Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Basic ARQ mechanism for 802.16ab**
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Re:	In response to call for comments in 802.16ab-01/02.
Abstract	In this contribution, we propose a single ARQ algorithm for TG3&4 MAC. The algorithm proposed is a selective repeat with a simple block addressing scheme based on MPDU indexing.
Purpose	Change the ARQ mechanism described in 802.16ab-01/01 as proposed.
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Basic ARQ mechanism for 802.16ab

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Introduction

The development work with the ARQ in 802.16 TG3/4 [1] has currently resulted in a scheme that combines not only the Go-back-N (GbN) and Selective Repeat (SR), but also aims to flexibility in many ways. Thus, the current proposal describes a system that is able to handle packets sent both by devices using GbN and SR with different requirements in an advanced way. However, the decision to try to satisfy both the advocates of GbN and SR has at the same time led to a solution that contains additional complexity that does not anymore serve only the original purpose to have an effective, but relatively simple automatic repeat query.

The main drawbacks caused by the combination can be seen in a multi-level sequence numbering and in a complicated acknowledgement mechanism. When using one basic ARQ mechanism the sequence numbering can normally be reduced to single length (serving also the reassembly purposes) and the feedback mechanism can be simplified considerably. The unnecessarily complicated ARQ mechanism will cost in terms of processing power, ease of implementation and possibly also in interoperability. These issues may decrease the appreciation and the value of the whole MAC standard.

The Selection of One Basic ARQ Mechanism

Because of the addressed problems, the selection of one basic mechanism (either SR or GbN) shall be considered seriously in the TG3/4 MAC group. Setting the other mechanism as optional to implement would help somewhat, but the base stations are still expected to have both mechanisms implemented to be able to serve users of both mechanisms. Therefore, we prefer the selection of one mechanism.

As being used also in many other advanced systems (GPRS, HiperLAN/2, etc.) the Selective Repeat ARQ shall be considered to be chosen as a basic mechanism in 802.16 TG3/4. While certain flexibility is still required in the ARQ mechanism, the SR gives the needed freedom. The proposal is to specify

- Selective Repeat with bitmap-based Cumulative Acknowledgments as the basic and default ARQ mechanism for 802.16ab (as described in [2])
    - o SR ARQ shall be implemented in all the BSs and CPEs
    - o ARQ usage is optional and shall be determined for each connection separately during negotion
- An incremental MPDU sequence number (MSN) for ARQ and fragmentation
- GbN algorithm as an optional ARQ mechanism for 802.16ab
    - o GbN is optional both for BS and CPE
    - o It's up to the CPE to propose usage of GbN as the ARQ algorithm; determined in connection establishment

References

[1]   IEEE 802.16ab-01/01, "Air Interface for Fixed Broadband Wireless Access Systems Part A: Systems between 2 and 11 GHz"
[2]   IEEE 802.16.1c-01/32, "ARQ for TG4 Systems"