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Title	Text Clarification and Clean-up for the MAC Header	
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Re:	IEEE P802.16e/D7-2005
Abstract	This contribution provides text clarification and clean-up regarding the MAC header
Purpose	Review and Adopt the suggested changes into P802.16e/D7
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1 Introduction

This contribution provides clarification and clean up text related to the MAC header section 6.3.2. Also, it includes proposed text change/comments that were accepted during session #36, but not included properly in p802.16e/D7. Those comments are:

Comment #3070, contribution C802.16e-05/192r4
Comment #3059, contribution C802.16e-05/119r2
Comment #3066
Comment #3045, contribution C802.16e-05/193r2

In the r1 version of this contribution, the following comments from the D7 commentary database has been merged into the proposed text change in section 2: comments 4011, 4012, 4013, 4414, 4415, 4417, 4014, 4015, 4017, 4018 (already accepted), 4019, 4020 (already accepted), 4021 (already accepted), 4023, 4024 (already accepted), 4416, 4022, 4026, 4027, 4028, 4029, 4030, 4032, 4418, 4033, 4034, 4035, 4036, 4037, 4038, 4039, 4040 (part 1 only), 4041, 4042, 4043, 4044.

In addition, the reply comment to 4011 has also been merged into this r1 version.

2 Proposed Text Change

Notes to editor: In this section, the text in black is the original text in p802.16e/D7. Instruction to editor is in 'blue'. Proposed text change is in 'red'.

6.3.2.1 MAC header formats

[Change the existing text in the first paragraph of 6.3.2.1 as shown below:]

~~In the DL, t~~There is one defined DL MAC header that is the generic MAC header which begins each MAC PDU containing either MAC management messages or CS data. ~~In the UL, Two six~~ There are two defined UL MAC header formats ~~are defined~~. The first is the generic MAC header that begins each MAC PDU containing either MAC management messages or CS data, where HT is set to 0 as shown in Table 4a. The second is the MAC header format without payload where HT is set to 1 as shown in Table 4a. For the latter format, the MAC header is not followed by any MAC PDU payload and CRC. ~~The second is the bandwidth request header used to request additional bandwidth. The single bit Header Type (HT) field distinguishes the generic MAC header and bandwidth request header formats. The HT field shall be set to zero for the Generic Header and to one for a bandwidth request header. The third is the PHY channel report header used for the MS to send a PHY channel report to the BS. The fourth is the feedback header used for the MS to provide its feedback. The fifth is the bandwidth request and UL TX power report header used for the MS to send a combined bandwidth request and UL Tx power report. The sixth is the SN report header used by the MS to feedback SDU SN during fast BS switching. The single bit header type (HT) field distinguishes the generic MAC header and the rest of the header formats. The HT field shall be set to zero for the generic header and to one for other MAC headers.~~

[Insert new table into 6.3.21 as follows:]

Table 4a—MAC Header HT and EC fields encoding

HT	EC*	MAC PDU Type	Reference Figure	Reference Table
0	0	Generic MAC header for DL and UL. MAC PDU with data payload, no encryption, with a 6-bit type field, see Table 6 for its type field encodings.	19	5
0	1	Generic MAC header for DL and UL. MAC PDU with data payload, with encryption with a 6-bit type field, see Table 6 for its type field encodings.	19	5

1	0	DL: This encoding is not defined UL: MAC signaling header type I. MAC PDU without data payload, ~~(also called Bandwidth Request Header)~~, with a 3-bit type field, see Table ~~7e~~5a for type encoding definitions.	19a, 20, 20a - f	5a, 7, 7a - f
1	1	DL~~-only~~: Compressed/Reduced Private DL-MAP** UL~~-only~~: MAC signaling header type II. ~~Feedback MAC Header,~~ MAC PDU without data payload, with 1-bit type field, see Table 7g for type encoding definitions.	~~??~~20g - i	~~??~~7g, 7h

* Note: Headers with HT=1 shall not be encrypted. Thus the EC field is used to distinguish between Feedback MAC header (UL) / Compress MAP (DL), and all other type headers.

** Note: Compressed DL-MAP and Reduced Private MAP do not use MAC headers as defined in 6.3.2.1, however, the first two bits of these maps overlay with HT/EC fields and are always set to 0b11 to identify them as such (see sections 8.3.6.3,8.3.6.7, 8.4.5.6 & 8.4.5.8).

6.3.2.1.1 Generic MAC h~~H~~eader

[Replace Figure 19 –Generic MAC header in 6.3.2.1.1 with the following figure:].

[Figure 19 drawing. No change]

Figure 19—Generic MAC header format

[Add the following entries to Table 5:]

Table 5—Generic MAC header fields

Name	Length (bits)	Description
ESF	1	Extended Subheader Field. If ESF = 0, the ESF is absent. If ESF=1, the ESF is present and will follow the GMH immediately (See 6.3.2.2.7). The ESF is applicable both in the DL and in the UL.

[Add the following to the end of 6.3.2.1.1:]
The ESF bit in the Generic MAC header indicates that the Extended Subheader field is present. Using this field, a number of additional subheaders can be used within a PDU. The ESF field shall always appear immediately after the Generic MAC header and before all other subheaders. The ESF field and all extended subheaders related to it are not encrypted (See 6.3.2.2.7).

[Add the following text before section 6.3.2.1.2]

6.3.2.1.2 MAC header without payload

This MAC header format is applicable to UL only. The MAC header is not followed by any MAC PDU payload and CRC.

6.3.2.1.2.1 MAC signaling header type I

For this MAC header format, there is no payload following the MAC header. The MAC signaling header type I is illustrated in Figure 19a. Table 5a describes the encoding of the 3-bit type field following the EC field.

[Insert the following figure]

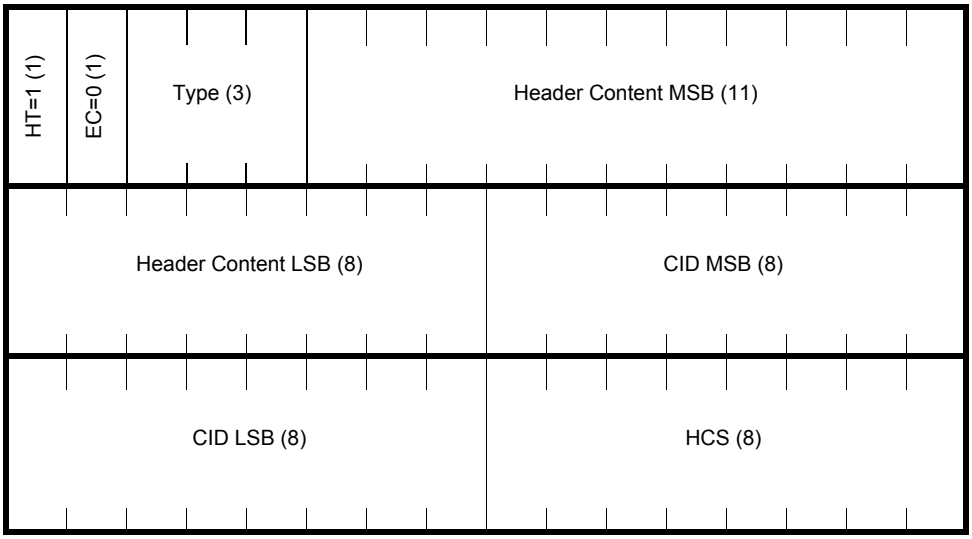

Figure 19a—MAC signaling header type I format

Table 5a—~~MAC Header~~ Type Field Encodings ~~with HT/EC=0b10~~ for MAC signaling header type I

