

# Discussion of Nico van Waes' comment LB11a-151

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Base Document:

Nico van Waes' comment LB11a-151

Purpose:

To present the details of HIPERMAN changes, which Nico's comment proposes to adopt.

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# Nico's comment LB11a-151 – what it's about

Naftali Chayat

# Rationale

- Harmonize OFDM description with ETSI Hiperman draft standard.
- Note: the referenced documents can be found from the .16 private site under the link "BRAN Inbox of unfiled documents"

# Resolution

- \*In 8.4.2.4, correct table 116ac according to accepted (transferred) document C802.16e-03/26
- \*In 8.4.7.2, correct figure 128aq according to accepted (transferred) document C802.16e-03/26
- \*Replace 8.4.3.6 with ETSI BRAN dts\_102177v000008p, section 5.6
- \*Amend 8.4.5 in accordance with ETSI BRAN dts\_102178v000006p, section 4.3.3 with the following exception:
  - Retain channel number in DL-MAP Report IE format instead of "Reserved" field
- \*Replace Physical Parameters and BW allocation support (11.4.1.2.7 through 11.4.1.2.10 and 11.4.1.6) with parameters from ETSI BRAN dts\_102178v000006p, section 4.3.12 with the following exception:
  - Retain bit#1 BTC in both "OFDM Modulator" and "OFDM Demodulator"
- \*Insert new section 6.2.2.3.33a, copy language from ETSI BRAN dts\_102178v000006p, section 4.3.17
- \*Insert new section 6.2.2.3.40, copy language from ETSI BRAN dts\_102178v000006p, section 4.3.24
- \*Amend 6.2.2.3.39 in accordance with ETSI BRAN dts\_102178v000006p, section 4.3.23 with the following changes:
  - Replace "Frequency Measurement Subcarrier Resolution" with "Frequency Measurement Resolution" and replace its values in table 56z as follows:

For OFDM:	For OFDMA:	For SC/SCa
0b00 = 4 subcarriers	0b00 = 32 subcarriers	0b00 = 64 measurement points
0b01 = 8 subcarriers	0b01 = 64 subcarriers	0b01 = 32 measurement points
0b10 = 16 subcarriers	0b10 = 128 subcarriers	0b10 = 16 measurement points
0b11 = 32 subcarriers	0b11 = 256 subcarriers	0b11 = 8 measurement points
- Under Frequency Measurement description, insert description from 4.3.23 for OFDM and OFDMA, maintain current description for SC/SCa
- \* In 10.1, clean up the mess and modify as shown in ETSI BRAN dts\_102178v000006p, section 10.6 with the following exception:
  - Maintain "Max. Map Pending" value for SC and SCa from 802.16-2001
- \* Modify 8.4.3.3 in accordance with ETSI BRAN dts\_102177v000008p, section 5.3 (i.e. replace Nmod with the value 12 throughout)
- \* Modify 8.4.4.3 in accordance with ETSI BRAN dts\_102177v000008p, section 6.3 and update the frame duration codes in 12.2 to match.
- \* Replace changes to 8.4.7.2 as shown in 802.16d/D2 with last two paragraphs of ETSI BRAN dts\_102177v000008p, section 8
- \* Change table 116bi and 116bk in accordance with tables from ETSI BRAN dts\_102177v000008p, section 10.2.2 and 11.1.
- \* Update eq. 65a and subsequent parameter explanation according to ETSI BRAN dts\_102177v000008p, section 11.1.

# Detailed discussion

# Resolution (1)

\*In 8.4.2.4, correct table 116ac according to accepted (transferred) document C802.16e-03/26

- The subcarrier index lists in IEEE802.16d-D2<sup>TM</sup> are copied incorrectly
- Corrected in HM PHY v0.0.8, clause 4.2, table 1
- Addressed also in Tal's comment 170

# Resolution (2)

- \*In 8.4.7.2, correct figure 128aq according to accepted (transferred) document C802.16e-03/26
- Correction of figure in the base standard
- *[Correct [B2], figure 128aq to move pilot from -84 to -88]*

# Resolution (3)

- \*Replace 8.4.3.6 with ETSI BRAN dts\_102177v000008p, section 5.6 (Section describing preambles)
- Full-BW Preamble improvements adopted in HM
  - Current full BW preamble has PAPR of 5.2 dB
  - The proposed preambles have hierarchical structure – all derived from one vector
    - full BW 2\*128, STC preamble from antenna 2, AAS preamble, 4\*64 preamble
- STC preamble is amended to transmit simultaneously regular (even subcarrier) preamble from antenna 1, and another (odd subcarriers) preamble from antenna 2.
  - Allows simultaneous, non-time skewed training both both responses
  - Allow integration with midamble based mechanism



