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| Title | **Handover Procedures from YBS to ABS** |
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| Re: | 802.16m AWD ("Call for Contributions on Project 802.16m Amendment Working Document (AWD) content", IEEE 802.16m-09/0012) |
| Abstract | This contribution proposes suggested AWD text on YBS-to-ABS handover procedures supporting WirelessMAN OFDMA Reference System |
| Purpose | For discussion and adoption in 802.16m AWD |
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# Handover Procedures from YBS to ABS

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## 1. Introduction

In the case of handover from YBS to ABS, an AMS may hand over from a serving YBS to the LZone of the target ABS using WirelessMAN-OFDMA Reference System procedures, and switch to the MZone of the ABS after the AMS entering LZone. To perform the zone switching, the AMS may need to know that the target BS is an ABS with legacy support after the AMS entering LZone. To avoid any extra signaling message, a method that utilizes the reserved bit of downlink frame prefix in LZone is modified from legacy OFDMA DL Frame Prefix format as follows.

The handover from YBS to ABS can be achieved through two-state procedures and one-stage direct procedures. In two-stage handover procedures, the AMS hands over to the LZone of target ABS and performs zone switch procedure. One of the reserved bits of RNG-REQ message sending in LZone is also re-defined as Zone_Switch_Request to indicate that (a) the AMS supports Advanced WirelessMAN-OFDMA system and (b) the AMS intends to perform zone switch. If the zone switching is permitted, the ABS sends a RNG-RSP message with Zone_Switch_Response=1 to the AMS to specify the parameters of MZone. One of the reserved bits of RNG-RSP is used and re-defined as the Zone_Switch_Response.

## 2. Proposed Text

---------- Text Start ----------

*{Note: suggested remedy for Table 43 in subclause 6.3.2.3.5}*

Table 43—RNG-REQ message format

| Syntax | Size (bit) | Notes |
|---|---|---|
| RNG-REQ_Message_Format() { | — | — |
| **Management Message Type = 4** | 8 | — |
| ~~*Reserved*~~<br>**Zone_Switch_Request** | 1 | ~~Shall be set to zero~~<br>**0: YMS or serving zone unchanged**<br>**1: AMS and request zone switch**<br>When this bit is set to 1, it indicates that the requesting MS is an AMS and requests for zone switch to MZone. |
| *Reserved* | 7 | Shall be set to zero |
| **TLV Encoded Information** | *variable* | TLV-specific |
| } | — | — |

*{Note: suggested remedy for Table 44 in subclause 6.3.2.3.6}*

Table 44—RNG-RSP message format

| Syntax | Size (bit) | Notes |
|---|---|---|
| RNG-RSP_Message_Format() { | — | — |
| **Management Message Type = 5** | 8 | — |
| ~~*Reserved*~~<br>**Zone_Switch_Response** | 1 | ~~Shall be set to zero~~<br>**0: Serving zone unchanged**<br>**1: Zone switch permission**<br>This bit indicates the result of zone switch request for the AMS. |
| *Reserved* | 7 | Shall be set to zero |
| **TLV Encoded Information** | *variable* | TLV-specific |
| } | — | — |

*{Note: suggested remedy for Table 313 in subclause 8.4.4.4}*

Table 313—OFDMA DL Frame Prefix format for all FFT sizes except 128

| Syntax | Size (bit) | Notes |
|---|---|---|
| DL_Frame_Prefix_Format() { | — | — |
| **Used subchannel bitmap** | 6 | Bit #0: Subchannel group 0<br>Bit #1: Subchannel group 1<br>Bit #2: Subchannel group 2<br>Bit #3: Subchannel group 3<br>Bit #4: Subchannel group 4<br>Bit #5: Subchannel group 5 |
| ~~*Reserved*~~<br>**MZone Indicator** | 1 | ~~Shall be set to zero~~<br>0: MZone absence<br>1: MZone presence<br><br>This field indicates the absence/presence of MZone (Advanced WirelessMAN-OFDMA System). |
| **Repetition_Coding_Indication** | 2 | 0b00: No repetition coding on DL-MAP<br>0b01: Repetition coding of 2 used on DL-MAP<br>0b10: Repetition coding of 4 used on DL-MAP<br>0b11: Repetition coding of 6 used on DL-MAP |
| **Coding_Indication** | 3 | 0b000: CC encoding used on DL-MAP<br>0b001: BTC encoding used on DL-MAP<br>0b010: CTC encoding used on DL-MAP<br>0b011: ZT CC encoding used on DL-MAP<br>0b100: CC encoding with optional interleaver<br>0b101: LDPC encoding used on DL-MAP<br>0b110 to 0b111: *Reserved* |
| **DL-Map_Length** | 8 | — |
| *Reserved* | 4 | Shall be set to zero |
| } | — | — |

