Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**A new method for downlink burst profile management in mobile environment**
Date Submitted	**2004-11-01**
Source(s)	Chi-Chen Lee Tzu-Ming Lin Yu-Ren Yang Industrial Technology Research Institute, Computer and Communications Research Labs, Taiwan Bldg. 11, 195 Sec. 4, Chung Hsing Rd. Chutung, HsinChu, Taiwan 310, R.O.C. Voice: 886-3-5914579 Fax: 886-3-5829733 mailto: jjlee@itri.org.tw mailto: TMLin@itri.org.tw mailto: yryang@itri.org.tw
Re:	IEEE P802.16e/D5-2004
Abstract	This contribution proposes a new method to improve the DL burst profile change management procedures in mobile environment.
Purpose	The purpose of this document is to improve the DL burst profile change management procedures in mobile environment.
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>.

A new method for downlink burst profile management in mobile environment

Chi-Chen Lee, Tzu-Ming Lin, Yu-Ren Yang
ITRI

Motivation

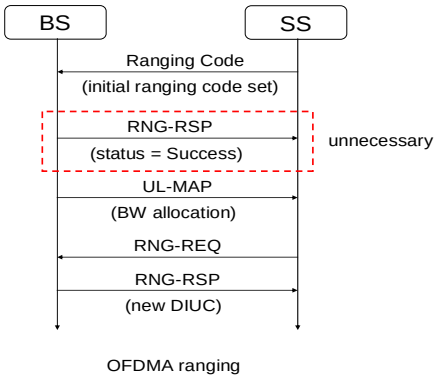
The current DL burst profile change management in IEEE P802.16e/D5-2004 only passively detects the CINR while receiving DL data. Furthermore, there are some ambiguities in the procedures should be clarified. This document proposes a new method to improve the DL burst profile change management.

Problems of current downlink burst profile management procedures

The concept of adaptive PHY, e.g. dynamic adaptive modulation, is important to adjust the burst profile of each SS in DL and UL according to quality of the signal. The BS controls the change of UL burst profiles while the change of DL burst profiles are triggered by SSs. In DL, the SS passively monitors the CINR while receiving DL data and compares the average value against the allowed range of operation. If the received CINR goes outside of the allowed operation range, the SS requests a change to new burst profile. Additionally, the SSs will change DL and UL burst profiles more frequently in the mobile environment. The data may be lost during the transition to a more robust DL burst profile if the SS only detects the CINR while receiving data. Moreover, there are several ambiguities in the procedures of DL burst profile change in IEEE P802.16e/D5-2004. We describe these problems in the following paragraphs.

In IEEE P802.16e/D5-2004 (refer to IEEE 802.16-2004) “Figure 79 —Transition to a more robust burst profile” and “Figure 80—Transition to a less robust burst profile”, the SS must monitor DL data through two different DIUC while changing the DL burst profile. This scenario is reasonable only if the *CID used* is ***not*** enabled by burst profile for SC and SCa PHY (see Table 139 and Table 190). In the case of OFDM, OFDMA PHY and in the case of SC, SCa PHY that the *CID used* is enabled by burst profile, the SS’s basic CID is included in each DL-MAP_IE. Thus, the SS can check the DL-MAP for it basic CID and know what DIUC it should use. This design improves the energy efficiency of the MSSs that have power consumption constrains. Due to the lack of consistency between this design and the procedures defined in specification, we provide a new figure (see Figure 80a below) to clarify this issue. Additionally, we suggest that CID should be included in DL-MAP_IE for SC and SCa PHY for energy efficiency for MSSs.

We observe that those parameters, i.e. DIUC and Configuration Change Count, carried in DBPC-RSP and RNG-RSP are already indicated in DL-MAP and in the corresponding DL-MAP_IE while the BS arranges data transmission for SSs. For example, the DCD Count in each DL-MAP must match the value of the Configuration Change Count of the DCD; the DIUC and the SS’s Basic CID (if CID is enabled) in the DL-MAP_IE identify which SS should use which DL burst profile to decode the data. Thus, the content of DBPC-RSP (9 bytes) and RNG-RSP (10 bytes) are redundant.

