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Title	**Structure and notation enhancements to IEEE P802.16h/D3**	
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Re:	Letter Ballot #29 of IEEE P802.16h/D3.	
Abstract	There are a number of structural and notional enhancements that should be applied to the IEEE P802.16h/D3 draft.	
Purpose	Ensuring the readability of the draft IEEE P802.16h/D3.	
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Structure and notation enhancements to IEEE P802.16h/D3

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1. Introduction

This document covers structure and notation enhancements to IEEE P802.16h/D3. The document covers:

- The addition of a new designation WirelessMAN-CBP.
- Restoration of the WirelessHUMAN designation.
- Removal of unnecessary and redundant features.
- Improvements to FRS.

2. Scope of structure and notation enhancements

Structure and notation enhancements to IEEE P802.16h/D3 are presented in this clause. This introduces the motivation for the editing changes that follow in clause 3.

2.1. Designation rationalization

Some definitions:

- **A designation WirelessMAN-CBP**: A designation specifically defined to draw on the family of features defined by UCP.
- **UCP (Uncoordinated Coexistence Protocol)**: A collective term for a family of features designed to provide uncoordinated (*passive cognitive radio*) coexistence with asynchronous systems, such as 802.11. UCP is not band specific but can be made band specific with appropriate choice of operational parameters.
- **UCP** consists of the **DCS (Dynamic Channel Selection)** and **LBT (Listen-Before-Talk)** features. Specifically LBT uses a **DMA (Dynamic Medium Acquisition)** algorithm to provide optimal co-channel sharing.

This is shown in diagrammatically in Figure 1.

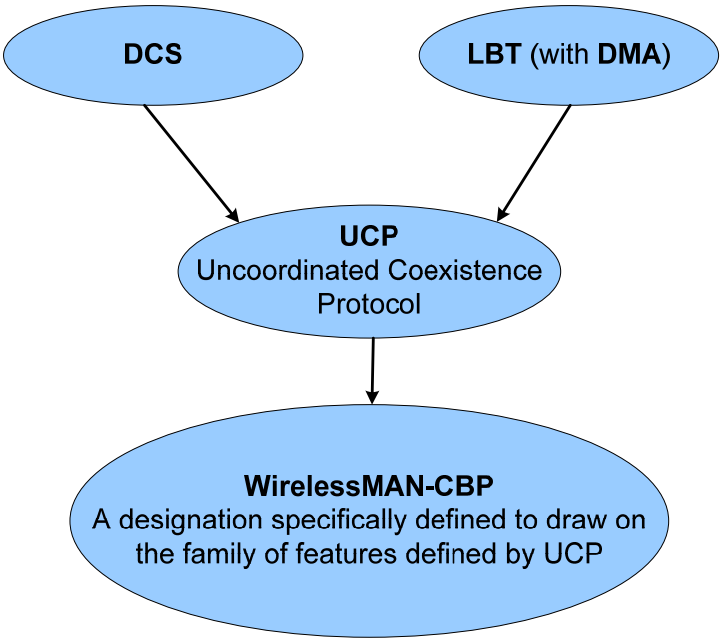


Figure 1 A diagrammatic representation of the features that underpin the *WirelessMAN-CBP* designation.

2.2. Removal of additional features applied to WirelessHUMAN

Given there is a new designation of WirelessMAN-CBP then the additional features previously applied to WirelessHUMAN can be removed. It is necessary to remove any material previously added to WirelessHUMAN and move it instead to WirelessMAN-CBP.

2.3. Removal of unnecessary and redundant features

Review of [1] reveals a number of subclauses containing redundant features:

- 6.3.2.3.23 *SS Basic Capability Request (SBC-REQ) message*
- 6.3.2.3.24 *SS Basic Capability Response (SBC-RSP) message*
- 6.4.1.1 *Capability Negotiation*
- 6.4.2.3.3 *Enhanced Measurement and Reporting for Non-Exclusively Assigned or Non-exclusively Licensed Bands*
- 8.5.1.2 *Extended channel numbering for other non-exclusively licensed bands below 6 GHz*
- 11.8.3.8 *SBC-REQ/RSP management message encodings*
- 11.12 *REP-RSP management message encodings*

2.3.1. Subclause 6.3.2.3.23 SS Basic Capability Request (SBC-REQ) message

Not required. Following analysis it is clear that WirelessHUMAN does not require this functionality. It is unlikely WirelessMAN-CX does either.

