| | |
|---|---|
| Project | **IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>** |
| Title | **Power control in MR networks** |
| Date Submitted | **2006-11-07** |
| Source(s) | Mike Hart<br>Yuefeng Zhou<br>Sunil Vadgama<br>Fujitsu Laboratories of Europe Ltd<br>Hayes Park Central, Hayes End Road,<br>Hayes, Middlesex, UB4 8FE, UK<br><br>Okuda Masato<br>Fujitsu Laboratories LTD.<br>Kamikodanaka 4-1-1, Nakahara-ku<br>Kawasaki, Japan. 211-8588<br><br>Voice: +44 (0) 20 8573 4444<br>FAX: +44 (0) 20 8606 4539<br><br>yuefeng.zhou@uk.fujitsu.com<br>mike.hart@uk.fujitsu.com<br>sunil.vadgama@uk.fujitsu.com |
| Re: | IEEE 802.16j-06/027: “Call for Technical Proposals regarding IEEE Project P802.16j” |
| Abstract | Clarification of the IEEE Std 802.16 power control mechanisms are required to explain how the MR-BS and RS should support SS UL power control and introduces a new TLV that enables the MR-BS to control the maximum downlink transmit power used by a subordinate RS. This contribution provides text focused on mandatory closed loop power control. |
| Purpose | Discuss and adopt proposed text. |
| Notice | This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16. |
| Patent Policy and Procedures | The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>. |

# Power control in MR networks

*Mike Hart, Yuefeng Zhou, Sunil Vadgama, M. Okuda*

*Fujitsu Laboratories of Europe Ltd. & Fujitsu Laboratories (Japan) Ltd.*

## Introduction

Clarification to the existing power control techniques is required for the case of MR networks to explain the mechanism for the case of centralized power control, where BS controls the UL transmit power of all SSs, whether or not they are relayed. Clarification is also required to explain the mechanism of SS UL transmit power control at the RS in the decentralized case.

New text is also required to explain how RS DL and UL transmit power control is performed to enable the BS to adjust the transmit power used at the RS. Such mechanisms allow the BS to control the range of the RS transmissions and interference in the multi-RS environment. It also gives the BS the flexibility to adapt the coverage provided by the composite BS/RS network.

## Proposed Text Change

***[Insert new subclause 8.4.10.4:]***

**8.4.10.4 Power control in MR networks**

***[Insert the following text:]***

A power control algorithm shall be supported in MR networks for the uplink channels from RSs and SSs with both an initial calibration and periodic adjustment procedure without loss of data. Power control of the RS downlink channels shall also be supported.

In the case of centralized MR, the UL power control algorithm shall be located in the MR-BS and the MR-BS shall control the transmit power on all uplink channels served by the MR-BS and its subordinate RSs. In the case of distributed MR, an UL power control algorithm shall be located in both the MR-BS and RSs to control the uplink channels it serves.

The response of the SS to power control messages received from the MR-BS or RS is described in subclause 8.4.10.3. This subclause defines how the RS responds to power control messages from the MR-BS and how the MR-BS and RS control the transmit power in MR networks.

The following subclauses describe the power control mechanism for both centralized and distributed cases.

***[Insert new subclause 8.4.10.4.1:]***

**8.4.10.4.1 Power control of RS**

***[Insert the following text:]***

The RS shall respond to UL power control messages from the MR-BS or RS in the same way an SS responds to power control messages, as specified in subclause 8.4.10.3. The RS shall also be capable of receiving DL power control messages from the MR-BS or RS. DL power control messages define the maximum DL transmit power that the RS is allowed to use.

***[Insert new subclause 8.4.10.4.2:]***

**8.4.10.4.2 Power control of SS in centralized MR**

***[Insert the following text:]***

In the centralized MR network the MR-BS shall generate the power control messages for the SS and transmit them to the SS via the RS. The SS shall respond to power control messages in the manner described in 8.4.10.3. The MR-BS shall also be responsible for controlling the DL transmit power used at all subordinate RSs.

***[Insert new subclause 8.4.10.4.3:]***

**8.4.10.4.3 Power control of SS in distributed MR**

***[Insert the following text:]***

In the distributed MR network, the RS shall generate the power control messages for the SSs that it serves. The SS shall respond to power control messages in the manner described in 8.4.10.3. The MR-BS shall be responsible for controlling the DL transmit power used at all subordinate RSs.

***[Insert new subclause 11.8.3.8.2:]***

**11.8.3.8.2 RS maximum downlink transmit power**

***[Insert the following text:]***

The maximum EIRP for the access DL transmission. The RS will inform the MR-BS of the maximum EIRP that can be supported during network entry. The MR-BS will indicate to the RS the maximum EIRP the RS can utilize. The MR-BS may also send unsolicited SBC-RSP at any time to adjust the maximum EIRP that the RS may use, up to the maximum EIRP that the RS indicated during network entry. The maximum EIRP parameters are reported in dBm and quantized in 1dB steps ranging from -128dBm (encoded 0x00) to 127dBm (encoded 0xFF). Values outside this range shall be assigned the closest extreme.

| Type | Length | Size | Notes |
|---|---|---|---|
| TBA | 1 | RS EIRP | SBC-REQ<br>SBC-RSP |