

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	On the Complexity of 802.16ab ARQ	
Date Submitted	2000-07-06	
Source(s)	<p>Subbu Ponnuswamy Malibu Networks 1035 Suncast Lane El Dorado Hills, CA 95762</p> <p>Jacob Jorgensen Malibu Networks 1035 Suncast Lane El Dorado Hills, CA 95762</p>	<p>Voice: 916-941-8815 Fax: 916-941-8850 mailto:subbu@malibunetworks.com</p> <p>Voice: 916-941-8810 Fax: 916-941-8850 mailto:jacob@malibunetworks.com</p>
Re:	In response to "Call for Comments on 802.16ab-01/02".	
Abstract	<p>The ARQ algorithms and options specified in the TG3/TG4 MAC are unnecessarily complex, incompatible with some TG1 baseline functions, and forces non-ARQ connections to use a complex block based segmentation and reassembly. This proposal makes some recommendations on simplifying the ARQ protocol to make the 802.16ab ARQ scalable. The complex ARQ options proposed in the draft standard (802.16ab-01/02) could also lead to incompatibility between products from different vendors.</p>	
Purpose	Approve portions of this document described as "Specific comments" as additions to IEEE 802.16ab-01/02.	
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On the Complexity of 802.16ab ARQ

Subbu Ponnuswamy and Jacob Jorgensen

Malibu Networks

Introduction

The ARQ scheme presented in 802.16ab-01/02 has the following options for Algorithms:

- **Go-back-N:** In Go-back-N ARQ, when an MPDU is lost, the transmitter is required to retransmit all MPDUs, starting from the first MPDU that was lost, as the receiver cannot buffer out of order MPDUs
- **Selective Repeat:** In Selective Repeat ARQ, only the lost MPDUs are retransmitted

Having two ARQ algorithms with incompatible features would result in “standard compliant” products from different vendors with incompatible ARQ features, unless the go-back-N is specified as a special case of Selective Repeat as suggested in 802.16abc-01/09. The go-back-N is very bandwidth inefficient and Selective Repeat has been the choice of ARQ in many recent protocol standards, especially point-to-multipoint wireless standards (e.g., HIPERLAN/2 and GPRS). Therefore, we recommend that the reference to go-back-N be removed from 802.16ab-01/02 and Selective Repeat be specified as the default ARQ mechanism for 802.16ab. Specifically, references to go-back-N in section 6.2.12 should be removed and the choice of retransmission algorithm (Selective Repeat) should be explicitly specified.

In addition, the ARQ scheme presented in 802.16ab-01/02 uses the following sequence numbering schemes:

- **Block-based Sequence Numbering:** A complex block-based sequence numbering that allows an MPDU size be changed between ARQ retransmissions
- **MPDU Sequence Numbering:** A simple MPDU sequence numbering scheme, where each MPDU is given a sequence number. Since ARQ is implemented at the MAC level, MPDU is the logical ARQ retransmission unit.

The block-based sequence numbering scheme has the following drawbacks:

- Additional complexity with no real benefits.
- Complicates segmentation and re-assembly and either forces all non-ARQ connections to use a “block-based” segmentation or forces all 802.16ab systems to use two different segmentation and reassembly schemes
- Incompatible with TG1 segmentation and reassembly

There should not be two ways of doing basic functions such as segmentation and packing. Also, non-ARQ connections should not be forced to use a complex “block-based” segmentation for no reason. Therefore, we recommend that the block-based segmentation be removed from 802.16ab-01/02. Specifically, section 6.3.3 of and many options defined in 6.3.4 to support the complex block-based ARQ should be removed.

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