Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Header-based ARQ Acknowledgement Scheme**
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Source(s)	Kanchei (Ken) Loa, Yung-Ting Lee, Chiu-Wen Chen, Chun-Yen Hsu, Youn-Tai Lee, Yi-Hsueh Tsai, Tsung-Yu Tsai Institute for Information Industry Voice: +886-2-66000100 Fax: +886-2-66061007 loa@iii.org.tw Whai-En Chen National Ilan University Shiann-Tsong Sheu, Chih-Cheng Yang National Central University Yang-Han Lee, Yih Guang Jan Tamkang University
Re:	Re: MAC: Data Plane; in response to the TGm Call for Contributions and Comments 802.16m-08/033 for Session 57
Abstract	This contribution proposes the text for ARQ scheme in 802.16m SDD
Purpose	For discussion and approval by IEEE 802.16 TGm
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Header-based ARQ Acknowledgement Scheme

Kanchei (Ken) Loa, Yung-Ting Lee, Chiu-Wen Chen, Chun-Yen Hsu, Youn-Tai Lee, Yi-Hsueh Tsai, Tsung-Yu Tsai
Institute for Information Industry (III)

Whai-En Chen
National Ilan University

Shiann-Tsong Sheu, Chih-Cheng Yang
National Central University

Yang-Han Lee, Yih Guang Jan
Tamkang University

Introduction

The IEEE 802.16e system supports ARQ scheme to accomplish the reliable transmissions for ARQ-enabled non-real-time services. The ARQ feedback information can be sent as a standalone MAC management message (ARQ_feedback message) or piggybacked on an existing connection. For an MS having the ARQ-enabled connection in downlink direction, it needs the uplink bandwidth for issuing the ARQ_feedback message to BS regularly; and the period of bandwidth request process requires at least three frames. To shorten the ARQ report latency and save bandwidth for reporting short ARQ_feedback message, we propose a header-based ARQ acknowledgement scheme for IEEE 802.16m system.

Message-based ARQ Acknowledgement Scheme

In order to efficiently use the channel resource, the legacy 16e system has defined four ARQ report types:

- Selective ACK (SA)
- Cumulative ACK (CA)
- Cumulative with Selective ACK (CSA)
- Cumulative ACK with Block Sequence ACK (CABSA)

The Cumulative ACK (CA) message only carries the information of block sequence number (BSN), which indicates the corresponding block and all blocks with lesser values within the transmission window have been successfully received. The selective ACK (SA) message carries the information of ARQ ACK MAP, which indicates the successfully received ARQ blocks and unsuccessfully received ARQ blocks. The CSA message combines both information of BSN and ACK MAP. The CABSA message is the most complicated one among four report types. According to the status of data reception, using different ARQ report type to carry ARQ feed information will cause different overheads.

When an MS desires to send an ARQ_feedback message to BS but has no available uplink bandwidth, it shall follow the contention-based bandwidth request procedure, as illustrated in Fig 1. In legacy 16e system, the process of an MS reporting short ARQ_feedback message also follows the entire bandwidth request procedure, which spends three or more time frames.

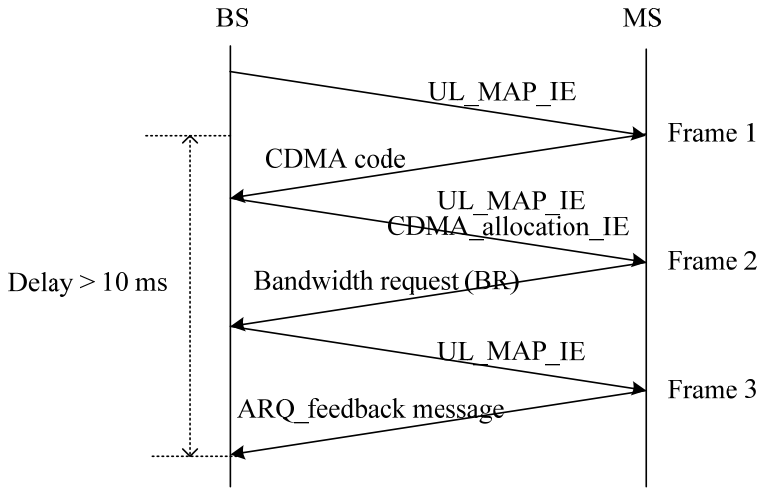

Figure 1 The message-based UL ARQ acknowledgement mechanism.

Header-based ARQ Acknowledgement Scheme

As the channel quality is stable and the link adaptation functions well, the MS may always report the short CA-type ARQ_feedback message to BS. To efficiently report such short message, we propose a header-based ARQ acknowledgement process by using the ARQ_feedback header. As the BS allocates bandwidth to MS in response to the ranging code, MS may send the ARQ_feedback header to BS, instead of the legacy BR header. As illustrated in Figure 2, the header-based ARQ acknowledgment scheme is able to reduce the latency of ARQ feedback report.

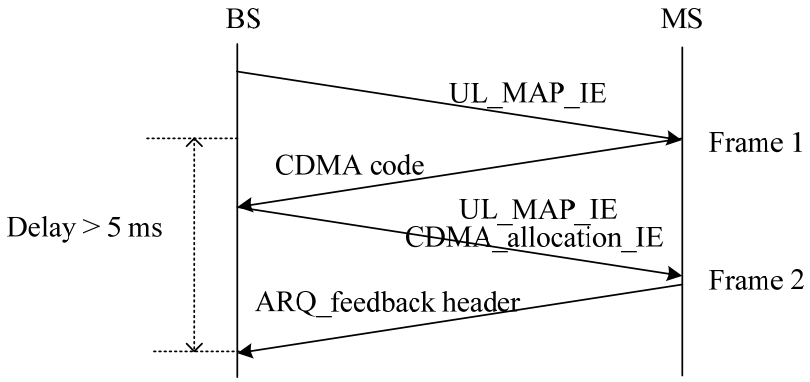

Figure 2 The header-based UL ARQ acknowledgement scheme.

Proposed Text Changes:

[Add the following subclause 10.x "ARQ Functions"]

10.x ARQ Functions

In the UL ARQ acknowledgement scheme, the ARQ feedback information should be sent in message or header format. For example, when BS first allocates bandwidth to MS in response to the received BR ranging code, the MS may send the ARQ feedback header to BS.

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