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Re:	IEEE 802.16j-07/019: "Call for Technical Comments Regarding IEEE Project 802.16j"
Abstract	This contribution proposes the enhanced remedy of relaying compressed DL-MAP and UL-MAP, HARQ-MAP and SUB-DL-UL-MAP, which do not have MAC headers and management message types.
Purpose	Text proposal for 802.16j Baseline Document.
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Remedy for relaying compressed DL-MAP/UL-MAP, HARQ-MAP and SUB-DL-UL-MAP

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1. Introduction

In MR networks under centralized scheduling, the RS shall relay the FCH, compressed DL-MAP/UL-MAP, HARQ-MAP and SUB-DL-UL-MAP for the subordinated RSs to broadcast on the access links. However, the associated relaying schemes have not been defined in the baseline document IEEE 802.16j-06/026r4 yet.

This contribution proposes the remedy of relaying FCH, compressed DL-MAP/UL-MAP, HARQ-MAP and SUB-DL-UL-MAP in the centralized control and centralized scheduling scenario. Because there is no MAC header and management message type defined in these MAPs, we propose a new message to encapsulate these MAPs for relaying.

In order to facilitate the incorporation of this proposal into IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026r4 are listed below. Moreover, the compressed DL-MAP/UL-MAP, HARQ-MAP, SUB-DL-UL-MAP, and HARQ and SUB-MAP Pointer IE defined in IEEE 802.16e-2005 are provided in Table 1~5 below for reference.

Table 1: Format of Compressed DL-MAP

Syntax	Size	Notes
Compressed DL-MAP () {	-	-
Compressed map indicator	3	Set to binary 110 to indicate a compressed map format
UL-MAP appended	1	
Reserved	1	Shall be set to zero
Map message length	11	This value specifies the length of the compressed map message(s) beginning with the byte containing the Compressed map indicator and ending with the last byte of the compressed DL-MAP message if the UL-MAP appended bit is not set or the last byte of the UL-MAP compressed message if the UL-MAP appended bit is set. The length includes the computed **32-bit CRC** value
PHY Synchronization Field() {	-	-
Frame Duration Code	8 bits	
Frame Number	24 bits	
}	-	-
DCD Count	8 bits	
Operator ID	8 bits	
Sector ID	8 bits	
No. OFDMA symbols	8 bits	Number of OFDMA symbols in the DL subframe including all AAS/permutation zone.

DL IE count	8 bits	
for (*n* = 0; *n* < DL IE count; *n*++) {	-	For each DL-MAP element 1 to *N*.
DL-MAP_IE()	*variable*	-
}	-	-
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}	-	-

Table 2 Format of Compressed UL-MAP

Syntax	Size	Notes
Compressed UL-MAP() {		
UCD Count	8 bits	
Allocation Start Time	32 bits	
No. OFDMA symbols	8 bits	Number of OFDMA symbols in the UL subframe
while (map data remains){	-	
UL-MAP_IE()	*variable*	
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}		

Table 3: Format of HARQ-MAP

Syntax	Size	Notes
HARQ_MAP message format() {	-	-
HARQ MAP Indicator = 111	3 bits	Set to 0b111
HARQ_UL-MAP appended	1 bit	
reserved	1 bit	Shall be zero
Map message length	9 bits	Length of HARQ MAP in bytes. (This value specifies the length of the HARQ MAP message beginning with the byte containing the HARQ MAP indicator and ending with the last byte of the HARQ MAP message. The length includes the computed **32-bit CRC** value.)
DL IE count	6 bits	Number of DL IE in the burst.
For (*n* = 0; *n* < DL IE count; *n*++) {	-	For each DL-MAP element 1 to *N*.
Compact DL-MAP IE ()	*variable*	-
}	-	-
If (Compact_UL-MAP appended == 1){		
while (map data remains){	-	
Compact UL-MAP_IE()	*variable*	
}		
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		

}	-	-

Table 4: Format of Sub-DL-UL-MAP

Syntax	Size	Notes
Sub-DL-UL-MAP () {	-	-
Compressed map indicator	3 bits	Set to 0b111
Map message length	10 bits	The length of the submap message in bytes including the compressed map indicator and the **16-bit CRC**.
RCID_Type	2 bits	0b00 = Normal CID 0b01 = RCID11 0b10 = RCID7 0b11 = RCID3
HARQ ACK offset indicator	1 bit	
If (HARQ ACK offset indicator == 1){	-	
DL HARQ ACK offset	8 bits	
UL HARQ ACK offset	8 bits	
}	-	-
DL IE count	8 bits	
for (n = 0; n < DL IE count; n++) {	-	For each DL-MAP element 1 to *N*.
DL-MAP_IE()	*variable*	-
}	-	-
No. OFDMA symbols	8 bits	This value indicates start symbol offset of subsequent subbursts in this UL Allocation Start IE
Subchannel offset	7 bits	This value indicates start subchannel offset of subsequent subbursts in this UL Allocation Start IE
reserved	1 bit	Shall be zero
while (map data remains){	-	
UL-MAP_IE()	*variable*	
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}	-	-

Table 5: HARQ and SUB-MAP Pointer IE format

Syntax	Size (bit)	Notes
HARQ and SUB-MAP Pointer IE () {	—	—
Extended DIUC	4	HARQ_P = 0x07
Length	4	—
While (data remains) {	—	—
DIUC	4	Indicates the AMC level of the burst containing a HARQ MAP message
No. Slots	8	The number of slots allocated for the burst containing a HARQ MAP message

