

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >
Title	<b>Fast Power Control IE</b>
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Re:	IEEE802.16Rev2/D2
Abstract	Enhancement on current Closed Loop Power Control Method; overhead reduction.
Purpose	Adopt the proposed solution and incorporate it in the P802.16Rev2 draft
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## **New Fast Power Control IE for CLPC**

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### **1. Problem Statements**

For FDD mode, CLPC (closed loop power control) may have higher chance to be used than OLPC (open loop power control) due to the fact that channels for downlink and uplink are not reciprocal. For the CLPC, FPC (Fast Power Control) message and PC (Power Control) IE are widely used, and FPC message is preferred to the PC IE due to less overhead. However, FPC message still has lots of overhead because it uses 16 bits CID to identify MS and also uses 8 bits to adjust the power for each MS.

In this contribution, we propose a new IE – Fast Power Control IE, which can provide power adjustments for multiple MS with much less overhead compared to the FPC message and Power Control IE.

Overhead reduction comes from reduced CID bits with RCID and reduced power adjustment bits. In this proposal, we use only 1 bit for power adjustment. From the power control test with channel emulator, the power adjustment step with 1 dB showed as good performance as step size of 0.25 dB. When there exists an MS, who needs more than 1 dB power control, we can utilize the Power Control IE for the MS.

Also, like all other power control related messages and IEs, Fast Power Control IE also can be used for OLPC in setting the parameter,  $Offset\_BS_{perSS}$ . Corresponding text changes are also addressed in Section 2.

## 2. Text Changes

[Modify Table 368 of page 760 as follows]

**Table 368 – Extended-2 UIUC code assignment for UIUC = 11**

Extended-2 Type (hexadecimal)	Usage
00	CQICH Enhanced Allocation IE
01	HO Anchor Active UL-MAP IE
02	HO Active Anchor UL-MAP IE
03	Anchor BS Switch IE
04	UL Sounding Command IE
05	<i>Reserved</i> <a href="#">Fast Power Control IE</a>
06	MIMO UL Enhanced IE
07	HARQ UL MAP IE
08	HARQ ACKCH Region Allocation IE
09	MIMO UL Basic IE
0A	Mini-subchannel allocation IE
0B ...0D	<i>Reserved</i>
0E	AAS SDMA UL IE
0F	Feedback Polling IE

[Add following texts at the end of 8.4.5.4.28, page 827]

### 8.4.5.4.29 Fast Power Control IE

When power changes for multiple SS are needed, the extended UIUC = 11 may be used with the subcode 0x05 as shown in [Table 426](#).

The CID used in the UL-MAP IE for this IE should be a broadcasting CID.

**Table 426 - Fast Power Control IE format**

<u>Syntax</u>	<u>Size</u>	<u>Notes</u>
<u>Fast Power Control IE() {</u>	—	—
<u>  Extended-2 UIUC</u>	<u>4 bits</u>	<u>New power control = 0x05</u>
<u>  Length</u>	<u>8 bits</u>	<u>Length in bytes</u>
<u>  Number of Stations</u>	<u>8 bits</u>	—
<u>  Power measurement frame</u>	<u>8 bits</u>	—
<u>  RCID Type</u>	<u>2 bits</u>	<u>0b00: Normal CID</u> <u>0b01: RCID11</u> <u>0b10: RCID7</u> <u>0b11: RCID3</u>
<u>  for (i=0; I &lt; Number of Stations; i++) {</u>	—	—
<u>    RCID IE()</u>	<u>variable</u>	—

<u>Power adjust</u>	<u>1 bit</u>	<u>0b00: -1 dB</u> <u>0b01: +1 dB</u>
<u>}</u>	—	—
<u>Padding</u>	<u>variable</u>	<u>Padding to byte; shall be set to 0</u>
<u>}</u>	—	—

**Number of stations**

Number of CID and Power Adjust tuples contained in this message.

**Power measurement frame**

The 8 LSBs of the frame number in which the BS measured the power corrections referred to in the message.

*[Modify line 6~10 of page 997 as follows]*

Additionally, the BS controls the  $\text{Offset\_BS}_{\text{perSS}}$  using PMC\_RSP message (6.3.2.3.55) to override the  $\text{Offset\_BS}_{\text{perSS}}$  value, or using RNG-RSP (6.3.2.3.6), Fast Power Control (FPC) message (6.3.2.3.34), Power Control IE (8.4.5.4.5), [Fast Power Control IE \(8.4.5.4.29\)](#) and UL-MAP Fast Tracking IE (8.4.5.4.22) to adjust the  $\text{Offset\_BS}_{\text{perSS}}$  value. The accumulated power control value shall be used for  $\text{Offset\_BS}_{\text{perSS}}$ .