Transmission for Broadcast Management Message (15.3.6.5.2)

IEEE 802.16 Presentation Submission Template (Rev. 9)

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Venue:
Comments on IEEE P802.16m/D2 for IEEE 802.16 Working Group Letter Ballot Recirc #30a
Area: “15.3.6 Downlink control structure”.
Base Contribution:
None
Purpose:
To be discussed and adopted by the IEEE 802.16 Working Group.
Notice:

Release:

Patent Policy:

Intro.

- **Current Design**
  - Control information for broadcast message
    - NUS A-MAP extension: 1 bit flag in NUS A-MAP
    - OR Assignment A-MAP

- **Need to Decide**
  - (1) IE contents for NUS A-MAP extension or broadcast A-A-MAP
  - (2) Signaling Method: NUS A-MAP extension or A-A-MAP
  - (3) How to organize broadcast burst

IE Contents (1/2)

- **Information Element**
  - Resource index: 11 bits
  - MCS ($I_{SizeOffset}$): not explicitly signaled
  - **(Proposal) Total 12 bits** (including reserved bit)

- **Resource Index: 11 bits**
  - Flexible allocation is required to minimize collision with PA and Long TTI bursts
  - Allocation size 1and 2 have the same burst size with allocation size 3
  - **(Proposal) Same RI method as in Basic A-A-MAP IE excluding allocation size of 1 and 2**

IE Contents (2/2)

- **Coding Scheme**

  (1) Need to consider both reuse 1 and reuse 3

  → $I_{SizeOffset}$ = 0 (≈1/12) for reuse 1 and $I_{SizeOffset}$ = 9 (≈ 1/4) for reuse 3 when 96 data tones per 1 LRU

  (2) The lowest code rate (CTC) is enough to meet 5% outage in reuse-1?

  → Cannot meet such requirement in EMD baseline test scenario (Appendix)

  → **(Proposal) twice more robust code rate**

  (3) Explicit or Implicit indication?

  → **(Proposal) Implicit method: mapping to S-SFH code rate**

Signaling Method

- **NUS A-MAP extension vs. A-A-MAP IE**

	NUS A-MAP extension	Assignment A-MAP
Overhead	- 12 bits - No CRC	- 56 bits (including CRC) - twice more robust code rate is possible: 56 bits = 2 x (12bits + 16bits)
Flag bit in NUS A-MAP	- Necessary	- O: 1 bit overhead (every subframe) - X: always decoding twice if ½X lower code rate is used
Effect of NUS A-MAP error	- If error occurs in flag bit, an AMS cannot find the starting position of A-A-MAP.	

