Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**HARQ for Persistent Allocation**
Date Submitted	**2009-3-2**
Source(s)	Adrian Boariu, Xin Qi, Shashikant Maheshwari, Yousuf Saifullah, Haihong Zheng Nokia Siemens Networks adrian.boariu@nsn.com Zexian Li Nokia zexian.li@nokia.com
Re:	"802.16m AWD text": IEEE 802.16m-09/0012, "Call for Contributions on Project 802.16m Draft AWD Content". Target topic: "HARQ".
Abstract	Proposes HARQ persistent allocation scheme for 802.16 amendment
Purpose	Review and adopt
Notice	*This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who 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	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

HARQ for Persistent Allocation

Adrian Boariu, Xin Qi, Shashikant Maheshwari, Yousuf Saifullah, Haihong Zheng
NSN
Zexian Li
Nokia

Introduction

The contribution proposes text for HARQ section in the AWD.

Proposed text

15.2.x HARQ

15.2.x.1 HARQ for downlink

Asynchronous HARQ scheme is used in the downlink.

15.2.x.1.1 HARQ operation for persistent allocation

Persistent Scheduling is a technique used to reduce A-MAP overhead for connections with periodic traffic pattern and with relatively fixed payload size. To allocate resources persistently, the ABS shall transmit the Persistent HARQ DL A-MAP Assignment IE for DL allocations. The persistently allocated resource and the MCS shall be maintained by the ABS and AMS until the persistent assignment is de-allocated, changed, or an error event occurs.

When persistent allocation is applied to initial transmissions, HARQ retransmissions are supported in a non-persistent manner, i.e. resources are allocated dynamically for HARQ retransmissions.

Persistent allocations shall be initialized using Persistent HARQ DL Assignment A-MAP IE (see Table a1), which is unicasted via A-MAP to the AMS. The ABS informs also the range of ACIDs used for persistent allocation, with the first ACID in the range being allocated to the first persistent allocation configured.

The AMS sends back an ACK (or ACK message) for confirmation upon reception a Persistent HARQ DL Assignment A-MAP IE either for initialization or changing or de-allocation, and applies the configuration provided in the Persistent HARQ DL Assignment A-MAP IE at the Frame Action Number indicated. If the ABS does not receive ACK it may retransmit the same configuration before the Frame Action Number can take effect while allowing time for ACK response, or if this is not possible it may transmit a new configuration.

The ABS uses the initial ACID for persistent allocation identification when it configures or changes or de-allocates a certain persistent allocation. If the AMS receives for an Initial ACID a new configuration, the AMS shall store the new HARQ region definition and determine its new resource allocation, and apply the changes at the indicated Frame Action Number.

Table a1. Persistent HARQ DL Assignment A-MAP IE

Syntax	Size (bit)	Notes
Persistent_HARQ_DL_Assignment A-MAP_IE{		
DIUC	TBD	

Initial ACID	4	Initial ACID configured, changed or de-allocated in this message.
Frame Action Number	4	LSB of the frame number to be effective the current configuration.
ACK Type Message	1	1: The AMS shall ACK message 0: The AMS shall ACK signal
If (ACK Type Message == 0) {		
ACK Region Index	8	Index number in the HARQ ACK region to acknowledge this IE.
}		
If (ACK Type Message == 1) {		
Allocation	TBD	Resource allocation to transmit acknowledgement of this message.
}		
Configuration Type	1	1: New or change 0: De-allocation
If (Configuration Type == 1){		
Data burst allocation	TBD	Persistent resources used.
MCS	TBD	MCS level used.
Persistent ACK Region Index	TBD	Index number in the Persistent HARQ ACK region to ACK/NAK the received data after the configuration take effect.
N_ACID	2	Number of ACID allocated, started from the Initial ACID for this persistent allocation.
Allocation Period	5	Periodic increment relative to Frame Action Number used to identify the subsequent transmissions of the data burst.
Boosting	TBD	Power boosting
Mode	TBD	HARQ combining types 00: IR
Subburst IE Length	TBD	
If (Mode == 00){		
IR IE		
}		
}		
}		

N_ACID

The values of Initial ACID field (N0) and N_ACID field (N) are used together to specify an implicit cycling of HARQ channel identifiers as follows. N0 is used as the HARQ channel identifier corresponding to the first occurrence of the persistent allocation. For each next allocation this value is incremented by one modulo (N + 1).

As illustrated in Figure a2, if N_ACID = 0b11 (meaning N+1 = 4), and if Initial ACID = 2, the HARQ channel identifier follows the pattern is 2, 3, 4, 5, 2, 3, 4, 5, etc

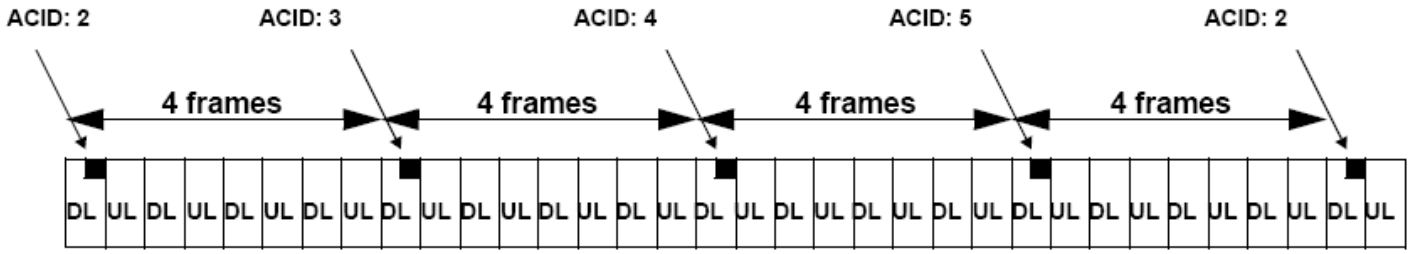

Figure a2. HARQ channel identifier example (N_ACID=0b11)

Allocation Period

The allocation period value shall be set to (ap-1) where ap is the period of the persistent allocation, in units of frames. For example, as illustrated in Figure a2, if ap=0b00011, then the period of the persistent allocation is four frames, and the time-frequency resource assignment is valid in frames N, N+4, N+8, etc.