type field (3 bits)	MAC Header Type (with HT/EC=0b10)	Reference Figure	Reference Table
000	BR incremental	20	7
001	BR aggregate	20	7
010	PHY channel report ~~header~~	20~~e~~d	7~~e~~d
011	BR with UL Tx power report	20a	7a
100	BR with DL burst profile change request	20b	7b
101	BR with UL sleep control ~~header~~	~~n/a~~ 20e	~~??~~ 7e
110	SN Report	~~??~~ 20f	~~??~~ 7f
111	CQICH ~~channel~~ allocation request	~~??~~ 20c	~~??~~ 7c

[Change 6.3.2.1.2 as indicated:]

6.3.2.1.2.1.1 Bandwidth request header

~~*[Change 6.3.2.1.2 as indicated:]*~~

The Bandwidth Request PDU shall consist of bandwidth request header alone and shall not contain a payload. The bandwidth request header is illustrated in ~~Table 7e~~ Figure 20. An MS receiving a bandwidth request header on the downlink shall discard the PDU.

The 'Bandwidth Request' header shall have the following properties:

a) This is a MAC signaling header type 1. ~~The length of the header shall always be 6 bytes.~~
~~b) The EC field shall be set to 0, indicating no encryption.~~
b~~c~~) The CID shall indicate the connection for which uplink bandwidth is requested.
c~~d~~) The Bandwidth Request (BR) field shall indicate the number of bytes requested.
~~The 'Bandwidth Request' field may be set to zero if Type is set to 0b111.~~
d) The allowed types of bandwidth requests are defined in Table 5a.

The fields of the bandwidth request header are defined in Table 7 ~~for types 0b000 and 0b001 and Table 7a for type 0b011. Every header is encoded, starting with the HT and EC fields. The coding of these fields is such that the first byte of a MAC header shall never have the value of 0xFX. This prevents false detection of the stuff byte.~~

[Insert new subclause 6.3.2.1.2.~~1~~1.2:]

6.3.2.1.2.1.2 Bandwidth request and UL Tx power report header

The Bandwidth Request and UL Tx power report PDU shall consist of bandwidth request and UL Tx power report header alone and shall not contain a payload. The bandwidth request and UL Tx power report header is illustrated in Figure 20a.

[Figure 20a drawing. No change]

Figure 20a—Bandwidth request with UL Tx power report header format

The bandwidth request with UL Tx power report header shall have the following properties:

a) This is a MAC signaling header type 1. ~~The length of the header shall always be 6 bytes.~~
~~b) The EC field shall be set to 0, indicating no encryption.~~
bc) The CID shall indicate the connection for which uplink bandwidth is requested.
cd) The allowed type for bandwidth request with UL Tx transmit power report is defined in Table 5a ~~0b011~~. T~~t~~he requested bandwidth is incremental.

The fields of the Bandwidth request and UL Tx power report header are defined in Table 7a.

Table 7a—Description of fields BR and UL Tx power report header

Name	Size (bits)	Description

~~HT~~	~~1~~	~~Header Type = 1~~
~~EC~~	~~1~~	~~Always set to zero~~
Type	3	~~Type = 0b011~~ The type of BR and UL Tx power report header is defined in Table 5a
BR	11	Bandwidth Request: The number of bytes of uplink bandwidth requested by the MS. The bandwidth request is for the CID. The request shall not include any PHY overhead. It is incremental~~aggregate~~ BW request. In case of the Extended rtPS, if the MSB is 1, the BS changes its poll-ing size into the size specified in the LSBs of the this field.
UL Tx power	8	UL Tx power level for the burst that carries this header (11.1.1). The maximum value shall be reported for the burst.
~~*reserved*~~	~~1~~	~~set to zero~~
CID	16	~~MS basic CID for which the BW is requested~~ The CID shall indicate the connection for which uplink bandwidth is requested
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

~~**UL Tx Power**~~

~~This parameter indicates the UL Tx power in dB, and it shall be interpreted as a single value from –16.0 dB to 47.5 dB in unit of 0.5 dB.~~

[Insert new subclause 6.3.2.1.2.~~2~~1.3:]

6.3.2.1.2.~~2~~1.3 Bandwidth request and downlink burst profile change request header

Bandwidth request and downlink burst profile change request (BR-DBPCR) PDU shall consist of bandwidth request and DL burst profile change request header alone, and shall not contain a payload. The bandwidth request and downlink burst profile change request header is illustrated in Figure 20b.

[Figure 20b drawing. No change]

Figure 20b—Bandwidth request and downlink burst profile change

The Bandwidth request and downlink burst profile change request header shall have the following properties:

a) This is a MAC signaling header type 1.
b) The CID shall indicate the connection for which uplink bandwidth is requested.
c) The allowed type for Bandwidth request and downlink burst profile change request is defined in Table 5a. The requested bandwidth is incremental.

The fields of the Bandwidth request and downlink burst profile change request header are defined in Table 7b.

Table 7b—Description of the fields of BR and DL burst profile change request header

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~
~~EC~~	~~1~~	~~Always set to zero~~
Type	3	~~Type = 0b100~~ The type of BR and DL burst profile change request header is defined in Table 5a
BR	11	Bandwidth Request: The number of bytes of uplink bandwidth requested by the MS. The bandwidth request is for the CID. The request shall not include any PHY overhead. It is incremental~~aggregate~~ BW request.
CINR	7	~~CINR for the burst that carries this header(11.1.1). When the CINR is different from slot to slot, the maximum value is reported.~~
DCD Change Indications	1	—
CID	16	~~MS Basic CID for which the BW is requested~~ The CID shall indicate the connection for which uplink bandwidth is requested
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

CINR

This parameter indicates the CINR ~~in dB~~ measured by the MS from the BS. ~~, and i~~It shall be interpreted as a single value from -16.0 dB to 47.5 dB in unit of 0.5 dB.

DCD Change Indication

This parameter is set to 1 if the DCD change count stored at MS is not equal to that in the received DL-MAP message. Otherwise, it is set to 0.

[Insert new subclause 6.3.2.1.2.~~3~~1.4:]

6.3.2.1.2.~~3~~1.4 CQICH a~~A~~llocation R~~r~~equest H~~h~~eader

The CQICH ~~A~~allocation request PDU shall consist of CQICH ~~A~~allocation request header alone and shall not contain a payload. This header is sent by MS to request the allocation of CQICH. The CQICH ~~A~~allocation request header is illustrated in Figure 20c.