2.3.2. Subclause 6.3.2.3.24 SS Basic Capability Response (SBC-RSP) message

Not required. The same motivation as 2.3.1 applies.

2.3.3. Subclause 6.4.1.1 Capability Negotiation

Not required. This is due to the reasons presented in 2.3.1 and 2.3.2 above.

2.3.4. Subclause 6.4.2.3.3 Enhanced Measurement and Reporting…

Not required. The new text restates that which is already covered by specification already in the draft.

2.3.5. Subclause 11.8.3.8 SBC-REQ/RSP management message encodings

Not required. This is due to the reasons presented in 2.3.1 and 2.3.2 above.

2.3.6. Subclause 11.12 REP-RSP management message encodings

The ‘extended report type’ does not add any additional value over the ‘basic report type’. Remove ‘extended report type’.

It is also necessary to fix the backwards compatibility issue in [1] for the REP-RSP message for the *Basic Report*.

2.4. Miscellaneous

2.4.1. Improvements to FRS

Simulation results indicate that a FRS transmission to protect the downlink is required in addition to transmission to protect the uplink (as currently specified). Detailed below in clause 3 are text and figure enhancements to support these findings.

2.4.2. Frame structure and frame allocation methodology

Given that the regulation of the 3.65GHz band requires the registration of base station and fixed subscribers it is therefore possible to use administrative means to allocate frames to 802.16 systems. Text is presented in clause

3 to accomplish this.

3. Specific editing changes

Blue underlined text represents specific editorial additions.

~~Red strikethrough~~ text is to be deleted.

Black text is text already in the draft.

Bold italic text is editorial instructions to the editor.

Make the following changes to subclause 1.3.3 in [1].

~~A summary of some applicable bands is given in *15.7.*~~

Modify the following row of Table 1 in [1] accordingly:

Designation	**Applicability**	**PHY**	**Options**	**Duplexing alternative**
WirelessHUMAN™	~~Below 11 GHz license-exempt bands~~ Bands below 11 GHz subject to *non-exclusive assignment* or *non-exclusive licensing*	~~license-exempt~~ [8.2, 8.3 or 8.4] and 8.5	AAS (6.3.7.6) ARQ (6.3.4) Mesh (6.3.6.6) (with 8.3 only) STC (8.2.1.4.3/8.3.8/8.4.8) DFS (6.3.15)	TDD

Add the following row in Table 1 in [1].

Designation	**Applicability**	**PHY**	**Options**	**Duplexing alternative**
WirelessMAN-	Bands below 11	8.4	AAS (6.3.7.6)	TDD

CBP	GHz subject to *non-exclusive assignment* or *non-exclusive licensing*		ARQ (6.3.4) STC (8.2.1.4.3/8.3.8/8.4.8) *Uncoordinated coexistence mechanisms* (Sub clause 6.4)	

Adopt the following changes to the paragraph in subclause 1.3.4 [1].

Implementations of this standard for ~~license-exempt~~ frequencies subject to *non-exclusive assignment* or *non-exclusive licensing* below 11 GHz ~~(such as those listed in B.1)~~ use the designations WirelessHUMAN, WirelessMAN-CX and WirelessMAN-CBP, and shall, where appropriate, comply with the WirelessMAN-SCa PHY as described in 8.2, the WirelessMAN-OFDM PHY as described in 8.3, or the WirelessMAN-OFDMA PHY as described in 8.4. WirelessHUMAN shall further comply with the DFS protocols (6.4.2.3.2) (where mandated by regulation) and with 8.5. WirelessMAN-CBP provides *uncoordinated coexistence mechanisms* (6.4) and WirelessMAN-CX provides *coordinated coexistence mechanisms* (15). ~~They shall further comply with the DFS protocols (6.3.15) (where mandated by regulation) and with 8.5.~~

Make the following changes to clause 3 in [1]: 'Definitions'.

3.138 WirelessMAN-CBP~~HUMAN~~: The designation used to describe the realization that adds *uncoordinated coexistence* mechanisms to systems operating below 11 GHz in *non-exclusively assigned* or *non-exclusively licensed* bands.

Add the following definition to clause 4 in [1]: 'Abbreviations and Acronyms'.