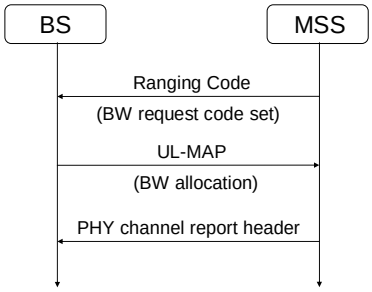


< Figure 1>

As depicted in Figure 1, in OFDMA, if a grant is not available the SS will send a ranging code which is randomly selected from the set of initial ranging codes. After a RNG-RSP with a success status the BS will allocate bandwidth to the SS for sending RNG-REQ. The second RNG-RSP in Figure 1 is the response to the change of the DL burst profile. The first RNG-RSP is unnecessary since the SS does not perform initial ranging actually. Besides, if the Time & Power need to be correct there may be extra RNG-RSP and ranging code sequences which do not make sense because the SS is performing the procedures of DL burst profile change.

Proposed Solutions

In IEEE P802.16e/D5-2004, there is a new header named “PHY channel report header” (see Figure 20a in specification) but with no description of its usage. Thus, we propose a new mechanism for the MSS to actively inform the BS of its “preferred DIUC” using PHY channel report header (see Figure 81b listed below) instead of using DBPC-REQ or RNG-REQ. The DL CINR can be calculated as the MSS decodes DL-MAP and UL-MAP or receives data. If the CINR goes outside of the allowed operation range it should issue a PHY channel report header immediately. Otherwise, the MSS only sends the PHY channel report header after the timeout of T29. Other fields of this header can help the BS collect the SS’s information, e.g. UL-TX-POWER, further. This method assists the BS in detecting the change of DL burst profile in advance. If there is no grant available the MSS will send BW request header to ask bandwidth for the PHY channel report header. Note the PHY channel report header is always 6 bytes and is smaller than DBPC-REQ (9 bytes) and RNG-REQ (9 bytes). Since DL-MAP and DL-MAP_IEs carry enough information for the SSs to decide which DL burst profile it should use, the response to the change of DL burst profile can be omitted to improve the bandwidth efficiency. This is called *implicit response*. In OFDMA, the problem described in Figure 1 will be solved and the new procedure is shown in Figure 2. The new method is simple and efficient in bandwidth. Moreover, this method changes the DL burst profile of MSSs in advance, and therefore makes the data transfer more robust.



< Figure 2>

Proposed Text changes

6.3.10.1 Downlink burst profile management

[Insert the following paragraph after the first paragraph in 6.3.10.1.]

For mobile operation, the DL-MAP_IE should include the CID field (i.e. the CID used is enabled in SC and SCa PHY), the MSS can use PHY channel report header to inform the BS of its *preferred DIUC* (see Figure 20a) whenever, e.g. while decoding DL-MAP, it detects that the CINR goes outside of the allowed operation range. The procedures are shown in Figure 80a, Figure 81b and Figure 81c. The ability of change of DIUC using PHY channel report header is optional for the MSS and mandatory for the BS.

[Insert new figures 80a, 80b and 80c after Figure 80.]