# Preamble family structure

- One vector of length 201
- All vectors derived from it:

4*64	Each fourth + conjugate	Coincides with current 4*64
2*128, regular, antenna 1	Even elements	
2*128 anti-symmetric For STC antenna 2	Odd elements	
2*128 anti-symmetric For AAS	Odd elements, conjugate	

# Resolution (4)

\*Amend 8.4.5 in accordance with ETSI BRAN

dts\_102178v000006p, section 4.3.3 with the following exception:

Retain channel number in DL-MAP Report IE format instead of "Reserved" field

- Amendment to the map element structures

# DIUC generic structure

- Start Time terminates previous allocation

Syntax	Size	Notes
DL-MAP_information_element() {		
DIUC	4 bits	
Preamble present	1 bit	0 = not present, 1 = present if DIUC==15, shall be 0
Start Time	11 bits	
if (DIUC == 15)		
Extended DIUC dependent IE	variable	Report_IE() or AAS_DL_IE() or STC_IE()
Padding nibble, if needed	4 bits	Completing to nearest byte
}		

# DUMMY\_IE extd-DIUC structure

- Allows a generic decoding procedure by stations
  - Know how much to skip
- Will be overloaded by future extensions

A SS shall be able to decode the DL-MAP DUMMY IE for forward compatibility. A BS shall not transmit this IE (unless under test). A SS may skip decoding DL bursts scheduled after the Start Time of this IE within the current frame.

Syntax	Size	Notes
DUMMY_Information_element() {		
extended DIUC	4 bits	0x2...0xF
Length	4 bits	0..15
Unspecified data	Length*8 bits	
}		

# Generic extd-DIUC structure

- Generic decoding structure
  - STC\_IE and AAS\_IE have no accompanying data → length=0
  - Report\_IE has 1 byte of data, length=1

Syntax	Size	Notes
XXXX_Information_element() {		
extended DIUC	4 bits	0x2...0xF
Length	4 bits	0..15
Unspecified data	Length*8 bits	
}		

# UIUC generic structure

- “Duration” reserves airtime for the activity

Syntax	Size	Notes
UL-MAP_information_element() {		
CID	16 bits	
UIUC	4bits	
Duration	12 bits	
if (UIUC == 4)		
Focused_contention_IE()	16 bits	
if (UIUC == 15)		
Extended UIUC dependent IE	Variable	AAS_UL_IE() or subchannelization_IE()
else if (subchannelization) {		See 4.3.3.3.4.
Start Time	11 bits	
Subchannel Index	5 bits	
Reserved	2 bits	Set to 0b00
Midamble Present	2 bits	0b00 = Preamble only 0b01 = Midambles after every 8 data symbols 0b10 = Midambles after every 16 data symbols 0b11 = Midambles after every 32 data symbols
}		
Padding nibble	0/4 bits	Shall be set to 0x0
}		

# DUMMY\_IE\_extd-UIUC structure

- Allows a generic decoding procedure by stations
  - Know how much to skip
- Will be overloaded by future extensions

An SS shall be able to decode the UL-MAP DUMMY IE for forward compatibility. A BS shall not transmit this IE (unless under test).

Syntax	Size	Notes
DUMMY_Information_element() {		
extended UIUC	4 bits	0x4...0xF
Length	4 bits	0..15
Unspecified data	Length*8 bits	
}		

# Resolution (5)

\*Replace Physical Parameters and BW allocation support (11.4.1.2.7 through 11.4.1.2.10 and 11.4.1.6) with parameters from ETSI BRAN dts\_102178v000006p, section 4.3.12 with the following exception:

Retain bit#1 BTC in both "OFDM Modulator" and "OFDM Demodulator"

- Subscriber capabilities' indication
  - Modulator + demodulator capabilities
  - SSTTG and SSRTD capabilities
  - BW allocation support (Half vs. full duplex)



# SSTTG, SSRTG

- Related to Roger Marks' comment and to Roger Eline contribution
- Adds management message for reporting station's capabilities
- Change text at the end of D2, p 23 lines 35-36 to
  - For TDD mode SSRTG and SSTTG shall be no more than 50  $\mu$ sec. For H-FDD mode SSRTG and SSTTG shall be no more than 100  $\mu$ sec