*{Note: suggested remedy for Table 315 in subclause 8.4.4.4}*

Table 315—OFDMA DL frame prefix format for 128-FFT

| Syntax | Size (bit) | Notes |
|---|---|---|
| DL_Frame_Prefix_Format() { | — | — |
| **Used subchannel bitmap** | 1 | 0: Subchannel 0 is used for segment 0,<br>Subchannel 1 is used for segment 1,<br>Subchannel 2 is used for segment 2,<br>1: Use all subchannels |
| ~~*Reserved*~~<br>**MZone_Indicator** | 1 | ~~Shall be set to zero~~<br>0: MZone absence<br>1: MZone presence<br>This field indicates the absence/presence of MZone (Advanced WirelessMAN-OFDMA System). |
| **Repetition_Coding_Indication** | 2 | 0b00: No repetition coding on DL-MAP<br>0b01: Repetition coding of 2 used on DL-MAP<br>0b10: Repetition coding of 4 used on DL-MAP<br>0b11: Repetition coding of 6 used on DL-MAP |
| **Coding_Indication** | 3 | 0b000: CC encoding used on DL-MAP<br>0b001: BTC encoding used on DL-MAP<br>0b010: CTC encoding used on DL-MAP<br>0b011: ZT CC encoding used on DL-MAP<br>0b100: LDPC encoding used on DL-MAP<br>0b110 to 0b111: *Reserved* |
| **DL-Map_Length** | 5 | — |
| } | — | — |

*{Note: add following text to subclause 15.2 Medium access control}*

## 15.2 Media access control

## 15.2.x MAC HO procedures

### 15.2.x.x Handover process supporting WirelessMAN-OFDMA reference system

#### 15.2.x.x.1 Network topology acquisition

The WirelessMAN-OFDMA Reference System/Advanced WirelessMAN-OFDMA System co-existing system consists of WirelessMAN-OFDMA Reference System and Advanced WirelessMAN-OFDMA System cells/sectors. An YBS advertises the system information for its neighbor YBSs and the LZones of its neighbor ABSs. An ABS advertises the system information for its neighbor YBSs in its both LZone and MZone. It advertises the LZones of its neighbor ABSs in its LZone. It also advertises the system information for its neighbor ABSs in MZone.

In LZone, the ABS shall indicate the presence of its MZone by using MZone_Indicator in OFDMA DL Frame Prefix (see Table 313 and Table 315). An AMS in LZone may request to switch to MZone if MZone_Indicator

is set.

15.2.x.x.2 Handover from YBS to ABS

15.2.x.x.2.1 Two-stage handover procedures

When a handover from an YBS to an ABS is triggered for an YMS, the YMS hands over from the serving YBS to the LZone of the target ABS using WirelessMAN-OFDMA Reference System handover procedures (see 6.3.21). When a handover from an YBS to an ABS is triggered for an AMS, the AMS hands over from the serving YBS to the target ABS using two-stage procedures, as shown in Figure yyy-1. In stage 1, the AMS hands over from the serving YBS to the LZone of the target ABS using WirelessMAN-OFDMA Reference System handover procedures (see 6.3.21). After entering LZone of the ABS, the AMS starts stage 2 to perform zone switch to the MZone of the ABS. The zone switch is initiated by either the AMS or the ABS by using the zone switch procedures.

The zone switch can be initiated by AMS. Before the AMS intends to initiate zone switch from LZone to MZone, the AMS has to confirm the presence of ABS's MZone by MZone_Indicator in FCH. Then the AMS sends a RNG-REQ with Zone_Switch_Request=1 (see Table 43) as the zone switch request in LZone to the ABS to request performing zone switch to MZone. After receiving the zone switch request, the ABS determines to accept or reject the zone switch request. If the request is rejected, the ABS sends a zone switch response to the AMS, indicating that the serving zone is unchanged, and the zone switch procedure is terminated. If the AMS does not receive the zone switch response after timer expiration, the zone switch procedure is also terminated.

If the zone switch request is permitted, the ABS checks if the MZone is activated or not. If not, the ABS will activate the MZone during zone switch preparation. Then the ABS sends a RNG-RSP with Zone_Switch_Response=1 (see Table 44) as the zone switch response to the AMS with zone switch permission and MZone parameters and synchronization information in TLV Encoded Information. After receiving zone switch permission, the AMS turns on Advanced WirelessMAN-OFDMA System operation mode and performs network entry/reentry based on the received MZone parameters and synchronization information. Once the AMS enters MZone successfully, the AMS turns off its WirelessMAN-OFDMA Reference System operation mode.

The zone switch can also be initiated by the ABS after confirming that the MS associated in LZone is an AMS. The ABS initiates the zone switch by sending a BS-initiated zone switch request (BSZS-REQ) to the AMS to specify the MZone parameters and synchronization information. After receiving the zone switch request from the ABS in the LZone and turning on Advanced WirelessMAN-OFDMA System operation mode, the MS performs network entry/reentry procedure to the MZone based on the received MZone parameters.