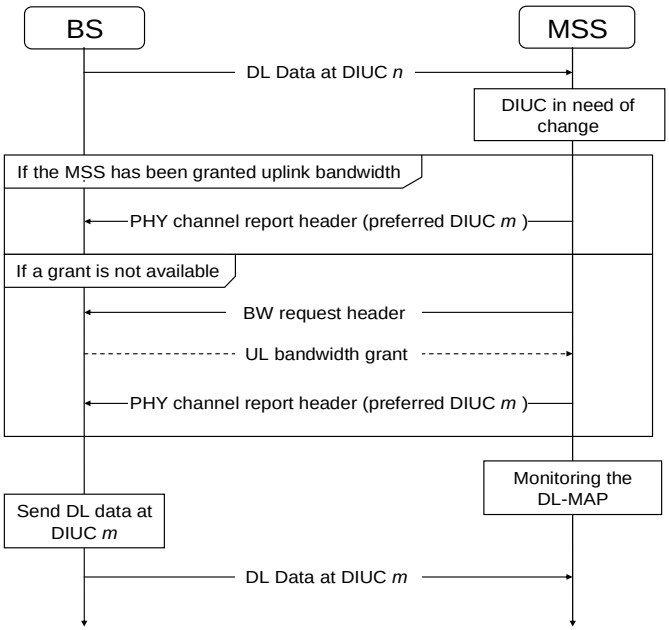


Figure 80a—Transition to a less or more robust DL burst profile—MSS

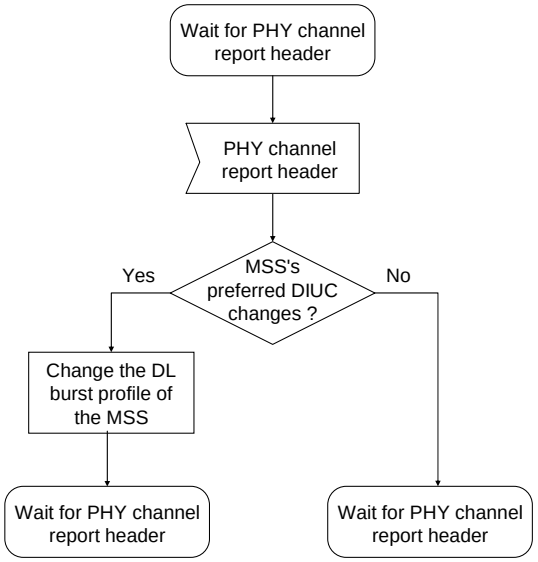


Figure 80b—Wait for PHY channel report header—BS

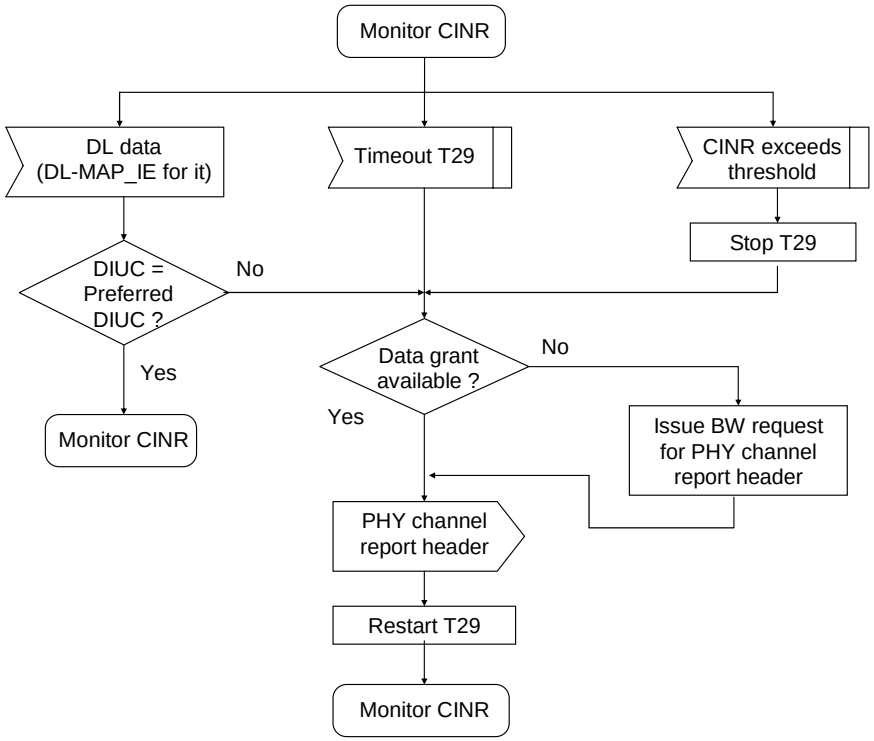


Figure 80c—PHY channel report—MSS