# Resolution (6)

- \*Insert new section 6.2.2.3.33a, copy language from ETSI BRAN dts\_102178v000006p, section 4.3.17
- Add Fast Power Control mgmt message
  - Changes power to a group of stations

Syntax	Size	Notes
Fast_Power_Control message format () {		
Management message	8 bits	
Number of stations	8 bits	
for (i=0;i<Number of stations;i++) {		
Basic CID	16 bits	
Power Adjust	8 bits	
}		
}		

# Resolution (7)

- \*Insert new section 6.2.2.3.40, copy language from ETSI BRAN dts\_102178v000006p, section 4.3.24
- **DUMMY** management message
  - Provides a way to handle the yet unspecified codes, which may be overloaded in the future with meaningful messages

Syntax	Size	Notes
DUMMY_Message_Format() {		
Management Message Type= 46...255	8 bits	
Length	8 bits	
Unspecified data	Length*8 bits	
}		

# Resolution (8)

\*Amend 6.2.2.3.39 in accordance with ETSI BRAN dts\_102178v000006p, section 4.3.23 with the following changes:

Replace "Frequency Measurement Subcarrier Resolution" with "Frequency Measurement Resolution" and replace its values in table 56z as follows:

For OFDM:	For OFDMA:	For SC/SCa
0b00 = 4 subcarriers	0b00 = 32 subcarriers	0b00 = 64 measurement points
0b01 = 8 subcarriers	0b01 = 64 subcarriers	0b01 = 32 measurement points
0b10 = 16 subcarriers	0b10 = 128 subcarriers	0b10 = 16 measurement points
0b11 = 32 subcarriers	0b11 = 256 subcarriers	0b11 = 8 measurement points

Under Frequency Measurement description, insert description from 4.3.23 for OFDM and OFDMA, maintain current description for SC/SCa

- Addresses the AAS Feedback Request/Response
  - Changing the definition of reported subcarrier set.

# Resolution (9)

- \* In 10.1, clean up the mess and modify as shown in ETSI BRAN dts\_102178v000006p, section 10.6 with the following exception:
  - Maintain "Max. Map Pending" value for SC and SCa from 802.16-2001
- Global values

# Global values

System	Name	Time reference	min	Default	Max
BS	Max. Map Pending	Maximum validity of map			End next frame
BS,SS	SS DL management message processing time	Max. time between transmission of management message by BS and compliance to its instructions by SS.			200 $\mu$ s
BS	SBC Request retries		3	3	16
BS	TFTP-CPLT retries		3	3	16
SS, BS	T22	Wait for ARQ-Reset			0.5s
SS	T23	Wait for TFTP-RSP			0.5s
Mesh node	T24	Network Entry: Detect network	1s		
Mesh node	T25	Network Entry: Accumulate MSH-NCFG messages		120s	
Mesh node	T26	Network Entry: Wait for MSH-NENT / MSH-NCFG		1s	

# Resolution (10)

- Modify 8.4.3.3 in accordance with ETSI BRAN dts\_102177v000008p, section 5.3 (i.e. replace Nmod with the value 12 throughout)
- Interleaver definition
  - Addressed also in Tal's comment 178
  - Detailed submission available comparing performance for multiple channel models
  - Recommendation is to adopt Nmod=12 for all modes.

