

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Need of flexibility in Burst Type definition	
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Source(s)	<p>Radu Selea Redline Communications 200 Cochrane Drive, Unit 3 Markham ,Ontario,L3R 8E8</p> <p>Subir Varma Aperto Networks 1637 South Main Street Milpitas,CA 95035</p>	<p>Voice: (905) 479 8344 Fax: (905) 479 7432 mailto: radu@redlinecommunications.com</p> <p>Voice: (408) 719 9977 Fax : (408) 719 9970 mailto: svarma@apertonet.com</p>
Re:	This document is submitted in response to IEEE 802.16 Task Group 1 Call for Comments on IEEE 802.16.1/D2-2001 and 802.16.4-01_06: Strawman MAC and PHY proposals for the 802.16.4 Air Interface Standard , IEEE 802.16.4-01/07.	
Abstract	This document proposes moving of Burst Type to IUC mapping definition (Table 4,5) in PHY—Specific Values section	
Purpose		
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Need of flexibility in Burst Type definition

References

[1] IEEE 802.16.1/D2 - 2001, Draft Standard for Air Interface for Fixed Broadband Wireless Access Systems

Abbreviations and Acronyms

DCD	Downlink Channel Descriptor
UCD	Uplink Channel Descriptor
IE	Information Element
DIUC	Downstream Interval Usage Code
UIUC	Upstream Interval Usage Code

Problems

Following the discussions from Session #11 and Session #11.5, we realized that the definition of Burst Types (Table 4,5) and Uplink Map Information Elements might not be appropriate for TG4 PHY layer.

Reasons:

- There are three possible modes of FFT size defined: 64,256,1024
- Guard interval size: 1/32,1/16,1/8,1/4
- Modulation: BPSK, QPSK, 16QAM, 64QAM
- Coding: Convolutional 1/2,2/3,3/4, Reed-Solomon (?), turbo-coders (?)
- Preamble: none/shortened (midamble)/full preamble.

Even if we take 802.11a as a baseline, 8 possible burst types with/without preamble requires a larger list of Burst Types and Information Elements. Given the channel conditions for UNII bands we will need a robust adaptive modulation mechanism and greater freedom to change the modulation or/and the FEC parameters.

Even if we presume that we shall constantly use just one set of (FFT size, GI size) we have to be able to dynamically specify changes in coding and modulation as well as the presence/absence of preamble symbols.

DIUC. The above observations suggest that 16 values of DIUC type (table 4) may not be enough.

However the odds of using more than 12 Burst Types per frame is very small and the DCD message lets us change Burst Type parameters if required. The point is that we will need the change more often than TG1 specifies and it may be better to study the possibility to have a larger table at the expense of an additional overhead in DL-MAP message.

UIUC. Same problem but more important is the IE type definition (table 5) as well as the size of IE in UL MAP message.

Because of the channel characteristics on the uplink transmission it is very likely that we will have to use more than 6 Data Grant Burst Types and change them in a dynamic manner. Only existing choice right now is the Expansion IE (value 15) which gives a number (?) of additional 32-bit words in the IE. That will give us a constant overhead of 4 bits (expanded UIUC) and an increased complexity of UL-MAP interpreter.

Keeping the same tables will result an additional table on what the expanded IE means and keep the value of UIUC =15. That will make the document more complicated perhaps, than necessary, aside from implementation-related complications. However these definitions are very tight linked to PHY parameters.

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Proposed Changes

Given the fact that using only the Expansion IE will lead to a constant overhead and a new definition table of expanded IE s we propose the following changes in the Draft Document, one of them based on minimal changes and the second based on more changes but giving us a large freedom on how to handle these issues.

1.Minimal Necessary Changes

- Move Table 4 Mapping of Burst Type to Downlink Interval Usage Code in Section 10 Parameters and Constants , eventually in 10.1.1 PHY-Specific Values .
- Move Table 5 Uplink Map Information Elements in Section 10 Parameters and Constants , eventually in 10.1.1 PHY-Specific Values .

2. Additional Desirable Changes.

- Modify Figure 28 – Uplink MAP Message Format (?) To avoid explicit specification of IE size and length of UIUC and Offset.
- Modify Figure 27 – Downlink MAP Message Format (?) to avoid explicit specification of DIUC and Start PS length.
- Modify Figure 24 – Top-Level Encoding for a Burst Descriptor to avoid explicit specification of UIUC length.
- Modify Figure 26 – Top-Level Encoding for a Downlink Burst Descriptor to avoid explicit specification of DIUC length.
- Page 57, line 50: ‘ a UIUC ‘ instead of ‘ a four bit UIUC’
- Page 66, line 35: ‘ A Uplink Interval Usage Code (UIUC) ‘ instead of ‘A four-bit Uplink Interval Usage Code (UIUC)’
- Page 60, line 47: ‘ a DIUC ‘ instead of ‘a four bit DIUC’

Conclusions.

In summary, we propose the following set of modifications:

Move Tables 4 & 5 from section 6 to section 10.

This kind of modification will address part of the problem but will need some specific explanations, because in some paragraphs and figures are implicitly specified the size of discussed parameters.