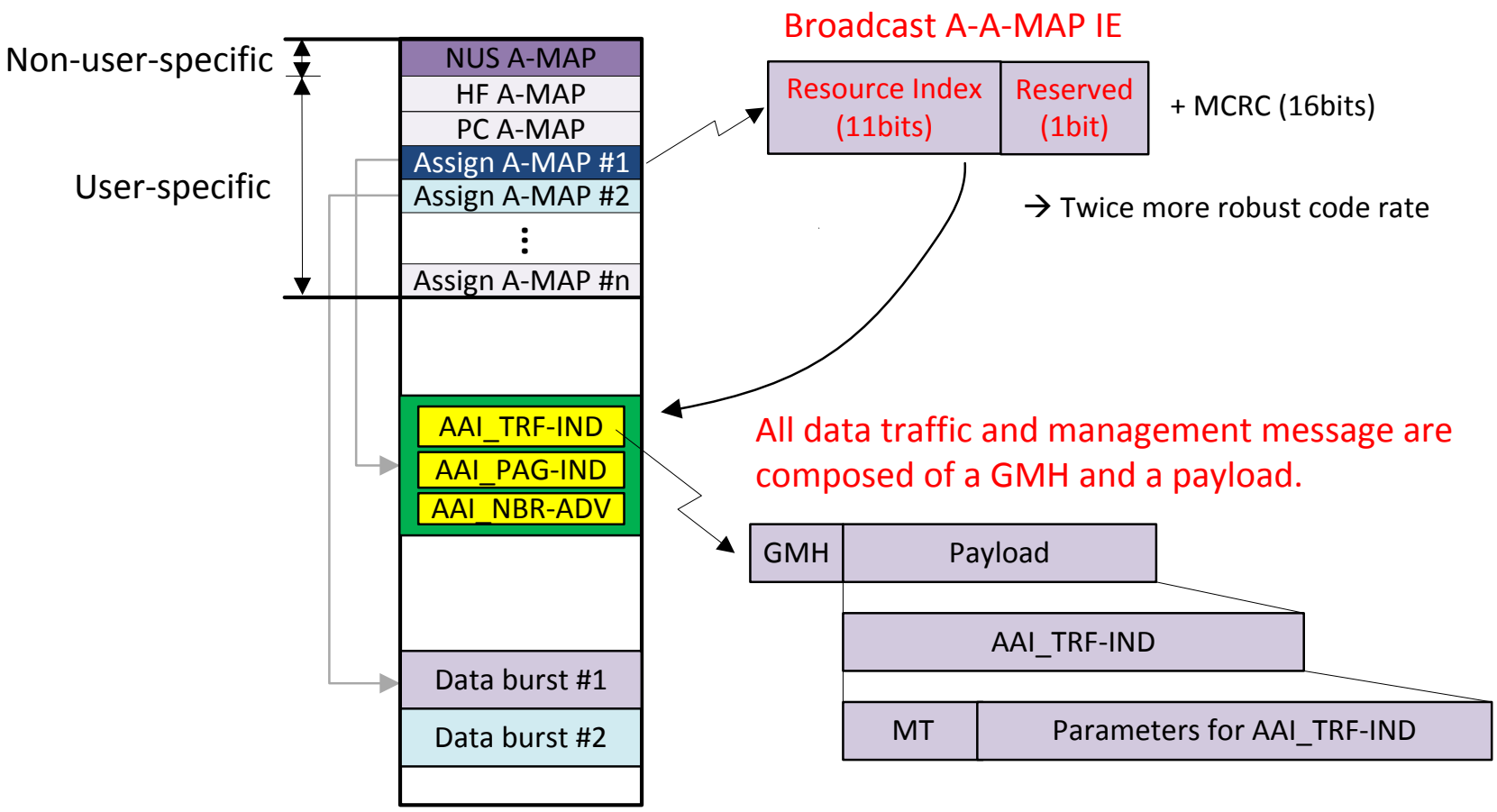
- **(Proposal) Assignment A-MAP**
  - In primary frequency partition, only one Broadcast A-A-MAP IE is present at the beginning of either group 1 or group 3 in A-A-MAPs, if exist.
  - No flag bit in NUS A-MAP
  - Twice more robust code rate: 1/8 or 1/16 at group 1 and 1/4 at group 3

Burst Transmission

- **(Proposal) Broadcast burst transmission**
  - One broadcast burst includes one or multiple broadcast management messages
  - AMS delineates the boundary of each MAC PDU (management message) in the broadcast burst by decoding its GMH
  - AMS identifies the type of broadcast management message by referring to message type (MT) in each MAC PDU

Proposed Structure

- **Illustration of Proposal**



Text Proposal

[Remedy 1: Add the following text after line 8, page 335, 15.3.6.2.2.2]

---------- Text Start ----------

In primary frequency partition, a Broadcast assignment A-MAP IE is present at the beginning of either group 1 or group 3 in assignment A-MAPs, if exist.

---------- Text End ----------

Text Proposal

[Remedy 2: Delete the text starting from line 46, page 357, as follows.]

---------- Text Start ----------

~~The resource allocation for Broadcast messages (e.g., PGID Info, AAI-TRF-IND, AAI-PAG-ADV, and other broadcast) is based on A-MAP_IE or non-user specific A-MAP extension.~~

~~**Table 799—The number of assignment A-MAPs in each assignment A-MAP group**~~

Index	Assignment A-MAP group-1	Assignment A-MAP group-2	…
…	…	…	

~~The resource allocation for Broadcast messages (e.g., PGID Info, AAI-TRF-IND, AAI-PAG-ADV, and other broadcast) is based on A-MAP_IE or non-user specific A-MAP extension.~~

Text Proposal

~~If the non-user specific A-MAP extension flag in the non-user specific A-MAP is set, the non-user specific A-MAP extension may be information used to decode the PGID Info, AAI-TRF-IND, AAI-PAG-ADV, and other broadcast messages. The PHY structure for this extension is the same as the non-user specific A-MAP.~~

---------- Text End ----------

Text Proposal

[Remedy 3: Add the following text in line 14, page 401.]