[Replace Figure 20c with the following drawing]

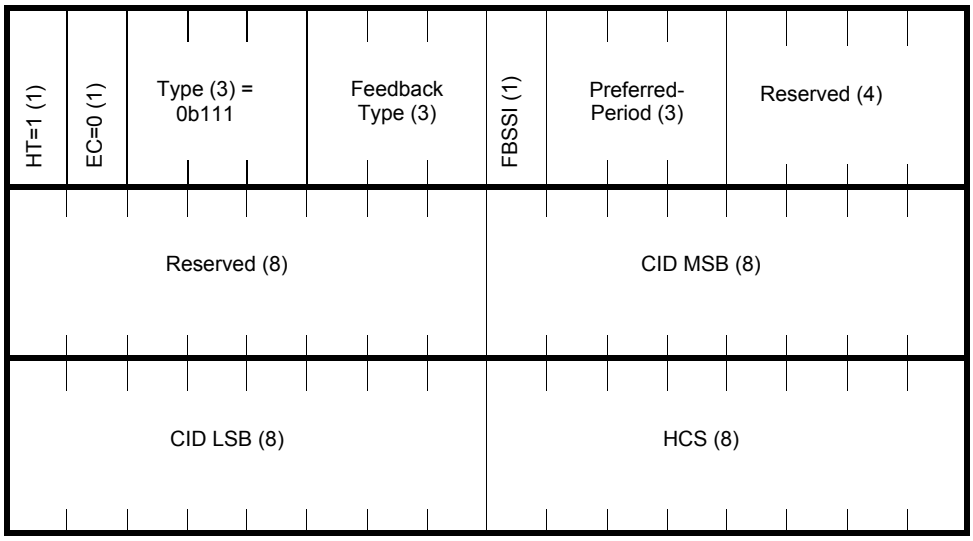

Figure 20c— CQICH aAllocation ~~Bandwidth~~ request

The CQICH allocation request header shall have the following properties:

a) This is a MAC signaling header type 1.
b) The CID shall indicate the MS basic CID.
c) The allowed type for CQICH allocation request is defined in Table 5a.

The fields of the CQICH allocation request header are defined in Table 7c.

[Modify Table 7c below.]

Table 7c—Description of the fields of CQICH aAllocation rRequest Header

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~
~~EC~~	~~1~~	~~Always set to zero~~
Type	3	~~Set according to Table 7i~~ The type of CQICH allocation request header is defined in Table 5a
Feedback Type	3	Set according to feedback type defined in Table 302a When FBSSI is set to 1, this field is neglected.
~~CQICH_Num~~	~~4~~	~~The number of CQICH requested by MS~~
FBSSI	1	FBSS Indicator: Set when MS request CQICH during FBSS handover.
Preferred-Period(=p)	3	CQICH allocation period MS prefers. The value is defined in units of frame. When FBSSI is set to 1, the value contained in this field shall be neglected.
RSVD	1~~1~~2	Set to zero
CID	16	MS basic CID

HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

[Insert new subclause 6.3.2.1.~~3~~2.1.5:]

6.3.2.1.~~3~~ 2.1.5 PHY channel report header

The PHY channel report PDU shall consist of a PHY channel report header alone and shall not contain a payload. The PHY channel report header is illustrated in Figure 20d.

[Replace Figure 20d drawing with the following drawing, to ensure consistency in all headers' drawing format]

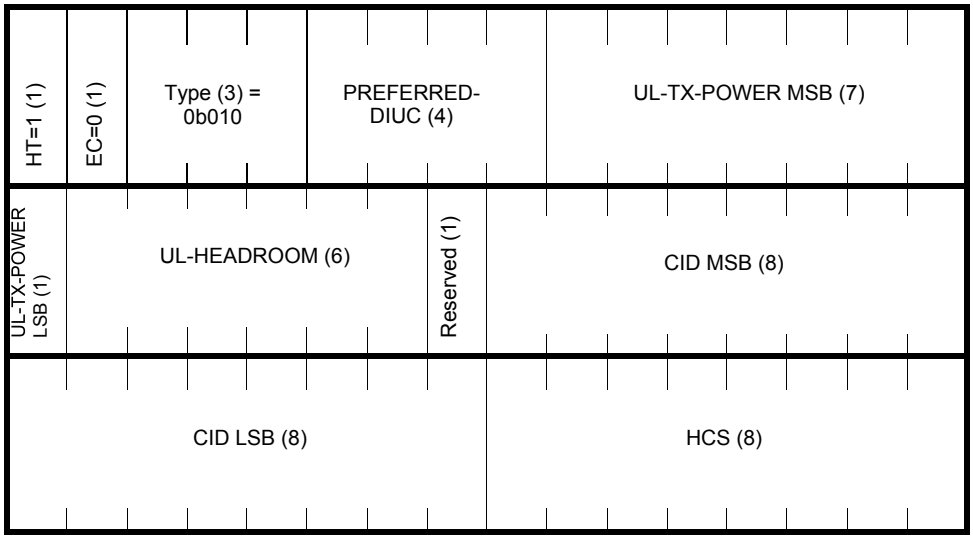

Figure 20d—PHY channel report header

The PHY channel report shall have the following properties:

a~~e~~) This is a MAC signaling header type 1. ~~The length of the header shall always be 6 bytes.~~
~~f) The EC field shall be set to 0, indicating no encryption.~~
b~~g~~) The CID shall indicate the MS basic CID.
c~~h~~) The allowed type for PHY channel report is defined in Table 5a. ~~The TYPE field shall be 0b010.~~

An MS receiving a PHY channel report header on the downlink shall discard the PDU.

The fields of the PHY channel report header are defined in Table 7d.

Table 7d—PHY channel report header fields

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~

~~EC~~	~~1~~	~~Always set to zero~~
Type	3	~~Type = 0b010~~ The type of PHY channel report header is defined in Table 5a
PREFERRED-DIUC	4	Index of the DIUC preferred by the MS
UL-TX-POWER	~~7~~8	UL Tx power level in dBm, for the burst that carries this Header (11.1.1). , ~~from +63 to -64 in dBm in 1 dB steps.~~ The maximum value ~~is~~ shall be reported for the burst.
UL-HEADROOM	6	Headroom to UL maximum power level in dB, for the burst that carries this Header, from 0 to 63 in 1 dB steps. Should the headroom exceed 63 dB, the value 63 shall be used.The minimum value is shall be reported for the burst.
Reserved~~SVD~~	~~2~~1	Set to zero
CID	16	MS basic CID
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

[Insert new subclause 6.3.2.1.~~4~~2.1.6:]

6.3.2.1.~~4~~2.1.6 Bandwidth request and uplink sleep control header

Bandwidth request and uplink s~~S~~leep c~~C~~ontrol h~~H~~eader is sent by the MS to request activation / deactivation of certain Power Saving Class. The ~~message~~header also indicates incremental transmission demand. The Bandwidth request and uplink sleep control PDU shall consist of a Bandwidth request and uplink sleep control header alone and shall not contain a payload. The Bandwidth request and uplink sleep control header is illustrated in Figure 20e.