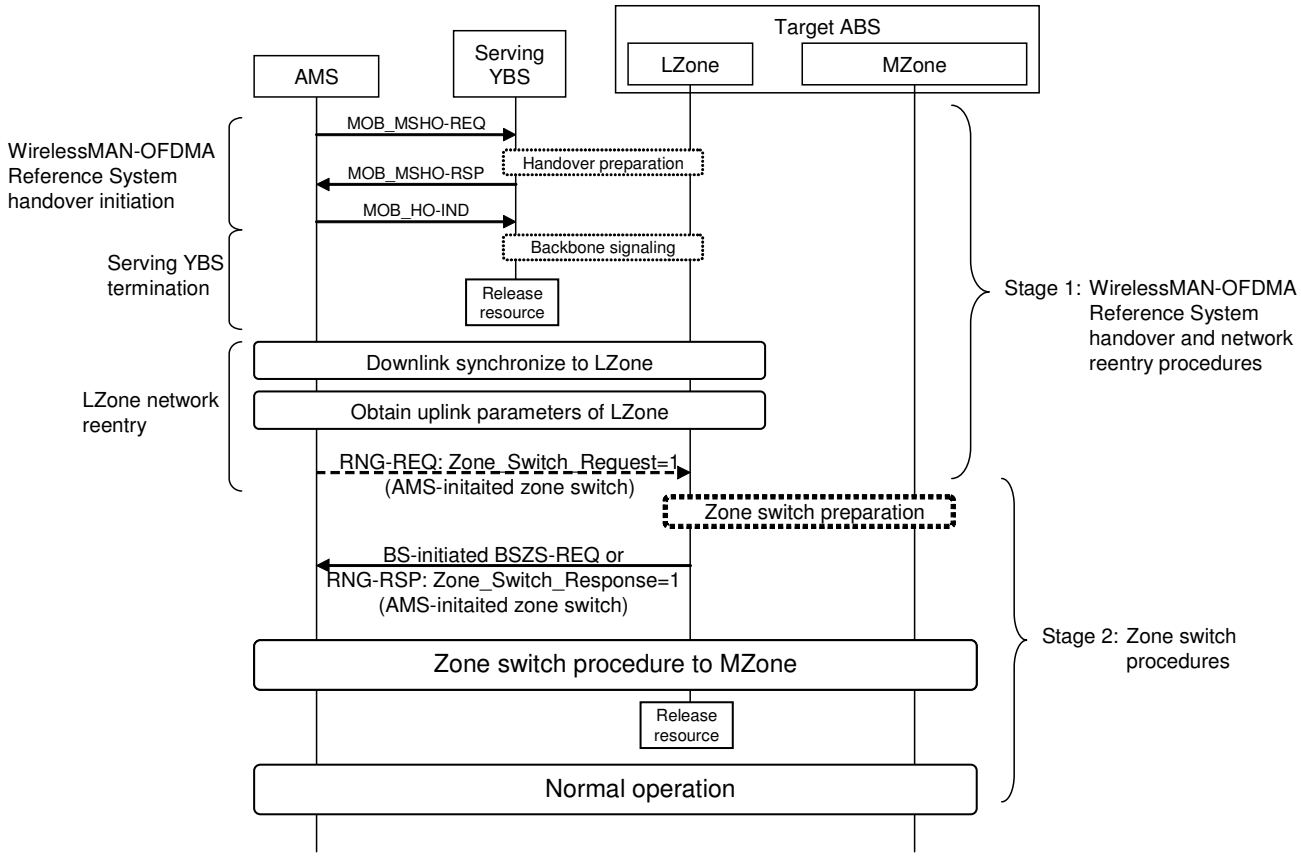


Figure yyy-1: Example of two-stage handover procedures from a serving YBS to a target ABS

15.2.x.x.2.2 One-stage direct handover procedures

An AMS in the cell of YBS shall perform neighbor ABS scanning automatically to find candidate ABSs. Upon finding candidate neighbor ABSs and determining to hand over to a target ABS, the AMS initiates the WirelessMAN-OFDMA Reference System handover initiations with the serving YBS. After terminating the connection with serving YBS, the AMS turns off its YBS operation and performs Advanced WirelessMAN-OFDMA System network reentry procedures with the target ABS. After completing network reentry procedures, the AMS enters the normal operation with the target ABS. Figure yyy-2 depicts an example of one-stage direct handover procedures from a serving YBS to a target ABS.

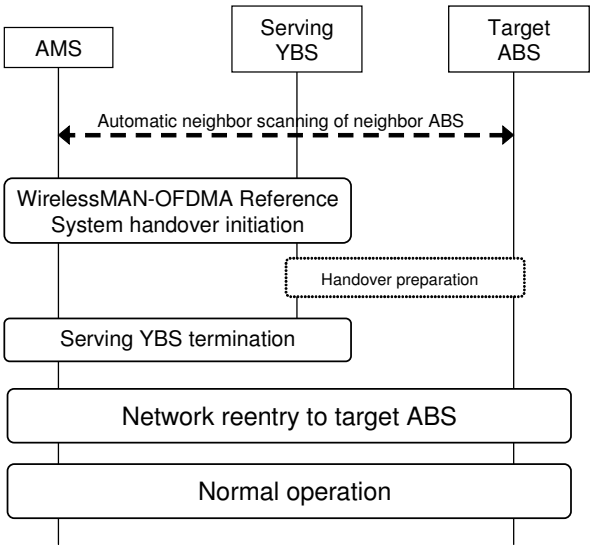


Figure yyy-2 Example of one-stage direct handover procedures from a serving YBS to a target ABS

---------- Text End ----------