CBP	Contention-Based Protocol
CMA	Clear Medium Assessment
DMA	Dynamic Medium Acquisition
FRS	Frame Reservation Signal
FRST	Frame Reservation Start Time
WirelessMAN-CBP	Wireless Metropolitan Access Network – Contention-Based Protocol

Delete 6.3.2.3.23 subclause 'SS Basic Capability Request (SBC-REQ) message' from [1].

Delete 6.3.2.3.24 subclause 'SS Basic Capability Response (SBC-RSP) message' from [1].

Delete 6.4.1.1 subclause 'Capability Negotiation' from [1].

Move subclause 6.4.1.2 'Additional ranging requirements for WirelessMAN-CX systems' in [1] to a new subclause 15.2.2.

Add the following paragraph to the end of 6.4.2.3.4 [1] 'Claiming a Master Frame Sequence'.

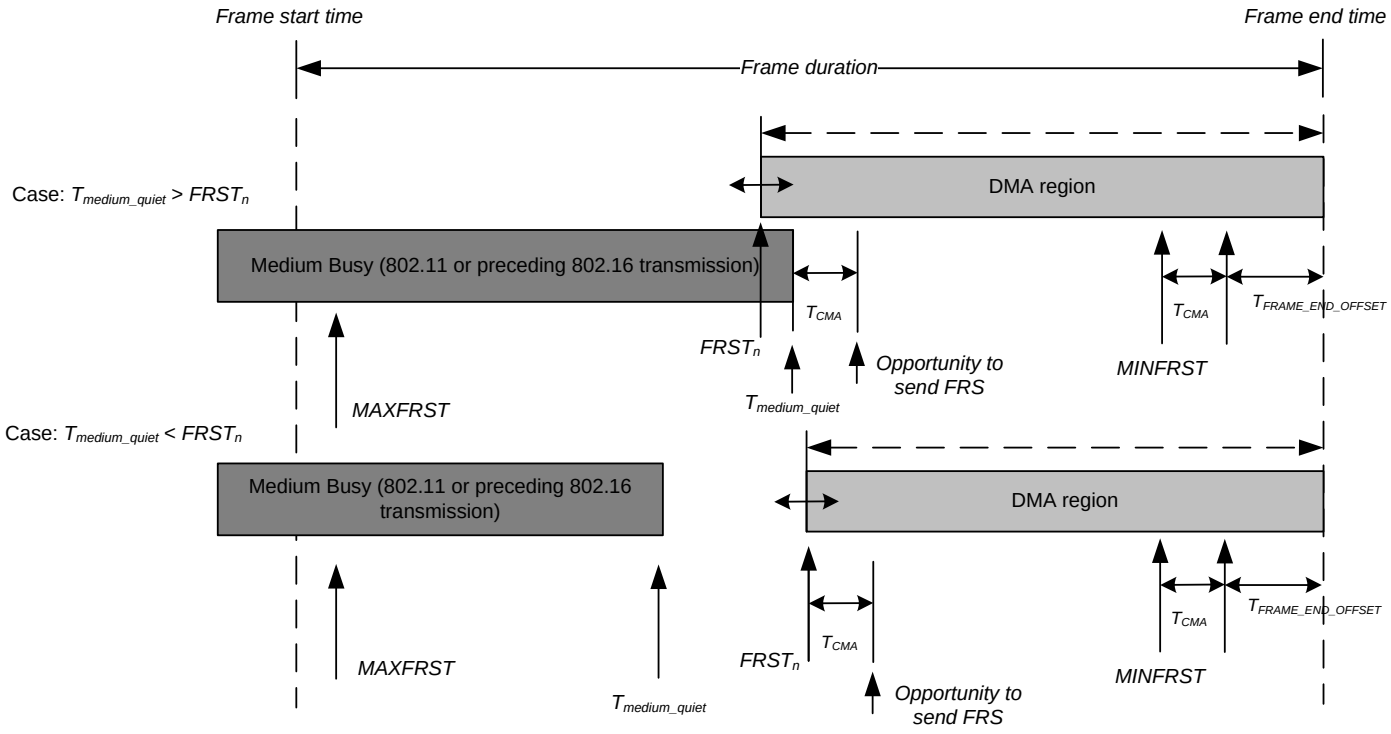
Situations exist where frames may be assigned to 802.16 systems by administrative means. Such situations occur, for example, in bands where a regulatory requirement demands device registration together with device location information. It is therefore possible to make use of this location information and make informed decisions on which systems should be assigned to which frames. This situation excludes the need to support a discovery protocol, and a priori knowledge of frame allocation patterns need not be specified. Therefore for the case of coexistence with asynchronous non-802.16 systems, 802.16 systems operating in a particular geographical area shall share all frames among all the 802.16 systems. The final decision to use a particular frame or not is based on channel measurements and ongoing fair sharing requirements as described in subclause 6.4.2.3.7.