[Replace Table 7e by a new Figure and Table below, so as to be consistent with other header description]

~~Table 7c—Bandwidth control and uplink sleep control header~~

~~Syntax~~	~~Size (bits)~~	~~Notes~~
~~MOB_SLP-ULC_Message_Format () {~~	~~—~~	~~—~~
~~HT~~	~~1~~	~~Encoded as 0b1~~
~~EC~~	~~1~~	~~Encoded as 0b0~~
~~Type~~	~~3~~	~~Encoded as 0b000~~
~~BR~~	~~11~~	~~Total transmission demand at the MS in units of 256 bytes~~
~~Power_Saving_Class_ID~~	~~6~~	~~Power Saving Class ID~~
~~Operation~~	~~1~~	~~= 1 to activate Power Saving Class = 0 to deactivate Power Saving Class~~
~~*reserved*~~	~~1~~	~~—~~
~~Basic CID~~	~~16~~	~~Basic CID of the MS~~
~~HCS~~	~~8~~	~~—~~

}	—	—

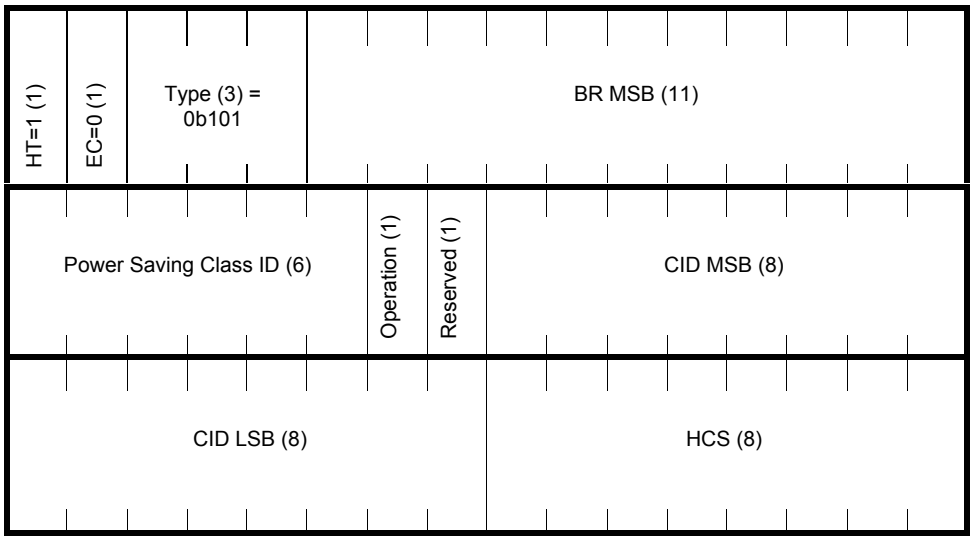

Figure 20e—Bandwidth request and uplink sleep control header

The Bandwidth request and uplink sleep control header shall have the following properties:

a) This is a MAC signaling header type 1.
b) The CID shall indicate the MS basic CID.
c) The allowed type for Bandwidth request and uplink sleep control is defined in Table 5a.

An MS receiving a Bandwidth request and uplink sleep control header on the downlink shall discard the PDU.

The fields of the Bandwidth request and uplink sleep control header are defined in Table 7e.

Table 7e—Description of the fields of Bandwidth request and uplink sleep control header

Name	Length (bits)	Description
Type	3	The type of Bandwidth request and uplink sleep control header is defined in Table 5a
BR	11	Bandwidth Request: The number of bytes of uplink bandwidth requested by the MS. The bandwidth request is for the CID. The request shall not include any PHY overhead. It is incremental BW request.

Power_Saving_Class_ID	6	Power Saving Class ID
Operation	1	1: to activate Power Saving Clas 0: to deactivate Power Saving Class
Reserved	1	Set to zero.
CID	16	Basic CID of the MS for which the bandwidth request and uplink sleep control header is sent
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

[Insert new subclause 6.3.2.1.~~5~~2.1.7:]

6.3.2.1.~~5~~2.1.7 SN report header

[Table 7f below is mis-placed. So, remove the Table 7f below and create the same table in the new section 6.3.2.1.2.2 (shown in later part of this contribution)]

~~Table 7f—MAC Header Type Field Encodings with HT/EC=0b10~~

~~FHD/EHD~~	~~MMAC header Type with HT/EC=0b11~~	~~Reference Figure~~	~~Reference Table~~
~~0~~	~~UL only: Feedback header, with another 5-bit type field, see Table 7d for its type encodings.1~~	~~20a-d~~	~~??~~
~~1~~	~~Reserved~~	~~??~~	~~??~~

[Add the following text before Figure 21a]

The SN report header is sent by the MS to report the the LSB of the next ARQ BSN or the virtual MAC SDU Sequence number for the active connections with SN Feedback enabled.

[Replace Figure 21a drawing with the following drawing to ensure consistency in headers' drawing format.]

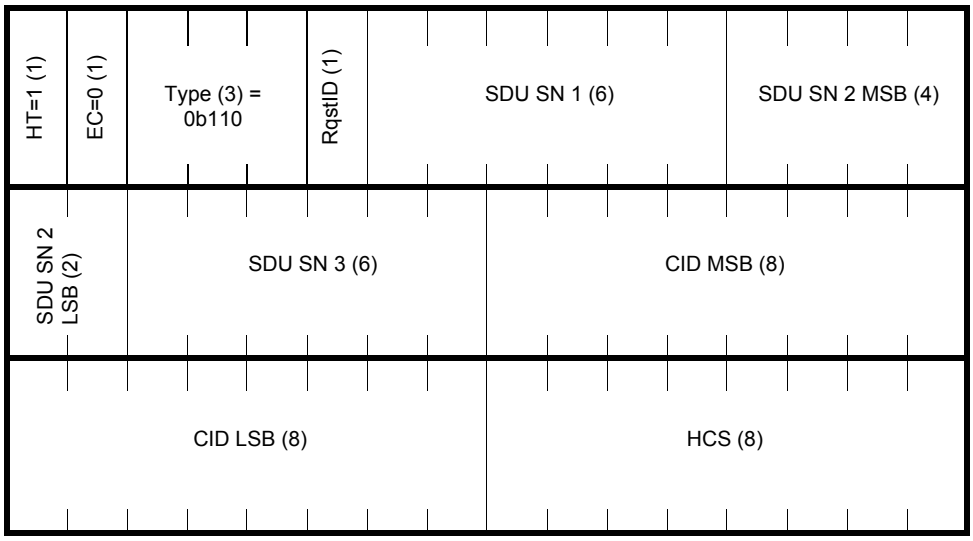

Figure ~~21a~~20f—SN report header format

The SN Report Header shall be of the form illustrated in Figure ~~21a~~20f. The SN Report header shall have the following properties:

a) This is a MAC signaling header type 1. ~~The length of the header shall always be 6 bytes~~
~~b) The EC field shall be set to 0, indicating no encryption~~
c) The CID shall indicate the basic connection of the MS~~S~~ for which the SN Report is being sent.
c) The allowed type for SN report header is defined in Table 5a.
d) The SDU SN field shall indicate the LSB of the next ARQ BSN or the virtual MAC SDU Sequence number for the active connections with SN Feedback enabled. The LSB of the ARQ BSN or virtual MAC SDU sequence number for each connection is provided. At most, three SNs can be provided in each SN report header in numerical ascending order of the SFID values of the connections with SN feedback enabled.
e) The RqstID field may be used to indicate whether the SN Report header is the last header, thus accommodating up to 6 active connections. ~~The fields of the SN Report header are defined in Table 7g. Every header is encoded, starting with the HT and EC fields. The coding of these fields is such that the first byte of a MAC header shall never have the value of 0xFXF. This prevents false detection of the stuff byte.~~

