

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	RS Downlink HARQ on Dedicated Channel	
Date Submitted	2007-07-15	
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Re:	This document is in response to call for technical comments and contributions IEEE 802.16j-07/019 dated 2007-06-07.	
Abstract	The current DL HARQ support defined in the current baseline is for centralized control. It involves substantial efforts to identify failure link and perform subsequent retransmission allocation. Whenever a failure occurs, all resources allocated beyond the failure link are wasted as well. This contribution proposes to allocate DL dedicated channel for DL HARQ burst transmission. As DL dedicated channel is a persistence allocation, there is no need for the MR-BS to reschedule retransmission. Hence, there is no needed to identify the failure link as well. This contribution also proposes the required mechanism to enable HARQ control signaling and ACK/NACK exchange to support DL HARQ on the dedicated channel.	
Purpose	To incorporate the proposed text into the P802.16j Baseline Document (IEEE 802.16j-06/026r4)	
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RS Uplink HARQ on Dedicated Channel

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Nortel

Introduction

The current DL HARQ support defined in the current baseline is for centralized control. It involves substantial efforts to identify failure link and perform subsequent retransmission allocation. Whenever a failure occurs, all resources allocated beyond the failure link are wasted as well. This contribution proposes to allocate DL dedicated channel for DL HARQ burst transmission. As DL dedicated channel is a persistence allocation, there is no need for the MR-BS to reschedule retransmission. Hence, there is no needed to identify the failure link as well. This contribution also proposes the required mechanism to enable HARQ control signaling and ACK/NACK exchange to support DL HARQ on the dedicated channel.

Text Proposal

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[Add the following subclause]

6.3.17.6 Downlink HARQ on Dedicated Channel

Under centralized control, when MR-BS needs to send DL HARQ burst to the MS, it may allocation DL DCH resource to each RS along the path using RS_DL_DCH assignment IE for HARQ burst transmission as well as HARQ control signaling.

HARQ sub-bursts for multiple MSs/RSs are multiplexed and transmitted through the DL DCH. Each DCH region can transmit a single HARQ burst at a time. The corresponding HARQ control signaling are sent in the same frame together with all HARQ bursts in the frame. The HARQ control signaling are sent using the DL DCH HARQ control header. The control header may be sent using the most robust DCH region amongst all the allocated DCH regions managed by the RS. The DCH region used to send the control header cannot be used to send HARQ burst. A non HARQ burst can be sent together with the control header in the same DCH region. The ACK/NACK bitmap is sent by the child RS using UL DCH HARQ ACK header. The RS that receives HARQ DL burst at i-th frame should transmit ACK signal at (i+j)-th frame. The frame offset “j” is defined by the “HARQ ACK Delay for DL Burst” field in the UCD message.

[Change Table 19a in Subclause 6.3.2.1.2.2.2 as indicated]

Table <X1>—Extended Type field encodings for Extended MAC signaling header type II

Extended Type field	MAC header Type	Reference figure	Reference table
0	RS BR header		
1	RS UL_DCH request header		
2	Acknowledgement header		

3	HARQ RS error report header		
<u>4</u>	<u>UL DCH control header</u>		
4 5-7	Reserved		

[Add the following subclause]

6.3.2.1.2.2.5 UL DCH control header

The UL DCH control header is used by the RS to send control signaling to MR-BS or parent RS. The header format is as follows:

