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Abstract	The document suggests text changes to enhance contention based association.
Purpose	The document is for consideration during Sponsor Ballot comments resolution
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Enhanced contention based association

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Introduction

In IEEE 802.16e/D6, MS can perform association procedure through initial ranging with the neighbor BS during scanning interval. There are two types of association, non-contention based association and contention based association.

In the case of OFDMA contention based association,

The MS performs association with the BS through following procedures.

- Measuring downlink channel quality
- Adjusting uplink transmission parameters through one or more initial ranging code and RNG-RSP transactions
- Receiving Basic/Primary Management CID in RNG-RSP after transmitting RNG-REQ including MAC address
- Requesting UL BW with BW-REQ code and BW-REQ header to transmit RNG-REQ including Serving BS ID TLV
- Transmitting RNG-REQ including Serving BS ID TLV
- Receiving Service Level Prediction TLV in RNG-RSP

MS transmits initial ranging request for association and network entry by using initial ranging code in the UL initial ranging interval. Therefore, the BS receiving initial ranging request from the MS can not tell whether the MS is attempting network entry or association, until it receives RNG-REQ including Serving BS ID TLV.

This causes all MSs to perform the procedure for Basic/Primary management CID allocation, UL-BW Request to transmit Serving BS ID TLV, and so on. The BS can determine MSs' Service Level Prediction only after receiving Serving BS ID for the MS. If Service Level Prediction is 0 or 1, the procedure for allocation of management CIDs and bandwidth request to transmit Serving BS ID was unnecessary and caused delay for association.
If a BS differentiates initial ranging for association from network entry, it can allocate appropriate UL BW for its own purpose to the MS. This can be achieved by using ranging codes assigned only for association. Using distinctive ranging code for association makes the association procedure shorter and faster than using initial ranging code.

So, we propose Association CDMA Ranging Code to indicate initial ranging request for association.

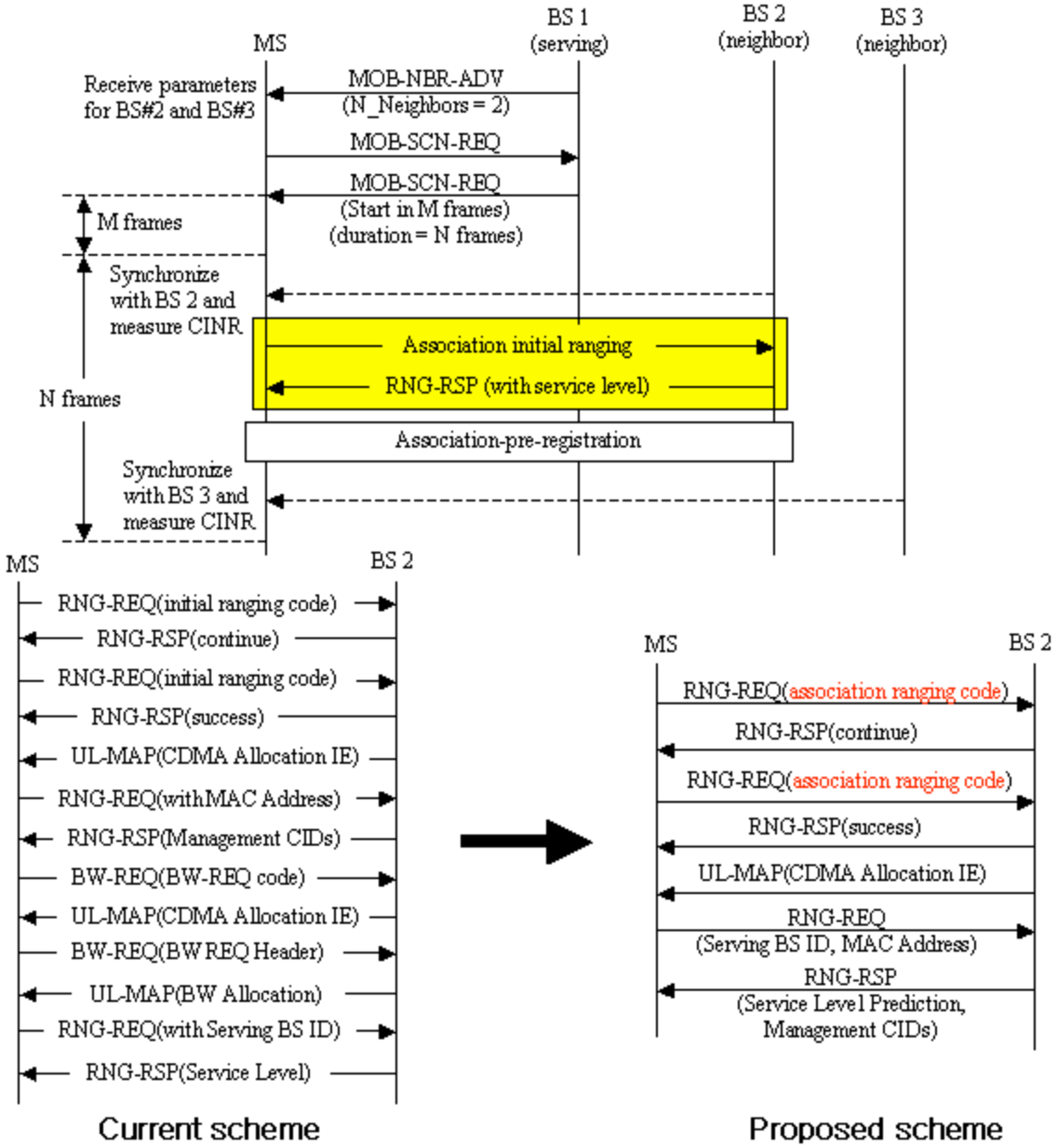

Figure. Example of contention based association

Proposed text change

Remedy : Add the text related to Association CDMA Ranging Code.