An MS receiving a SN report header on the downlink shall discard the PDU.

The fields of the SN report header are defined in Table 7f.

Table 7~~g~~f—SN report header fields

[Rearrange rows in Table below to make the format consistent with other headers]

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~

~~EC~~	~~1~~	~~Encryption Control. Always set to 0~~
Type	3	The type of SN Report header is defined in Table 5a
RqstID	1	If set to 1, this is the last SN report header. Set to 0 to indicate that this is the first of the maximum of two consecutive SN report headers.
SDU SN 1	6	The ARQ BSN (LSB) or MAC SDU SN (LSB) for the first SFID~~CID~~ in this header. The order of reporting the sequence numbers, SNs, for the connections is predetermined as indicated in 6.3.20.2.6.2.3
SDU SN 2	6	The ARQ BSN (LSB) or MAC SDU SN (LSB) for the second SFID~~CID~~ in this header.
SDU SN 3	6	The ARQ BSN (LSB) or MAC SDU SN (LSB) for the third SFID~~CID~~ in this header.
CID	16	Basic Connection Identifier of the MS from which the SN report header is sent.
~~EC~~	~~1~~	~~Encryption Control. Always set to 0~~
HCS	8	Header Check Sequence
~~HT~~	~~1~~	~~Header Type = 1~~
~~Type~~	~~3~~	~~Set to 0b110. Indicates that it is a SN Report header~~
~~RqstID~~	~~1~~	~~If set to 1, this is the last SN report header. Set to 0 to indicate that this is the first of the maximum of two consecutive SN report headers.~~

[Insert a new subclause 6.3.2.1.2.2, 6.3.2.1.2.2.1, 6.3.2.1.2.2.1.1]

6.3.2.1.2.2 MAC signaling header type II

This type of MAC header is UL specific. There is no payload following the MAC header. The MAC signaling header type II is illustrated in Figure 20g. Table ~~5a~~7g describes the encoding of the 1-bit type field following the EC field. The description of DL MAC header format with HT/EC = 0b11, defined as the Compressed DL-MAP, is not part of this section. The detailed description can be found in section 8.4.5.6.1.

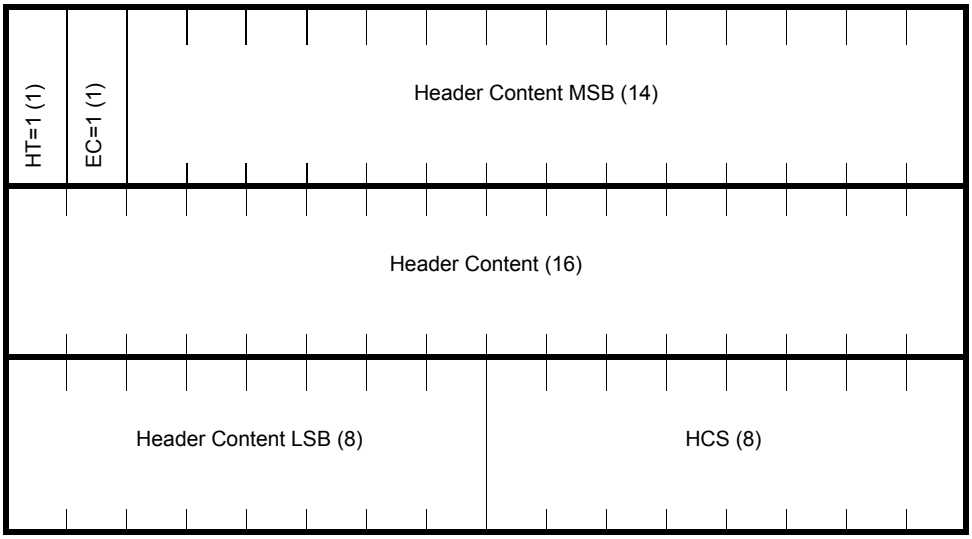

Figure 20g— MAC signaling header type II format

Table 7g—Type Field Encodings for MAC signaling header type II

Type field	MAC header Type (with HT/EC=0b11)	Reference Figure	Reference Table
0	Feedback header, with another 4-bit type field, see Table 7i for its type encodings.	20h, 20i	7h
1	Reserved	-	-

~~*[Insert new subclauses 6.3.2.1.6, 6.3.2.1.6.1, 6.3.2.1.6.2, 6.3.2.1.6.3:]*~~

[Apply proposed changes in IEEE C802.16e-05/119r2 to the Feedback header section. This was comment #3059 but the contribution accepted should be IEEE C802.16e-05/119r2 instead of IEEE C802.16e-05/119. A new feedback type is added for closed-loop MIMO feedback which was missing in the p802.16e/D7. Additional changes are applied to clean up the section and align with the definition in Table 7g above]

6.3.2.1.~~6~~2.2.1 Feedback header

The Feedback header is sent by a MS either as a response to Feedback Polling IE (see 8.4.5.4.29~~3.20~~), or the Feedback request extended subheader (see 6.3.2.2.7.4) or as an unsolicited feedback. When sent as a response to the Feedback Polling IE or the Feedback request extended subheader, the MS shall send a Feedback header using the assigned resource indicated in the Feedback Polling IE or the Feedback request extended subheader. When sent as an unsolicited feedback, the MS can either send the Feedback header on currently allocated UL resource, or request additional UL resource by sending Indication flag on the Fast-feedback channel or the enhanced Fast-feedback channel (refer to 8.4.5.4.10.11) or sending BW request ranging code.

~~**6.3.2.1.6.1 Feedback header**~~

The Feedback PDU shall consist of the Feedback header alone and shall not contain a payload. The Feedback header with and without CID field are illustrated in Figure 20~~d~~h and Figure 20~~d~~i. The Feedback header with CID field shall be used when the UL resource used to send the Feedback header is requested through BW request ranging. Otherwise, the Feedback header without CID field shall be used.