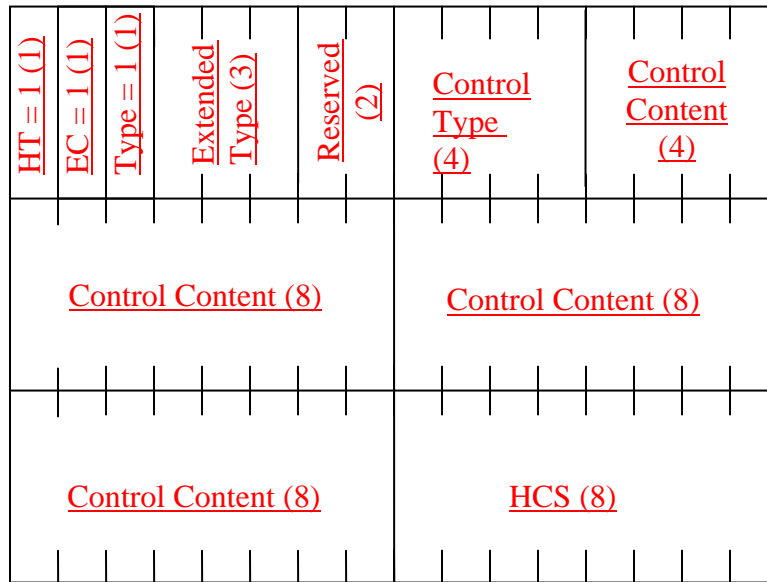


Figure XXX – UL DCH control header

Table XXX - UL DCH control header format

<u>Syntax</u>	<u>Size</u>	<u>Notes</u>
<u>MAC Header()</u>		
<u>HT</u>	<u>1 bit</u>	<u>Shall be set to 1</u>
<u>EC</u>	<u>1 bit</u>	<u>Shall be set to 1</u>
<u>Type</u>	<u>1 bit</u>	<u>Shall be set to 1</u>
<u>Extended TYPE</u>	<u>3 bits</u>	<u>Shall be set to 100 for UL DCH control header</u>
<u>Reserved</u>	<u>2 bits</u>	
<u>Control Type</u>	<u>4 bits</u>	<u>0000 = UL DCH HARQ ACK signaling</u> <u>0001-1111 = Reserved</u>
<u>Control Content</u>	<u>28 bits</u>	
<u>HCS</u>	<u>8 bits</u>	<u>Header check sequence</u>
<u>}</u>		

[Add the following subclause]

6.3.2.1.2.2.5.1 UL DCH HARQ ACK header

The UL DCH HARQ ACK header is used by the RS to send the HARQ ACK/NACK bitmap to acknowledge the corresponding DL DCH HARQ bursts from the MR-BS or parent RS. The RS that receives HARQ DL burst at i -th frame should transmit ACK signal at $(i+j)$ -th frame. The frame offset “ j ” is defined by the “HARQ ACK Delay for DL Burst” field in the UCD message. The format of the header is shown in Figure XXX.

Table XXX - UL DCH HARQ ACK header format

Syntax	Size	Notes
MAC Header(){		
HT	1 bit	Shall be set to 1
EC	1 bit	Shall be set to 1
Type	1 bit	Shall be set to 1
Extended TYPE	3 bits	Shall be set to 100 for UL DCH control header
Reserved	2 bits	
Control Type	4 bits	Shall be set to 0000 for UL DCH HARQ ACK signaling
ACK/NACK bitmap	8 bits	HARQ ACK/NACK bitmap for the corresponding DL DCH HARQ bursts specified by the DL DCH HARQ control header (maximum 8 bursts)
Reserved	20 bits	
HCS	8 bits	Header check sequence
}		

[Add the following subclause]

6.3.2.1.3 DL MAC Header without payload (DL MAC control header)

The DL MAC header without payload (control MAC header) is sent on DL only. The DL MAC control header is used by MR-BS or RS(s) to send control signaling to its child RS(s). The format of DL control MAC header is shown in Figure XXX.

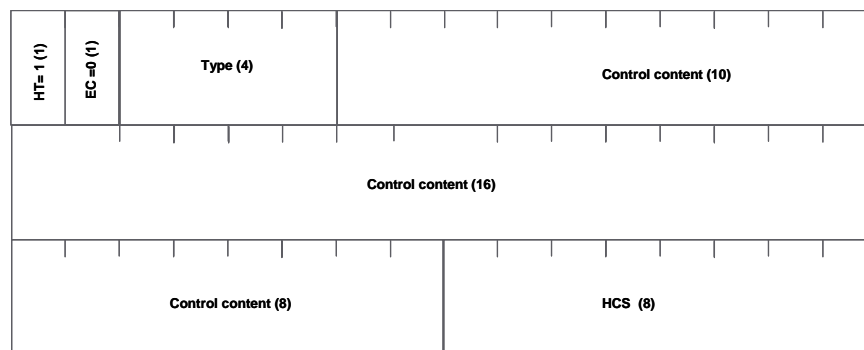


Figure XXX. Format of DL MAC control header.

The DL MAC control header field encoding is show in Table XXX.

Table XXX - DL MAC control header field encoding.