In subclause 6.4.2.3.7 'Listen-Before-Talk (LBT)', Page 39, line 58 replace all references to 'WirelessMAN-CX' with 'WirelessMAN-CBP'.

Make the following changes to subclause 6.4.2.3.7 'Listen-Before-Talk (LBT)', Page 41, line 58:

MAXFRST - the maximum value of FRST. Band dependent. ~~For example, in the 3.65 GHz band in the US 4 ms is a reasonable value since any 802.11 burst in this band would be shorter and could fit before the start of the 802.16 frame.~~

Replace Figure h19 in [1] 'Reclaiming the Medium' with the follow:



$MINFRST = T_{CMA} + T_{FRAME\_END\_OFFSET}$

Delete all changes to clause 8.5 in [1]: 'WirelessHUMAN specific components'.

Delete subclause 11.8 'SBC-REQ/RSP management message encodings' and all its subclauses from [1].

Delete the following rows in the second table in 11.11 'REP-REQ management message encodings' at Page 54, line 9 of [1].

~~ExChNr~~	~~1.10~~	~~2~~	~~Logical Extended Channel Number to be reported on (WirelessMAN-CX and WirelessHUMAN only)~~
~~Extended report type (WirelessMAN-CX only)~~	~~1.11~~	~~1~~	~~Bit #0 = 1: Include summary extended report~~ ~~Bit #1 = 1: Include full extended report~~ ~~Bit #2 = 1: *Specific Spectrum User* extended report~~

			~~Bits #3 - #7: Reserved~~

Delete the following row in the first table in 11.12 'REP-RSP management message encodings' at Page 54, line 28 of [1].

~~Extended report type~~	~~8~~	~~variable~~	~~Compound~~

Make the following changes in the second table in 11.12 'REP-RSP management message encodings' at Page 54, line 34 of [1].

REP-REQ Report type	**Name**	**Type**	**Length**	**Value**
Bit #0 = 1	Report	1.4	1	Bit #0: ~~WirelessHUMAN~~IEEE 802.16 system detected on the channel Bit #1: Unknown transmissions detected on the channel Bit #2: *Specific Spectrum User* detected on the channel (type #1) Bit #3: Unmeasured. Channel not measured Bit #4: *Specific Spectrum User* detected on the channel (type #2) Bit #5: *Specific Spectrum User* detected on the channel (type #3) Bit #6: *Specific Spectrum User* detected on the channel (type #4) Bit #7: IEEE 802.11 system detected on the channel

Delete table with top left cell containing text 'REP-REQ Extended report type' in subclause 11.12 at Page 55, line 27 of [1].

Delete subclause 15.7 in [1].

Delete subclause 15.7.2 in [1].

Delete subclause 15.7.3 in [1].

Delete subclause 15.7.4 in [1].

Delete subclause 15.7.5 in [1].

Delete subclause 15.7.6 in [1].

Make the following changes to subclause 6.4.2.3.7 'Listen-Before-Talk (LBT)' on page 43 of [1].

When using any carrier sense protocol, such as LBT, in a wireless environment the hidden node problem cannot be 100% avoided. It can only be mitigated. Additionally, in bands such as 3.65 GHz in the US, there is an aggravated hidden node problem due to the distinctly lower transmit power allowed for mobile devices compared to fixed, registered devices. The mobiles are more often geographically disadvantaged due to this transmit power disparity. Fixed, registered client devices can also be geographically disadvantaged (the classical hidden node problem), although not as often. To remedy this the BS transmits a Frame Reservation Signal (FRS) at the end of the DL subframe to reserve the subsequent UL subframe (or used portion, thereof) for the subscriber stations. The BS also transmits an FRS in the DMA region at the time a decision is made to claim the medium. The form of the FRS is band dependent and should be structured to be receivable by other technologies that may be co-channel. For instance, in bands where 802.11 would be a typical co-channel asynchronous system, the 802.11 CTS transmitted using the appropriate 802.11 burst structure would suffice. The reservation of the DL and UL subframe by the BTS precludes the need for the SS to also perform LBT. ~~The use of~~ An example of using the FRS to protect the DL and UL is shown in *Figure h 21*.