[Replace drawing in Figure 20b in p802.16e/D7 with the following drawing to ensure consistency]

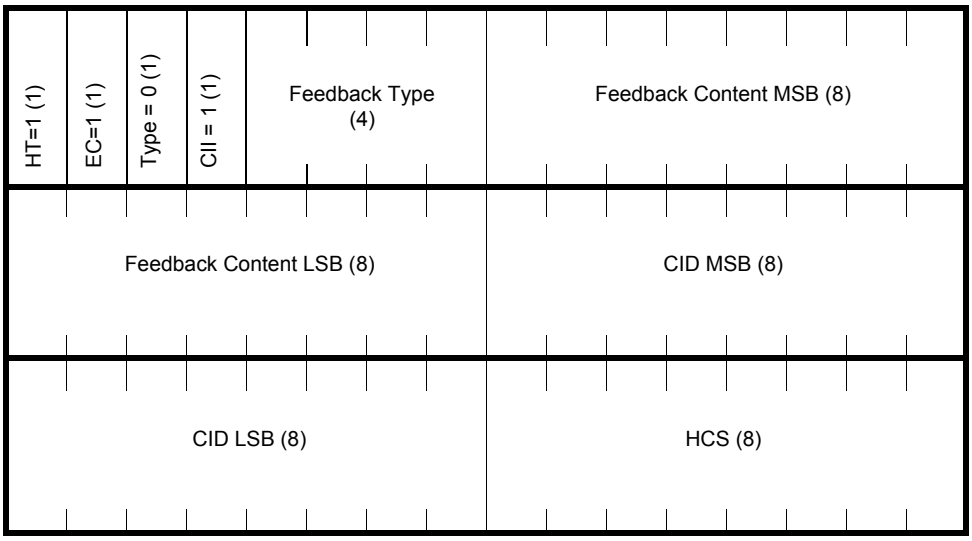

Figure 20~~b~~h — Feedback header with CID field

[Replace drawing in Figure 20c in p802.16e/D7 with the following drawing to ensure consistency]

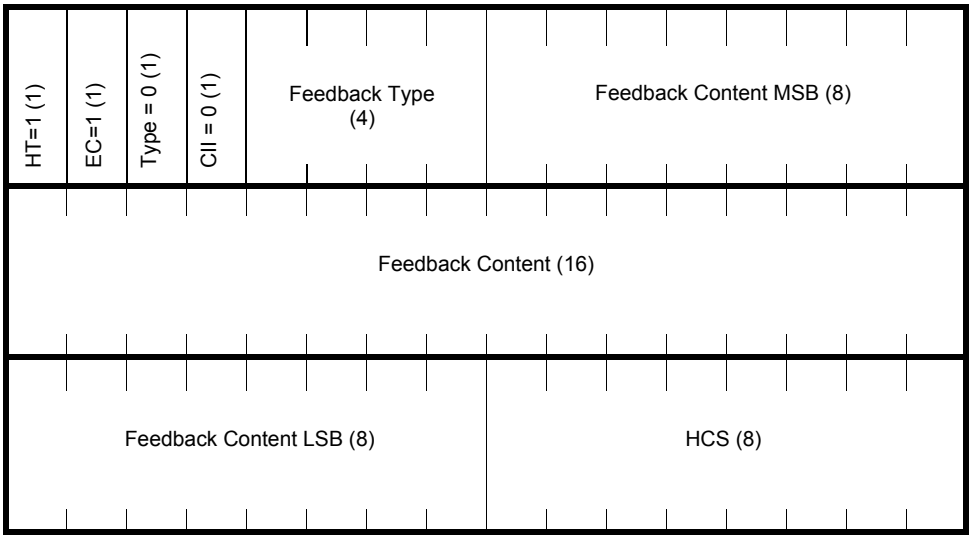

Figure 20~~c~~i — Feedback header without CID field

The Feedback header shall have the following properties:

a) This is a MAC signaling header type II. The length of the header shall always be 6 bytes.
b) The allowed type for Feedback header is defined in Table 7g. ~~The HT field is set to 1, and the EC field is set to 1 and the Type field is set to 0, which indicates the feedback header type.~~
c) The Feedback type field shall be set according to Table 7i.
d) The CII field (CID Inclusion Indication) shall be set to 1 for the header with CID field and set to 0 for the header without CID field.
e) The Feedback Content field shall be set accordingly based on the value of the feedback type field.

The Feedback header shall be used by the MS to provide its feedback(s). An MS receiving a Feedback header on the downlink shall discard the PDU.

The support of Feedback header is OFDMA PHY specific and is specified as part of the capability exchange dialog (REG-REQ/RSP)

The fields of Feedback header are defined in Table 7h.

Table 7h—Description of the fields of Feedback header

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~
~~EC~~	~~1~~	~~EC = 1~~
~~N/M flag~~ Type	1	~~Normal feedback header/mini feedback header indication. Shall be set to 0 to indicate that this is a normal size Feedback header.~~ The type of Feedback header is defined in Table 7g.
CII	1	CID Inclusion indication. Set to 1 for a Feedback header with CID field; set to 0 for a Feedback header without CID field.
Feedback Type	4	Set according to Table 7i
Feedback Content	16 or 32	Set according to Table 7i. Length of 16 bits for a Feedback header with CID field and length of 32 bits for a Feedback header without CID field.
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5)

Table 7i—Feedback type and feedback content

Feedback Type	Feedback contents	Description
0000	~~Set as described in Table 296d~~ MIMO feedback type (3 bit) + feedback payload (6 bits)	~~MIMO mode and permutation feedback~~ CQI and MIMO feedback. The definition of MIMO feedback type (3 bit) and the corresponding feedback payload (6 bits) are the same as that defined in Table 302a and sections 8.4.5.4.10.4, 8.4.5.4.10.5, 8.4.5.4.10.6, 8.4.5.4.10.7, 8.4.5.4.10.8, 8.4.5.4.10.9, 8.4.5.4.10.10 for the Enhanced Fast-feedback channel.
0001	DL average ~~CQI~~ CINR (5 bits)	~~5 bits CQI feedback~~ DL average CINR of the serving or anchor BS (for the