<u>Name</u>	<u>Length (bits)</u>	<u>Description</u>
<u>HT</u>	<u>1</u>	<u>Header type. Shall be set to 1</u>
<u>EC</u>	<u>1</u>	<u>Encryption control. Shall be set to 0</u>
<u>Type</u>	<u>4</u>	<u>0000 = DL DCH HARQ control</u> <u>0001-1111 = Reserved</u>
<u>Control content</u>	<u>34</u>	<u>Content of control</u>
<u>HCS</u>	<u>8</u>	<u>Header check sequence</u>

[Add the following subclause]

6.3.2.1.3.1 DL DCH HARQ control header

The DL DCH HARQ control header is used by the MR-BS or parent RS to send HARQ control signaling to child RS. The control content is sub-divided into 8 groups of 4 bits which allow up to eight DL DCH regions for HARQ burst transmission. The first group of 4 bits corresponding to the first allocated DCH region and so on. The first bit, when set to 1, indicates HARQ enabled. The next 2 bits indicate ACID (up to 4 HARQ channels per DCH region). The last bit indicates AI SN. The header format is as follows:

Table XXX - DL DCH HARQ control header format

<u>Name</u>	<u>Length (bits)</u>	<u>Description</u>
<u>HT</u>	<u>1</u>	<u>Header type. Shall be set to 1</u>
<u>EC</u>	<u>1</u>	<u>Encryption control. Shall be set to 0</u>
<u>Type</u>	<u>4</u>	<u>Shall be set to 0000 for DL DCH HARQ control</u>
<u>For (i=0; i<8; i++) {</u>		
<u> <u>HARQ Enable</u></u>	<u>1</u>	<u>Set to 1 to enable HARQ</u>
<u> <u>ACID</u></u>	<u>2</u>	<u>HARQ CH ID</u>
<u> <u>AI SN</u></u>	<u>1</u>	<u>HARQ ID Seq. No</u>
<u> <u>↓</u></u>		
<u> <u>Reserved</u></u>	<u>2</u>	
<u>HCS</u>	<u>8</u>	<u>Header check sequence</u>

[Add the following subclause]

8.4.5.9.2 RS DL DCH assignment IE

This IE is used for the initial allocation and subsequent updates of the downlink dedicated channel.

Table XXX. RS_DL_DCH assignment IE format.

<u>Syntax</u>	<u>Size</u>	<u>Notes</u>
<u>RS_DL_DCH assignment IE {</u>		
<u>Type</u>	<u>5 bits</u>	
<u>Length</u>	<u>4 bits</u>	
<u>RSCID</u>	<u>8 bits</u>	<u>Reduced basic CID of the RS</u>
<u>Update type</u>	<u>2 bits</u>	<u>00 = Normal</u> <u>01 = Service flow based</u> <u>10 = Access zone</u> <u>11 = Reserved</u>
<u>If (Update type == 01) {</u>		<u>If service flow based update</u>
<u>Throughput size</u>	<u>24 bits</u>	<u>Amount of throughput update in byte/s</u>
<u>Access RSCID</u>	<u>8 bits</u>	<u>Reduced basic CID of the access RS of the MS that completed the service flow event</u>
<u>}</u>		
<u>Assignment type</u>	<u>2 bits</u>	<u>00 = Incremental (Add the specified resource to DL DCH)</u> <u>01 = Removal (Remove the specified resource from DL DCH)</u> <u>10 = Aggregate (An aggregate assignment with no resource means DL DCH removal)</u> <u>11 = Reserved</u>
<u>DIUC</u>	<u>4 bits</u>	
<u>Boosting</u>	<u>3 bits</u>	
<u>Repetition coding indication</u>	<u>2 bits</u>	
<u>Num_region_id</u>	<u>4 bits</u>	<u>Number of region IDs in the assignment list of resources allocated to DCH</u>
<u>For (i=0; i<Num_region_id; i++) {</u>		
<u>Region ID</u>	<u>6 bits</u>	<u>Index to the DL region defined in DL region definition TLV in DCD</u>
<u>}</u>		
<u>Frequency (N)</u>	<u>4 bits</u>	<u>Allocation repeats once every N frames</u>
<u>}</u>		

+++++++ End Text Proposal ++++++