| Project | **IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>** |
|---|---|
| Title | **Corrections on Open loop power control for uplink** |
| Date Submitted | **2005-01-10** |
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| Re: | Recirculation of P802.16 REVe/D5 |
| Abstract | The current description of open loop power control has some errors. This contribution presents corrections for them. |
| Purpose | Adoption of suggested changes into P802.16e/D6 |
| Notice | |
| Release | |
| Patent Policy and Procedures |

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## Problem Definition

The current text of open loop power control contains come errors and ambiguity. This contribution provides some correction and clarifications.

1. The resolution on the comment (#1622) is not reflected as is in the contribution C80216e-04_409r1.
    A. PMC-REQ/PMC-RSP
2. For the open loop power control, power control values from PCS_RSP message (6.3.2.3.58), Fast Power Control (FPC) message (6.3.2.3.34) and Power Control IE (8.4.5.4.5) shall be accumulated to $Offset\_BS_{perSS}$. However, the current text is not clear.
3. When PMC-REQ is sent to request to change the power control mode, BS shall send PMC-RSP. However, an interval when a MSS assumes that the PMC-REQ is not delivered is not defined.
4. For AAS operation, UL noise and interference level IE format shall include NI level field for AAS operation.

## Suggested text changes to 16.e standard

[Change the text as follows in 8.4.10.3.1 "Open loop power control"]

Additionally, BS may control the $Offset\_BS_{perSS}$ using PCS_RSP message (6.3.2.3.58), Fast Power Control (FPC) message (6.3.2.3.34) and Power Control IE (8.4.5.4.5). ~~In this mode, the power control values delivered by the power control messages from the PMC_RSP that orders a SS to use the open loop power control, shall be accumulated.~~ The accumulated power control value shall be used for $Offset\_BS_{perSS}$.

[Change the text as follows in 6.3.2.3.57]

**6.3.2.3.57 Power control mode change request (PMC_REQ) message**

~~PMC_REQ is sent from SS to BS when BS wants to change uplink power control mode. SS's intention to change the power control mode to the open loop or closed loop power control can be made by this message. PMC _RSP from the BS confirms the power control mode change and the corresponding power control scheme shall be applied after the PMC_RSP. SS shall change the uplink power control mode when the unsolicited PMC_RSP from BS is received. The closed and open loop power control scheme is described in 8.4.10.3.~~

This subcaluse is applied only to OFDMA PHY mode. The decision of the change of the power control mode between the open loop power control and closed loop power control is done at BS and the decision is indicated by the PMC_RSP MAC message. Before the frame start specified in PMC_RSP, the SS shall transmit PMC_REQ in response to receipt of an PMC_RSP from the BS directing a change to uplink power control mode. Further, PMC_REQ can be used to request to change the power control mode. On the receipt of the PMC_REQ from SS, BS may send PMC_RSP in T33. The closed and open loop power control scheme are described in 8.4.10.3.

**Table fff— PMC_REQ message format**

| Syntax | Size | Notes |
|---|---|---|
| PMC_REQ message format{ | | |
|     Management Message Type = 62 | 8 bits | Type = 62 |
|     Power control mode change | 1 bits | 0: Closed loop power control mode<br>1: Open loop power control mode |
|     UL Tx power | 8 bits | UL Tx power level for the burst that carries this header (11.1.1). When the Tx power is different from slot to slot, the maximum value is reported. |
|     Confirmation | 1 bit | 0: Request<br>1: Confirmation |
|     Reserved | ~~7~~6 bits | |
| } | | |

CID shall be the basic CID of SS. SS shall generate the PMC_REQ message including the following parameters

**Power control mode change**
    0: Closed loop power control mode
    1: Open loop power control mode

**UL Tx power**
    UL Tx power level for the burst that carries this header (11.1.1). When the Tx power is different from slot to slot, the maximum value is reported.

**Confirmation**
    0: SS requests to change the power control mode.
    1: SS confirms the receipt of PMC_RSP from BS.

[Change the text as follows in 6.3.2.3.58]

**6.3.2.3.58 Power control mode change response (PMC_RSP) message**

For OFDMA PHY mode only, PMC_RSP is sent from BS as a confirmation of SS's uplink power control change intention with PMC_REQ message or it is sent unsolicited manner to command SS to change the uplink power control mode as indicated in the PMC_RSP.

[Change the text as follows in 8.4.5.3.18]

### 8.4.5.3.18 UL noise and interference level IE format

For the open loop power control, UL interference and noise level shall be broadcast to MSSs in the given BS coverage by BS. UL interference and noise level IE broadcast the UL interference and noise level (dBm) estimated in BS. All the UL interference and noise level are quantized in 0.25 dBm steps from – 110 dBm (encoded 0x00) to – 46.25 dBm (encoded 0xFF).

**Table 284i— UL interference and noise level extended IE**

| Syntax | Size | Notes |
|---|---|---|
| UL interference and noise level_IE{ | | |
| Extended DIUC | 4 bits | UL NI = 0x0F |
| Length | 4 bits | Length = 0x03~~6~~7 |
| Bitmap | 8 bits | LSB indicates the there exists "CQI/ACK/Ranging region NI" field (1). Otherwise, it is '0' <br> The 2nd LSB indicates the there exists "PUSC region NI" field (1). Otherwise, it is '0' <br> The 3rd LSB indicates the there exists "Optional PUSC region NI" field (1). Otherwise, it is '0' <br> The 4th LSB indicates the there exists "AMC region NI" field (1). Otherwise, it is '0' <br> The 5th LSB indicates the there exists "AAS region NI" field (1). Otherwise, it is '0' |
| If ( LSB of Bitmap = 1) { | | |
| CQI/ACK/Ranging region NI | 8 bits | Estimated average power level (dBm) per a subcarrier in CQI/ACK region. |
| } | | |
| If ( The 2nd LSB of Bitmap = 1) { | | |
| PUSC region NI | 8 bits | Estimated average power level (dBm) per a subcarrier in PUSC region. |
| } | | |
| If ( The 3rd LSB of Bitmap = 1) { | | |
| Optional PUSC region NI | 8 bits | Estimated average power level (dBm) per a subcarrier in optional PUSC region. |
| } | | |
| If ( The 4th LSB of Bitmap = 1) { | | |
| AMC region NI | 8 bits | Estimated average power level (dBm) per a subcarrier in AMC region. |
| } | | |
| If ( The 5th LSB of Bitmap = 1) { | | |
| AAS region NI | 8 bits | Estimated average power level (dBm) per a subcarrier in AAS region. The interference and noise level shall be estimated before the beam forming. |
| } | | |
| } | | |

[Add the following entry at the end of table 340a:]

| System | Name | Time Reference | Minimum value | Default value | Maximum value |
|--------|------|----------------|---------------|---------------|---------------|
| BS | T33 | PMC_RSP_Timer: BS shall send the PMC_RSP before T33+1 frames after BS receives PMC_REQ (confirmation = 0) correctly. | 8 frames | 128 frames | 1024 frames |