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Re:	Call for contributions, IEEE P802.16e-2005 Sponsor Ballot
Abstract	This document suggests changes in TGe Draft Document IEEE 802.16e-2005 to define initial transmit power calculation during FBSS handover for OFDMA PHY
Purpose	Adopt into the current TGe working draft
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Initial Transmit Power Calculation during FBSS Handover for OFDMA PHY

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1   Introduction

The power control for OFDMA PHY in the 802.16e standard [1] has been designed with great consideration. However, the FBSS process defined in the standard, does not define a clear PC mechanism to be used during its execution. This fact may lead to unclear and/or unexpected MS behavior that may greatly degrade system performance.

This contribution is aimed at expanding previous PC elements for use during the FBSS handover process, so as to clearly define a mandatory PC mechanism for use during this process.

2   Motivation for the Changes

According to section 6.3.22.3 in the standard [1][2], handover initiation may be performed using FBSS process. During a FBSS process, if the target BS allocates a CQICH_Allocation_IE in the UL-MAP, the MS shall report CINR value through the allocated CQICH. If the target BS does not allocate any CQICH for the MS, then the MS may request the CQICH allocation through the CQICH_allocation_request header. In this case, the MS shall transmit a bandwidth request CDMA code first for the request of uplink bandwidth in order to transmit the CQICH_allocation_request header. However, the standard does not indicate the initial transmit power level for the initial transmission of CQICH or bandwidth request ranging code at target BS.

This contribution proposes a method for the calculation of the initial transmit power for MS in FBSS, which is similar to the case of Fast_Ranging_IE adopted in IEEE802.16_Cor2/D2 [2].

3   Detailed Text Changes

[Modify the following text from Section 8.4.10.3.2.2 in IEEE802.16_Cor2/D2[2]]

8.4.10.3.2.2 Power control in handoff

During handover, the target BS may provide BW allocation information to the MS using Fast_Ranging_IE to send an RNG-REQ message. In case of FBSS handover, the target BS may allocate a CQICH for the MS to report CINR, or the MS may transmit the bandwidth request ranging code in order to request uplink bandwidth allocation at target BS. In ~~this case~~ these cases, the target BS shall also transmit the UL_noise_and_interference_level_IE in the same frame in which the OFDMA_Fast_Ranging_IE or CQICH_Allocation_IE is transmitted. This UL_noise_and_interference_level_IE shall include at least the NI field that corresponds to the same zone that Fast_Ranging_IE points to (i.e. the UL zone in which the MS may transmit RNG-REQ) if the Fast_Ranging_IE is used. The UL_noise_and_interference_level_IE shall include at least the NI field that corresponds to the CQICH region if CQICH_Allocation_IE is transmitted . Also, during the FBSS process, the target BS shall provide the UL_noise_and_interference_level_IE that includes at least the NI field corresponding to the Perodic Ranging Region if the BS does not allocate CQICH to the MS. This NI value is used for the MS to determine the initial transmit power level for the transmission of bandwidth request ranging code to the target BS. In turn, the MS shall calculate the initial transmit power at the target BS as follows:

1). ~~1.~~ If the MS is in open loop power control mode with serving BS, then equation (138a) of section 8.4.10.3.2 shall be used. In this calculation, the MS will reuse $offset\_BS_{perSS}$ from its serving BS, while all other equation parameters will be target BS related.

2). ~~2.~~ If the MS is in closed loop power control mode with serving BS, then the following equation shall be used:

$$P_{TBS} = P_{last,SBS} - RSSI_{TBS} + RSSI_{last,SBS} + NI_{TBS} - NI_{last,SBS} + C/N_{TBS} - C/N_{last,SBS} + BS\_EIRP_{TBS} - BS\_EIRP_{SBS} - 10log_{10}(R_{TBS}) + 10log_{10}(R_{last,SBS}) \quad (138e)$$

Where:

$P_{last,SBS}$	MS transmit power level of the last transmission to the SBS [dBm].
P_{TBS}	Initial MS transmit power level (dBm) to be used in subsequent HO-ranging, bandwidth request ranging, CQICH transmission or Fast_Ranging_IE allocation transmissions to the TBS.
$RSSI_{last,SBS}$	DL RSSI at MS of the SBS preamble, used to derive Tx power of last transmission at the SBS [dBm].
$RSSI_{TBS}$	DL RSSI of the TBS preamble, measured by the MS [dBm].
$NI_{last,SBS}$	Combined noise+interference known at time of last transmission at the SBS [dBm].
NI_{TBS}	Combined noise+interference at the TBS [dBm].
$C/N_{last,SBS}$	Carrier-to-noise level for assigned UL MCS of last transmission at the SBS [dB].
C/N_{TBS}	Carrier-to-noise level for UL MCS derived from the UIUC assigned to the Fast_Ranging_IE allocation, carrier-to-noise level for CDMA code, or carrier-to-noise level for FAST_FEEDBACK at the TBS [dB].
BS_EIRP_{SBS}	SBS ~~maximum~~ equivalent isotropic transmit power (from DCD) [dBm].
BS_EIRP_{TBS}	TBS ~~maximum~~ equivalent isotropic transmit power (from DCD settings in MOB_NBR-ADV) [dBm].
$R_{last,SBS}$	Repetition factor of assigned UL MCS of last transmission at the SBS.
R_{TBS}	Repetition factor of assigned UL MCS at the TBS.

3). If the MS does not have one of the parameters needed for the above calculations (open loop or closed loop), it will disregard Fast_Ranging_IE allocations or CQICH_Allocation_IE allocations, and perform CDMA handover ranging with the target BS.

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4   References

[1]   IEEE P802.16e-2005.

[2]   IEEE P802.16_Cor2/D2.