[Modify the text in 11.3 UCD management message encodings, page 473, line 61, as follows :]

Table 351a—UCD PHY-specific channel encodings - WirelessMAN-OFDMA

Name	Type (1 byte)	Length	Value (variable length)
Handover Ranging Codes	173	1	Number of handover ranging CDMA codes. Possible values are 0-255.

The start of ranging code groups	155	1	Indicates the starting number, S, of the group of codes used for this uplink. All the ranging codes used on this uplink will be between S and ((S+O+N+M+L+K) mod 256). Where, O is the number of handover-ranging codes, N is the number of initial-ranging codes, M is the number of periodic-ranging codes, L is the number of bandwidth-request codes the range of values is. K is the number of association-ranging codes.
Initial ranging interval	180	1	Number of frames between initial ranging interval allocation.
Association Ranging Codes	181	1	Number of association ranging CDMA codes. Possible values are 0-255.

[Modify the text in 8.4.5.4 UL-MAP IE format, page 269, line 38, as follows :]

Syntax	Size	Notes
UL-MAP_IE() {		
CID	16 bits	
UIUC	4 bits	
if (UIUC == 12) {		
OFDMA Symbol offset	8 bits	
Subchannel offset	7 bits	
No. OFDMA Symbols	7 bits	
No. Subchannels	7 bits	
Ranging Method	2 bits	0b00 – Initial Ranging/Handover Ranging/Association Ranging over two symbols 0b01 – Initial Ranging/Handover Ranging/Association Ranging over four symbols 0b10 – BW Request/Periodic Ranging over one symbol 0b11– BW Request/Periodic Ranging over three symbols
~~*reserved*~~Dedicated ranging indicator	1 bit	~~shall be set to zero~~ 0: the OFDMA region and Ranging Method defined are used for the purpose of normal ranging 1: the OFDMA region and Ranging Method defined are used for the purpose of ranging using dedicated CDMA code assigned in the MOB-PAG-ADV message.
} else if (UIUC == 14) {		
CDMA_Allocation_IE()	32 bits	
} else if (UIUC == 15) {		

Extended UIUC dependent IE	*variable*	See subclauses following 8.4.5.4.3
} else {		
…	…	…

[Modify the text in 8.4.7.1 Initial-ranging/handover-ranging transmissions, page 407, line 37, as follows :]

8.4.7.1 Initial-ranging/handover-ranging/association-ranging transmissions

[Change the text in 8.4.7.1 as indicated:]
The initial-ranging/handover-ranging/association-ranging transmission shall be used by any MS that wants to synchronize to the system channel for the first time. An initial-ranging/handover-ranging/association-ranging transmission shall be performed during two consecutive symbols. The same ranging code is transmitted on the ranging channel during each symbol, with no phase discontinuity between the two symbols. A time-domain illustration of the initial-ranging/handover-ranging/association-ranging transmission is shown in Figure 239.

[Change the title of Figure 239 as indicated:]
Figure 239-Initial-ranging/handover-ranging/association-ranging transmission for OFDMA

[Change the text above Figure 240 as indicated:]
The BS can allocate two consecutive initial-ranging/handover-ranging slots, onto those the MS shall transmit the two consecutive initial-ranging/handover-ranging codes (starting code shall always be a multiple of 2), as illustrated in Figure 240:

[Change the title of Figure 240 as indicated:]
Figure 240-Initial-ranging/handover-ranging/association-ranging transmission for OFDMA, using two consecutive initial ranging codes

[Modify the text in 8.4.7.3 Ranging codes, page 408, line 23, as follows :]

The number of available codes is 256, numbered 0..255. Each BS uses a sub-group of these codes, where the sub-group is defined by a number S, 0 <= S <= 255. The group of codes will be between S and ((S+O+N+M+L+K) mod 256).

— The first N codes produced are for initial-ranging. For example, for the default case of two sub-channels in the ranging channel, clock the PRBS 144 x (S mod 256) times to 144 x ((S + N) mod 256) – 1 times.
— ~~I~~The next M codes produced are for periodic-ranging. For example, for the default case of two subchannels in the ranging channel, clock the PRBS 144 x ((N + S) mod 256) times to 144 x ((N + M +S) mod 256) -1 times.
— The next L codes produced are for bandwidth-requests. For example, for the default case of two subchannels in the ranging channel, clock the PRBS 144 x ((N + M + S) mod 256) times to 144 x ((N +M + L + S) mod 256) -1 times.
— The next O codes produced are for handover-ranging. For example, for the default case of two subchannels in the ranging channel, clock the PRBS 144 x ((N + M +L+ S) mod 256) times to 144 x ((N +M + L + O+S) mod 256) -1 times.
— The next K codes produced are for association-ranging. For example, for the default case of two subchannels in the ranging channel, clock the PRBS 144 x ((N + M + L + O + S) mod 256) times to 144 x ((N +M + L + O + K + S) mod 256) -1 times.

[Modify the text in 6.3.10.3.3 CDMA handover ranging and automatic adjustment, page 407, line 37, as follows :]

6.3.10.3.3 CDMA handover ranging and automatic adjustment

An MS that wishes to perform handover/association ranging shall take a process similar to that defined in the initial ranging section with the following modifications.

In CDMA handover/association ranging process, the CDMA handover/association ranging code is used instead of the initial ranging code. The code is selected from the handover-ranging/association-ranging domain as defined in 8.4.7.3.

Alternatively, if the BS is pre-notified for the upcoming handover/association MS, it may provide BW allocation information to the MS using Fast_Ranging_IE to send an RNG-REQ message.