# Resolution (11)

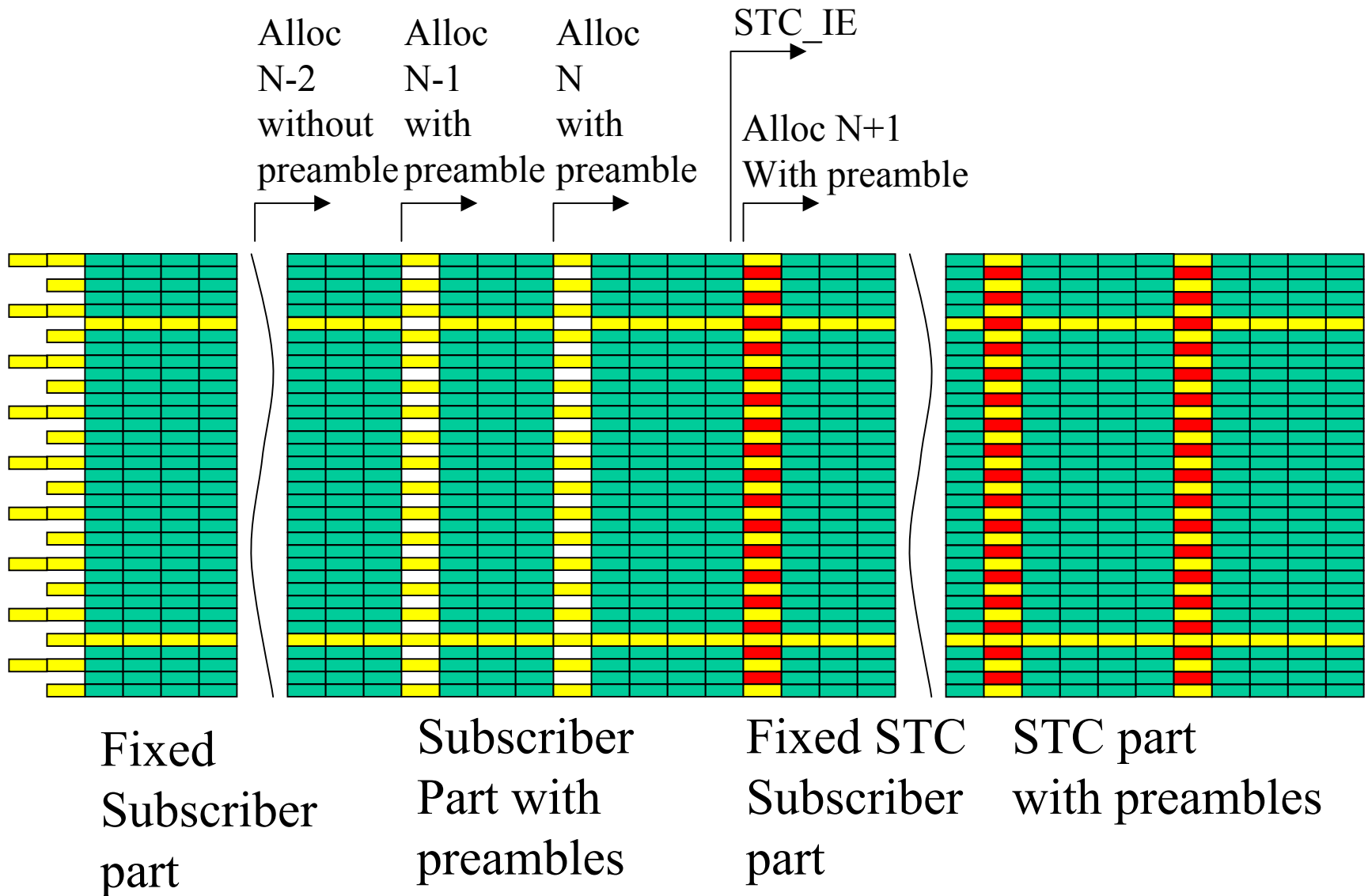
- Modify 8.4.4.3 in accordance with ETSI BRAN dts\_102177v000008p, section 6.3 and update the frame duration codes in 12.2 to match.
- Duration codes
  - Addressed also in Tal's comment 141
  - Use spec such as #frames per second is an integer
    - 2.5, 4, 5, 8, 10, 15.625, 20 msec



# Resolution (12)

- Replace changes to 8.4.7.2 as shown in 802.16d/D2 with last two paragraphs of ETSI BRAN dts\_102177v000008p, section 8
- Space time coding definition
  - Improvement of wording
  - Addresses the new preamble structure
    - both antennas trained in one symbol
    - First burst after STC\_IE must start with a preamble
  - Addresses the burst length and total length (multiple of 2) issue
  - Addresses the relation to midambles
  - Clarifies the pilot usage part

# Illustration of the solution



# Resolution (13)

- Change table 116bi and 116bk in accordance with tables from ETSI BRAN dts\_102177v000008p, section 10.2.2 and 11.1.
- Transmitter constellation error
- Receive SNR
- Also Tal's comment 142
- Receive SNR table corrected
- Transmitter constellation error relaxed by 3.5 dB relative to previous spec
- (need to incorporate Lars' comment resolution)

# Resolution (14)

- Update eq. 65a and subsequent parameter explanation according to ETSI BRAN dts\_102177v000008p, section 11.1.
- Receiver sensitivity definition