		case of FBSS), with 5-bit payload encoding as defined in section 8.4.5.4.15.
0010	Number of index, *L* (2 bits) + *L* occurances of Antenna index (2 bits) + MIMO coefficients (5 bits, see definition in 8.4.5.4.10.6)	MIMO coefficients feedback for up to 4 antennas.
0011	Preferred-DIUC (4 bits)	Preferred DL channel DIUC feedback
0100	UL-TX-Power (~~7~~8 bits) (see Table 7a for definition)	UL transmission power
0101	PREFERRED~~referred~~-DIUC(4 bits) + UL-TX-POWER~~ower~~(7 bits) + UL-HEADROOM~~headroom~~ (6 bits) (see Table 7~~a~~d for definitions)	PHY channel feedback
0110	~~Number of bands, *N* (2 bits) + *N*occurances of 'band index (6 bits) + CQI (5 bits)'~~ AMC band indication bitmap (12 bits, see 6.3.17.5) + *N* CQI (N x 5 bits) *N* is the number of '1's in the AMC band indication bitmap.	CQIs of up to 4 best reception DL ~~multiple~~ AMC bands
0111	Life span of short term precoding feedback (4 bits) according to Table Z2.	The recommended number of frames the short term precoding feedback can be used for.
1000~~0111~~	Number of feedback types, *0* (2 bits) + *0* occurances of 'feedback type (4 bits) + feedback content (variable)'	Multiple types of feedback
1001~~0~~	Feedback of index to long term precoding matrix in code book (6 bits), rank of precoding code book (2 bits) and FEC and QAM feedback (6 bits) according to Table Z.	Long term precoding feedback
~~1001~~	~~Life span of short term precoding feedback (4 bits) according to Table Z2.~~	~~The recommended number of frames the short term precoding feedback can be used for.~~
101~~0~~0	Combined DL average CINR ~~CQI~~ of Active BSs (5 bits).	Combined DL average CINR ~~CQI value~~ of all Active BSs within the Active Set, with 5-bit payload encoding as defined in section 8.4.5.4.15..
1011	MIMO channel feedback (see Table 7~~e~~j for description of feedback content fields)	MIMO mode channel condition feedback
~~0b~~1~~011~~100	CINR Mean (8 bits) + CINR Standard Deviation (8 bits)	CINR Feedback (values and coding defined in 8.4.11.3)

1101	CL MIMO type (2 bits)
	If (CL MIMO type == 00 {
	Antenna grouping index (4 bits) + average CQI (5 bits) }
	Elseif (CL MIMO type == 01{
	Number of streams (2 bits) + Antenns selection option index (3 bits) + average CQI (5 bits) of the selected antennas}
	Elseif (CL MIMO type == 10) {
		Closed-loop MIMO feedback
		CL MIMO type:
		0b00: antenna grouping
		0b01: antenna selection
		0b10: codebook
		0b11: indication of transition from closed-loop MIMO to open-loop MIMO
		
		Antenna grouping index: 0b0000~

	Number of streams (2 bits)+Codebook index (6 bits) + average CQI (5 bits) }	0b1001 = 101110 ~ 110110 in Table 298d Antenna selection option index: 0b000 ~0b010 = 110000 ~ 110010 in Table 317f for 3 Tx antenna 0b000~0b101 = 110000~110101 in Table 317g for 4 Tx antenna Codebook index: (See 8.4.8.3.6)
0b11~~00~~10-0b1111	Reserved for future use	

The feedback payload shall be placed at the first available bits of the feedback content field. Any unused bit in the content field shall be set to zero.

[The accepted-modified resolution of comment #3066 should be to remove section 6.3.2.1.6.2. Delete section 6.3.2.1.6.2 below]

~~**6.3.2.1.6.2 Mini Feedback header**~~

~~The Mini Feedback PDU shall consist of Mini Feedback header alone and shall not contain a payload. The Mini Feedback header is illustrated in Figure 20d. When sent alone without any other UL MAC PDU, the Mini Feedback header shall be duplicated.~~

[Delete Figure 20d]

~~**Figure 20d—Mini feedback header**~~

~~The Mini Feedback header shall have the following properties:~~

~~a) The length of the header shall always be 3 bytes.~~
~~b) The HT field is set to 1 and the EC field is set to 1, which indicates the feedback header type.~~
~~c) The N/M field (Normal feedback header/Mini feedback header indication) shall be set to 1 to indicate that this is a half-sized Mini Feedback header.~~
~~d) The Feedback Type field shall be set according to Table 7i, except that the feedback types of 0b1000 to 0b1111 shall not be used, such that the first byte of a MAC header shall never have the value of 0xFX. This prevents false detection.~~
~~e) The Feedback Content field shall be set accordingly based on the value of the feedback type field.~~

~~The support of Mini Feedback header is OFDMA PHY specific and is specified as part of the capability exchange dialog (REG-REQ/RSP).~~

~~For the Mini feedback header, the feedback type of 0b1111 shall not be used.~~

~~The field of Mini Feedback header are defined in Table 7j.~~

~~**Table 7j—Description of the fields of Feedback header**~~

~~Name~~	~~Length (bits)~~	~~Description~~
~~HT~~	~~1~~	~~Header Type = 1~~

EC	1	EC = 1
N/M flag	1	Normal feedback header/mini feedback header indication. Set to 1 to indicate that this is a half-sized Mini Feedback header.
Feedback Type	4	Set according to Table 7i
Feedback Content	8	Set according to Table 7i. Length of 16 bits for a Feedback header with CID field and length of 32 bits for a Feedback header without CID field.
HCS	8	Header Check Sequence

[Modify section 6.3.2.1.6.3 below]

6.3.2.1.6.32.2.1.1 MIMO Channel Feedback header

The MIMO Channel Feedback header is used for MSS to provide DL MIMO channel quality feedback to the BS. The MIMO Channel Feedback header can be used to provide a single or composite channel feedback.

The MIMO Channel Feedback header with or without basic CID field is illustrated in Figure 20ej and Figure 20fk respectively.

[Replace drawing in Figure 20e on page 28 in p802.16e/D7 with the following drawing]

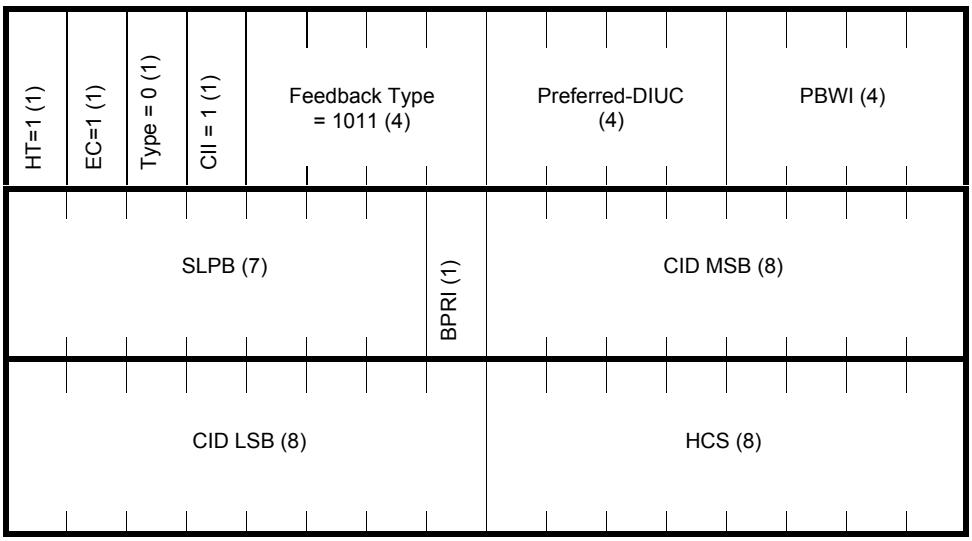

Figure 20ej — MIMO Channel Feedback header with CID field

[Replace drawing in Figure 20f on page 28 in p802.16e/D7 with the following drawing]

