Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Optional Block Sequence ARQ Feedback
Date Submitted	**2004-08-31**
Source(s)	Yigal Eliaspur, Assaf Mor, David Ayoun Intel Corporation yigal.eliaspur@intel.com Voice: +972-547-884877
Re:	IEEE P802.16e-D4
Abstract	Make the Block Sequence format in the ARQ feedback optionally supported by the SS
Purpose	Simplify the parsing process of the ARQ feedback for a mobile SS by eliminating a potentially esoteric format
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>.

Optional Block Sequence ARQ Feedback

Assaf Mor,
Yigal Eliaspur,
David Ayoun
Intel Corporation

1. Motivation

ARQ feedback format defined in IEEE 802.16 has several options in order to make the best of the few bits dedicated to it whether it in a separate MAC management message or piggybacked on an existing connection. Each of the formats has its advantages depending on the ARQ window size, ARQ feedback frequency and the medium disturbance patterns. However one of the method – namely the *Cumulative ACK with Block Sequence Entry* is a little more complex than the others for implementation and it could be a real obstacle for a low power, low capacity, mobile device limited by necessity in processing power. When the ARQ feature is declared to be supported, all the formats described in IEEE P802.16-REVd/D5 section 6.3.4.2 must be supported by the transmitter side (the receiver of the ARQ feedback), while the receiver has the ability to choose whatever format it will use for any particular feedback.
This contribution proposes to make the last format – Block Sequence ARQ feedback – optional so that it will not be mandatory for a mobile device to make the ARQ feedback parser too power, time and code consuming

2. Details

ARQ feedback has 4 formats: Selective, Cumulative, Cumulative – Selective and Block Sequence. The Selective and Block Sequence allows some savings in a very specific circumstance: within 16 bits in this format, it can express up to 128 bits for an equivalent semantic in the cumulative-selective format. But this is true for a very specific packet error pattern: from the cumulative BSN, 63 non received blocks and then 63 received blocks for this extreme example.
For this format to offer some benefit, there must be a sequence of more than 16 bits in 2 or 3 alternate sequences of 0 and 1. This implies, 1) that there are long sequences of lost blocks, 2) that the ARQ window is large enough to contain such sequences, and finally 3) that the ARQ feedback is sent seldom enough that such sequences are necessary. This makes this format potentially esoteric.
This proposal suggests to make the support for this format optional for a mobile device.

3. Text Change

[~~p 675, line 3,~~ In section 11.7.8 SS capabilities encodings ~~11.7.8.1 ARQ Support, change text as follows~~add the following new TLV]

~~***11.7.8.1 ARQ Support***~~
~~This field indicates the availability of SS support for ARQ.~~

~~A value of 2 indicates that the SS supports and required the BS to support ARQ ACK type negotiation during ARQ connection creation.~~

~~Type~~	~~Length~~	~~Value~~	~~Scope~~
~~10~~	~~1~~	~~0: No ARQ support capability~~ ~~1: ARQ supported~~ ~~2: ARQ supported with negotiable ARQ ACK Type~~ ~~3-255: *Reserved*~~	~~REG-REQ~~ ~~REG-RSP~~

~~*[Add the following in the end of section 11.13.18 ARQ TLVs for ARQ-enabled connections]*~~

11.13.18.x ARQ ~~_~~ ACK ~~_ TYPE~~Type

The~~is~~ value of this parameter specifies the ARQ ACK type supported by the ~~transmitter~~ MSS . ~~on this connection. This parameter shall be established by negotiation during the connection creation dialog.~~ MSS shall transmits this parameter if ARQ is supported. The requester includes its desired setting in the REQ message. The receiver of the REQ message shall take the common part of the values it prefers and values in the REQ message. Those common value is included in the RSP message and becomes the agreed upon the values sets. Absence of the parameter during a ~~DSA~~ REG dialog shall indicate the originator of the message desires all the possible ACK type to be supported.

Type	**Length**	**Value**	**Scope**
~~[145/146].xx~~ ~~1.x~~xx~~x~~	1	Bit 0 Selective ACK entry Bit 1 Cumulative ACK entry Bit 2 Cumulative with Selective ACK entry Bit 3 Cumulative ACK with Block Sequence Ack Bits 4-7 reserved.	~~DSA-REQ, DSA-RSP~~ REG-REQ, REG-RSP