---------- Text Start ----------

15.3.6.5.2.15 Broadcast Assignment A-MAP IE

The resource allocation for broadcast messages (e.g., PGID Info, AAI-TRF-IND, AAI-PAG-ADV, and other broadcast) is based on Broadcast assignment A-MAP IE described in Table xxx.

The broadcast data burst indicated through Broadcast A-A-MAP IE includes one or multiple broadcast management messages: PGID Info, AAI-TRF-IND, AAI-PAG-ADV, and other broadcast messages (TBD).

Table xxx—Broadcast Assignment A-MAP IE

Syntax	Size [bits]	Notes
Resource Index	11	Includes location and allocation size.
Reserved	1	Reserved bits

Text Proposal

Resource Index field is interpreted as in the DL Basic assignment A-MAP IE, except for allocation of size 1 and 2 LRUs. Allocation of size 1 and 2 LRUs is not allowed for broadcast data bursts.

When calculating the burst size of broadcast data burst, $I_{SizeOffset}$ is implicitly indicated based on code rate of S-SFH and frequency partition index as shown in Table yyy.

Table yyy—Burst size of Broadcast data burst

Code rate of S-SFH	**$I_{SizeOffset}$ or Burst size (Reuse 1 FP)**	**$I_{SizeOffset}$ or Burst size (Boosted Reuse 3 FP)**
1/12	$I_{SizeOffset} = 0$	$I_{SizeOffset} = 9$
1/24	Burst size to allocation size mapping is defined in Table zzz	$I_{SizeOffset} = 3$

Text Proposal

Table zzz—Burst size to allocation size mapping

Allocation size	Burst size	Allocation size	Burst size	Allocation size	Burst size	Allocation size	Burst size
6	6	13	13	27	27	57	57
8	8	15	15	31	31	64	64
9	9	17	17	36	36	71	71
10	10	19	19	40	40	80	80
11	11	22	22	44	44	90	90
12	12	25	25	50	50		

---------- Text End ----------

Appendix

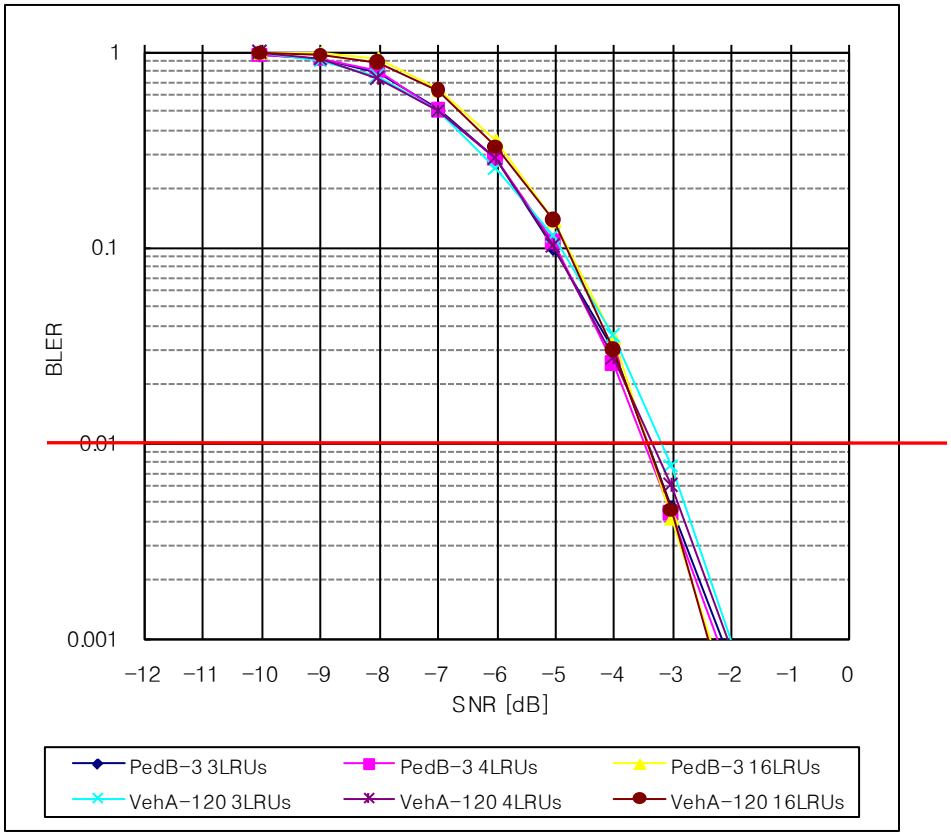
Analysis on Code Rate of Broadcast Burst

