSP message may include the following TLV parameter:

          HO_ID.

[Modify RNG-REQ message encoding. Add the following row to Table 318a]

11.5 RNG-REQ message encoding

Table 318a – RNG-REQ Message Encoding

Name	Type (1byte)	Length	Value
HO_ID	5	1	The identifier assigned to a MSS during HO by a target BS

[Modify RNG-RSP Encoding. Add the following row to Table 320a]

11.6 RNG-RSP message encoding

Table 320a- RNG-RSP Message Encoding

Name	Type (1byte)	Length	Value
HO_ID	TBD	1	The identifier assigned to

			a MSS during HO by a target BS