Replace figure h21 with the following.

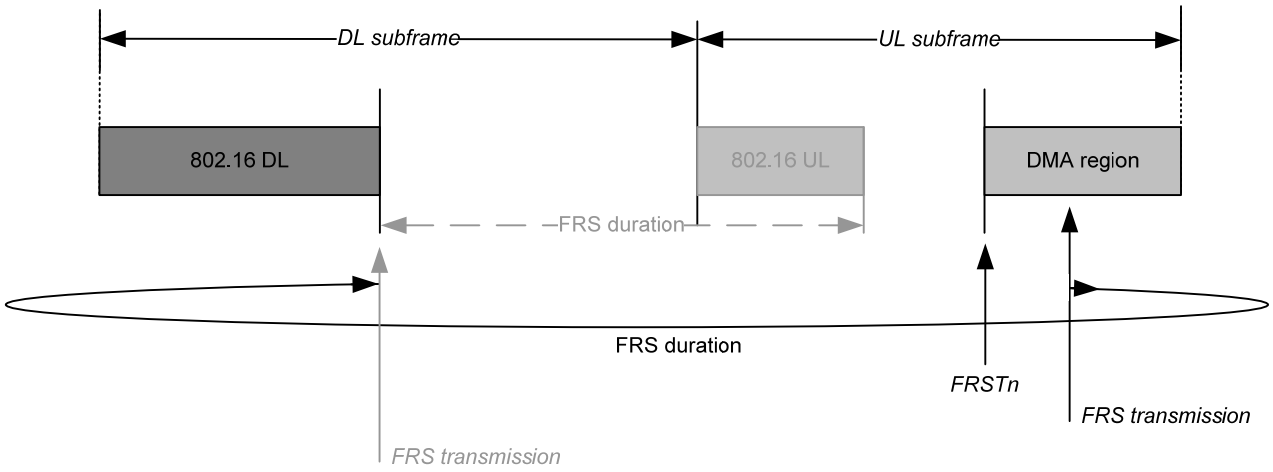


Figure h21 (a) Downlink FRS

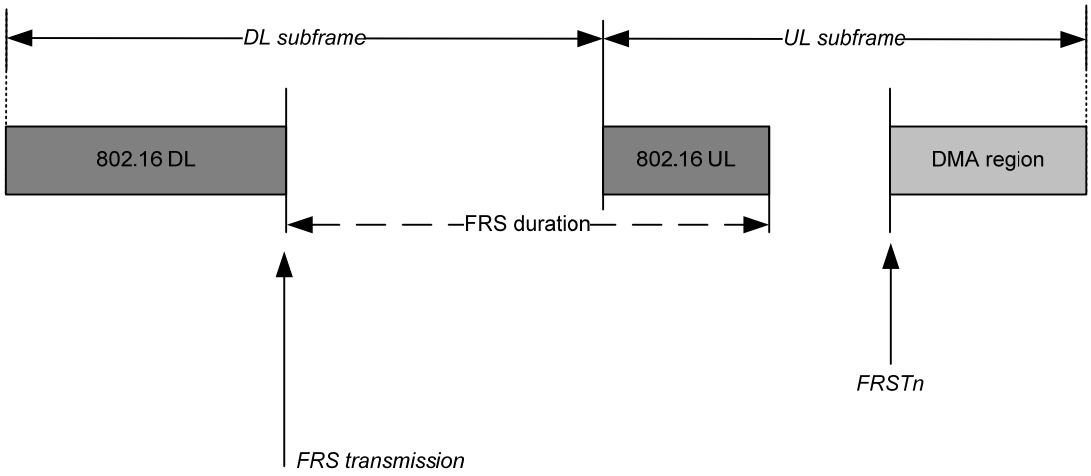


Figure h21 (b) Uplink FRS

4. References

[1] IEEE P802.16h/D3: *Air Interface for Fixed Broadband Wireless Access Systems Improved Coexistence Mechanisms for License-Exempt Operation*, Draft Standard.