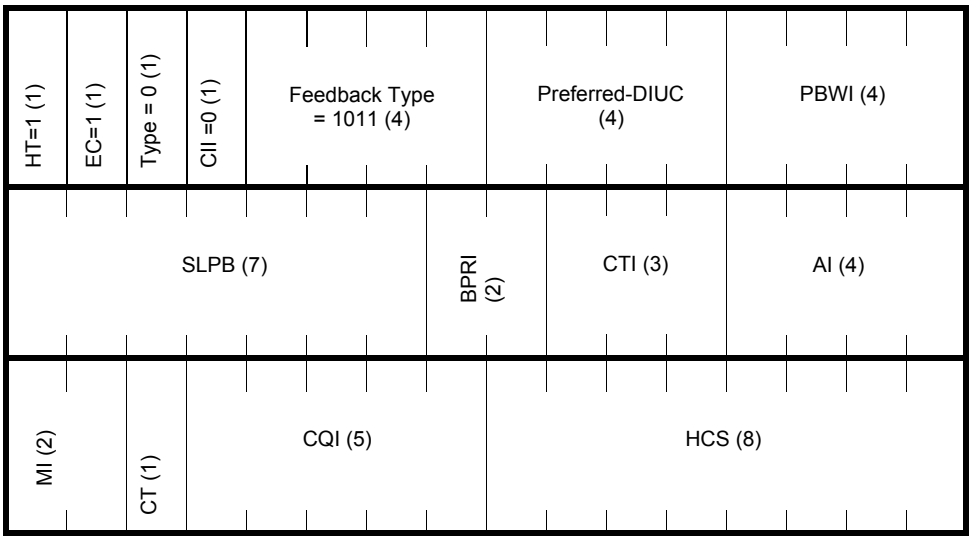

Figure 20~~f~~k — MIMO Channel Feedback header without CID field

~~The MIMO Channel Feedback header shall have the following properties:~~

~~f) The length of the header shall always be 6 bytes.~~
~~g) The TYPE field shall be 0b1000.~~
~~h) PREERRED-DIUC indicates the preferred DIUC suggested by the MSS.~~
~~i) PBWI provides the size of the preferred bandwidth, which can be used for DIUC transmission.~~
~~j) SLPB points to the starting preferred bandwidth location. Combining with PBWI field, BS knows the exact size and location of the preferred bandwidth in the channel~~
~~k) BPRI can be used to rank up to four preferred burst profiles within the DL channel.~~
~~l) CTI provides coherent time information.~~
~~m) AI can support up to four antennas.~~
~~n) MI suggests the preferred STC/MIMO Matrix for the MSS.~~
~~o) CT/CQI can support two types of CQI report.~~

The fields of MIMO Channel Feedback header are defined in Table 7~~k~~j

Table 7~~k~~j—Description of MIMO Channel Feedback header fields

Name	Length (bits)	Description
~~HT~~	~~1~~	~~Header Type = 1~~
~~EC~~	~~1~~	~~Always set to 1~~

~~N/M~~	~~1~~	~~Always set to zero~~
~~CII~~	~~1~~	~~The CII field (CID Inclusion Indication) shall be set to 1 for the header with CID field and set to 0 for the header without CID field.~~
Feedback Type	4	Feedback Type ~~= 0b1011~~ of MIMO Channel Feedback header is defined in Table 7i
PREFERRED-DIUC	4	Index of the preferred DIUC ~~preferred~~ suggested by the MS.
PBWI	4	This field provides the size of the preferred bandwidth, which can be used for DIUC transmission. The Preferred Bandwidth Index indicates the ratio of the preferred bandwidth over used channel bandwidth: 0000: 1 0001: 3/4 0010: 2/3 0011: 1/2 0100: 1/3 0101: 1/4 0110: 1/5 0111: 1/6 1000: 1/8 1001: 1/10 1010: 1/12 1011: 1/16 1100: 1/24 1101: 1/32 1110: 1/48 1111: 1/64 Where Ratio = $BW_{preferred}/BW_{used}$ $BW_{preferred}$: Preferred bandwidth for DIUC transmission BW_{used}: Actual used channel bandwidth (excluding guard bands)
SLPB	7	This field points to the starting preferred bandwidth location. Combining with PBWI field, BS knows the exact size and location of the preferred bandwidth in the channel Starting Location of Preferred Bandwidth: 0-127 The effective bandwidth (used bandwidth) is divided into 1/128 interval, from 0 to 127 representing from lower to higher band. SLPB indicates the starting location of preferred bandwidth for the DIUC burst profile
BPRI	1/2	This field can be used to rank up to four preferred burst profiles within the DL channel. Burst Profile Ranking Indicator (without basic CID): BPRI indicates the ranking for DL channel condition of the preferred bandwidth as reported in the current header where 0 is the most preferred bandwidth) 00: 1st preferred burst profile 10: 2nd preferred burst profile 01: 3rd preferred burst profile 11: 4th preferred burst profile Burst Profile Ranking Indicator (including basic CID): 0: 1st preferred burst profile 1: 2nd preferred burst profile. This field is 1 bit when CII is set to 1, otherwise this field is 2 bits.

CTI	3	This field provides coherent time information. Coherent Time Index: CTI indicates the proximate duration of the valid MIMO channel conditions 000: Infinite 001: 1 frame 010: 2 frames 011: 3 frames 100: 4 frames 101: 8 frames 110: 14 frames 111: 24 frames This field is only present when CII is set to 0.
AI	4	This field is for Antenna Indication. It can support up to four antennas. This feedback header ~~report~~ can ~~be~~ report a composite channel condition ~~report~~, each bit represents for each antenna; "1" is applicable, "0" is not applicable Antenna Index: Bit 0 (MSB)- Antenna 0 Bit 1 – Antenna 1 Bit 2 – Antenna 2 Bit 3 (LSB) – Antenna 3 This field is only present when CII is set to 0.
MI	2	This field suggests the preferred STC/MIMO Matrix for the MS Matrix Indicator: 00: No STC 01: Matrix A 10: Matrix B 11: Matrix C This field is only present when CII is set to 0.
CT	1	This field indicates the type of CQI feedback in the CQI field. CQI Type: The type of CQI feedback in the CQI field 0: DL average CQI feedback 1: CQI feedback for the preferred bandwidth indicated in the current header This field is only present when CII is set to 0.
CQI	5	CQI feedback This field is only present when CII is set to 0.
CID	16	MS~~S~~ basic CID. This field is only present when CII is set to 1.
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

[Change page 160, line 21-25, section 6.3.21.2.6.2]

If after the switch, the MS does not receive a CQICH allocation within duration equals to the switching period, the MS requests the new anchor BS (e.g. BS B) to allocate CQICH channel by transmitting ~~Bandwidth Request~~

~~header with Type=0b111~~ CQICH allocation request header. If the new anchor BS (e.g. BS B) receives ~~Bandwidth Request header with Type 0b111~~ CQICH allocation request header, the BS shall allocate a CQICH for the MS~~S~~.