Repetition Coding Indication	2	0b00: No repetition coding 0b01: Repetition coding of 2 used 0b10: Repetition coding of 4 used 0b10: Repetition coding of 6 used
MAP Version	2	0b00: HARQ MAPv1 0b01: Submap 0b10: Submap with CID mask included 0b11: Reserved
If (MAP Version == 0b10) {	—	—
Idle users	1	Bursts for idle users included in the submap
Sleep users	1	Bursts for sleep users included in the submap
CID Mask Length	2	0b00: 12 bits 0b01: 20 bits 0b10: 36 bits 0b11: 52 bits
CID mask	*N*	n = The number of bits of CID mask is determined by CID Mask Length. When the MAP message pointed by this pointer IE includes any MAP IE for an awake mode MS, the bit index corresponding to ((Basic CID of the MS) MOD n) in this CID Mask field shall be set to 1. Otherwise, it may be set to 0.
}	—	—
}	—	—
Reserved	0 or 4	For a byte alignment of IE. Shall be set to zero
}	—	—

2. Spec Changes

[Insert the following subclause 6.3.2.3.91 in line 53 of page 65]

6.3.2.3.91 Optional R-MAP message

[This subclause is just a place holder. The contents are in a different contribution (C80216j-07_371).]

6.3.2.3.92 RLY-FCH-MAP message

Table xxx RLY-FCH-MAP message format

Syntax	Size	Notes
RLY-FCH-MAP_message_format() {	-	-
Management Message Type = 98	8 bits	-
DL Frame Prefix Format()	12 or 24 bits	see 8.4.4.3
Compressed MAP Field() {	8*L* bits	*L* = Map message length – 4, where "Map message length" is described in Compressed DL-MAP and the CRC-32 of original compressed MAPs is excluded
Compressed DL-MAP()	*variable*	see 8.4.5.6.1
If(UL-MAP appended == 1)	-	"UL-MAP appended" is described in Compressed DL-MAP
Compressed UL-MAP()	*variable*	see 8.4.5.6.2

}	-	-
}	-	-
For (i = 0; *i* < *N*; *i*++) {	-	*N* = Number of "HARQ and SUB-MAP Pointer IE" in Compressed DL-MAP()
If (MAP Version == 0b01 or 0b10) {	-	"MAP Version" of the *i*-th "HARQ and SUB-MAP Pointer IE" in Compressed DL-MAP()
SUB-DL-UL-MAP()	$8M_i$ bits	M_i = Map message length – 2, where "Map message length" is described in SUB-DL-UL-MAP (see 6.3.2.3.60) and the CRC-16 of original Sub-MAPs is excluded
} else if (MAP Version == 0b00){	-	"MAP Version" of the *i*-th "HARQ and SUB-MAP Pointer IE" in Compressed DL-MAP()
HARQ-MAP()	$8K_i$ bits	K_i = Map message length – 4, where "Map message length" is described in HARQ-MAP (see 6.3.2.3.43) and the CRC-32 of original HARQ-MAPs is excluded
} else if (MAP Version == 0b11){	-	"MAP Version" of the *i*-th "HARQ and SUB-MAP Pointer IE" in Compressed DL-MAP()
Optional R-MAP()	$8N_i$ bits	N_i = Map message length – 4, where "Map message length" is described in Optional R-MAP (see 6.3.2.3.43) and the CRC-32 of original Optional R-MAPs is excluded
}	-	-
}	-	-
Pendding	*variable*	
TLV Encoded Information	*variable*	-
}	-	-

The RLY-FCH-MAP message may include the following parameter encoded as TLV tuples:

HMAC/CMAC Tuple (See 11.1.2.)

6.3.2.3.93 RLY-R-FCH-MAP message

Table xxx RLY-R-FCH-MAP message format

Syntax	Size	Notes
RLY-R-FCH-MAP_message_format() {	-	-
Management Message Type = 99	8 bits	-
R-Zone Prefix format ()	24 bits	see 8.4.4.3
R-MAP()	$8N_i$ bits	N_i = Map message length – 4, where "Map message length" is described in R-MAP (see 8.4.5.9) and the CRC-32 of original R-MAPs is excluded
TLV Encoded Information	*variable*	-
}	-	-

The RLY-FCH-MAP message may include the following parameter encoded as TLV tuples:

HMAC/CMAC Tuple (See 11.1.2.)

6.3.28 Messages and Data relaying

6.3.28.1 RS broadcast messages relaying

[Change the following text in line 25 of page 134]

~~A non-transparent RS shall broadcast~~ The DCD, UCD, DL-MAP, ~~and~~ UL-MAP, compressed DL-MAP/UL-MAP, HARQ-MAP and SUB-DL-UL-MAP messages broadcasted by a non-transparent RS in the DL access zone~~, which~~ may be generated by the MR-BS and be sent in the relay zone. The MR-BS should send DCD and UCD messages with RS primary CID, and DL-MAP and UL-MAP messages with RS basic CID to the RS. The MR-BS should send RLY-FCH-MAP message with RS basic CID containing FCH, compressed DL-MAP/UL-MAP, HARQ-MAP and SUB-DL-UL-MAP to the RS. The MR-BS should send RLY-R-FCH-MAP message with RS basic CID containing R-FCH, R-MAP to the RS.

Upon receiving the DCD/UCD message with RS primary CID, the RS shall broadcast the DCD/UCD message with fragmentable broadcast CID.

Upon receiving the DL-MAP/UL-MAP message with RS basic CID, the RS shall broadcast the DL-MAP/UL-MAP message with broadcast CID.

Upon receiving the RLY-FCH-MAP message with RS basic CID, the RS shall append CRC-32 to the compressed DL-MAP/UL-MAP, CRC-32 to the HARQ-MAP, and CRC-16 to the SUB-DL-UL-MAP, respectively.

Upon receiving the RLY-R-FCH-MAP message with RS basic CID, the RS shall append CRC-32 to the R-MAP.