Summary

- **Method**
  - LLS curves: Find SNR value (x) at 1% FER
  - Geometry distribution: Find SNR value (y) at 5% CDF
  - If x>y: outage requirement is NOT satisfied.
  - Else (x<=y): outage requirement is satisfied.
- **Results**
  - x = -3.5
  - Y = -3.7 (EMD baseline), -5.6 (Open rural macro)
  - In EMD baseline and Open rural macro, the current lowest code rate CANNOT meet the requirement

Result-1: LLS Performance

- **In LLS curves, Find SNR value at 1% FER**
  - Around -3.5 dB

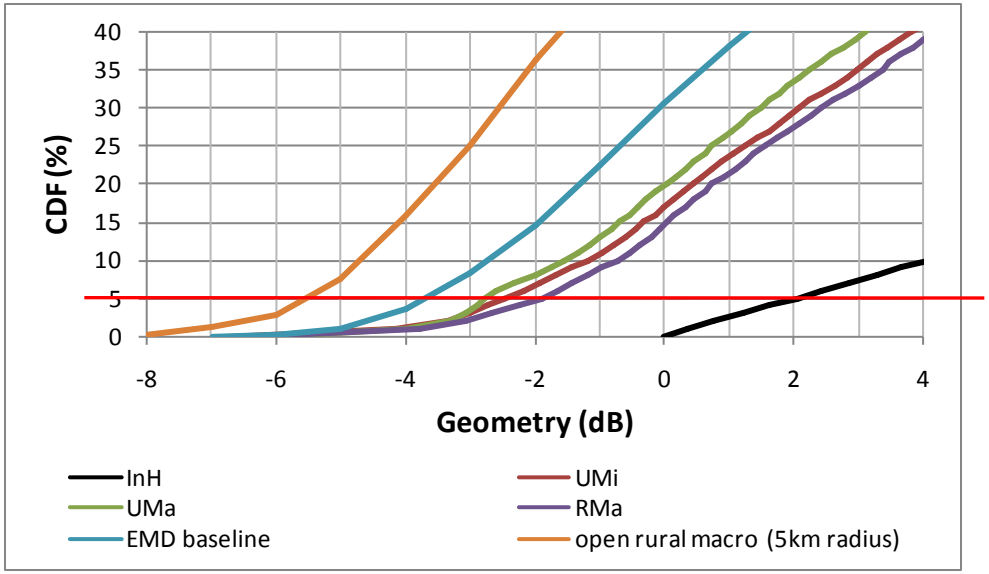


Parameter	Value
Bandwidth	10 MHz
MIMO scheme	2x2 SFBC
Sub CH.	DRU
Modulation	QPSK
FEC	CTC
1 LRU	18 x 5

Burst size	Code rate	# of LRUs
48 (bits)	1/10	3
64	1/10	4
288	9/80	16

Result-2: Geometry Distribution

- **In Geometry distribution, Find SNR value at 5% CDF**



Test Scenario	SNR@5% (dB)
InH	2
UMi	-2.5
UMa	-2.8
RMa	-1.9
EMD baseline	**-3.7**
Open rural macro (5km-radius)	**-5.6**