

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	<b>WirelessMAN-SCa Errata and System Profiles</b>	
Date Submitted	<b>2003-03-12</b>	
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Re:	Call for Comments/Contributions on Project 802.16d: IEEE Standard 802.16: 2-11 GHz System Profiles and Corrections of Errors in Base Standard	
Abstract	Provides suggested text for correction to errata in 80216a Clause 8.3 (WirelessMAN-SCa phy) and text for SCa system profiles.	
Purpose	For inclusion in 802.16d working document.	
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## WirelessMAN-SCa Errata and System Profiles

Brian Eidson (Conexant Systems Inc)  
Bob Nelson (MacPhy Modems Inc)

### Errata

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**Location:** Page 123, Line 37, Section 8.3.1.4.1.3 of P802.16a/D7-2002  
and Page 125, Line 43, Section 8.3.1.4.2.1 of P802.16a/D7-2002

**Issue:** Frame duration (table 124, page 246, line 21) only has scope of SC; therefore, it should not be listed as an applicable TLV in {8.3.1.4.1.3 page 123, line 37} or {8.3.1.4.2.1 page 125 line 43}

**Resolution:** Remove “Frame Duration Code” from list of “DL Channel Descriptor Parameters” for {8.3.1.4.1.3 page 123, line 37} and {8.3.1.4.2.1 page 125 line 43}.

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**Location:** Page 143, Line 26, Section 8.3.4.2 of P802.16a/D7-2002  
and Page 292, Line 56, Table B.24 of P802.16a/D7-2002

**Issue:** The offset value in the expression for symbol rate is specific to the case when  $\alpha = .25$ .

Also, even for this case, an offset value of 0.16 is much too loose, and was probably inadvertently introduced based on the SS frequency offset requirements---which are not a factor, since the SS will pull in its LO frequency based on DL measurements.

The correct way to include the offset is to bias the raw channel bandwidth by the offset, and then apply the roll-off factor to recover the symbol rate.

An offset of .088 is consistent with the frequency offset requirements of the BS (over the 11 GHz range of operation), which was the original justification for introducing the offset.

The entry for “symbol rate” in table B.24 does not include the offset value

**Resolution:** Replace the contents of Section 8.3.4.2 with the following:

For a roll-off factor of alpha ( $\alpha$ ), the nominal symbol rate (in Msymb/s) for implemented channel bandwidths, BW, in MHz, shall be  $(BW - .088) / (1 + \alpha)$ .

In table B.24, replace the contents of the “Parameter Values” column in the row for the parameter “Symbol Rate” with the expression:

$$R = (W - .088) / (1 + \alpha)$$

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**Location:** Page 243, Line 16, Table 122 [UCD Channel Encoding] of P802.16a/D7-2002

**Issue:** Channel Width scope includes SCa, but this seems superfluous. Other UCD channel encodings (see previous page) with SCa scope include the Symbol Rate and Roll-off factor, and these collectively fully specify the channel spacing, given the formula used to map channel BW to symbol rate in clause 8.3.4.2. Note that the TG1 scope does not include Channel Width, but does use roll-off and symbol rate. TG1's description/solution is sufficient for us. (OFDM requires a different solution, because their "symbol rate" has a different meaning.)

**Resolution:**

*Remove SCa from scope of "Channel Width" TLV*

*Also, remove "Channel Width from {line 13, page 125, clause 8.3.1.4.2.1} and {line 9, page 123, clause 8.3.1.4.1.3}*

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**Location:** Page 248, Line 19, Table 125a of P802.16a/D7-2002

**Issue:** The DCD TLV for the Unique Word length (in Table 125a, page 248 line 19) has the name "Unique Word Parameters" whereas the corresponding UCD TLV (Table 123a, page 244, line 38) has the name "Unique Word Length". They should be consistent.

**Resolution:** *Rename the DCD TLV "Unique Word Parameters" to "Unique Word Length"*

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**Location:** Page 248, Line 21, Table 125a of P802.16a/D7-2002

**Issue:** The "Pilot Word Parameters" TLV for the DL and UL should have exactly the same description, because they perform the same function. However, note that the TLV description for the UCD in Table 123a, page 244, lines 40-48, is not the same as that for the DCD, in Table 125a, page 248, lines 21-28. In fact, for some reason, the interpretation when used in STC burst profiles is omitted for the case of the DCD.

**Resolution:** *The UCD TLV is better worded, and contains the STC interpretation. Replace the text for the "value" field of the Table 125a DCD parameter "Pilot Word Parameters" (page 248, line 21) with the text for the value field of the UCD TLV parameter "Pilot Word Parameters" (page 244, line 40).*

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**Location:** Page 248, Line 34, Table 125a of P802.16a/D7-2002

**Issue:** The DCD TLV for the Block Interleaver Depth (in Table 125a, page 248, line 34) has the name "Byte Interleaver Depth" whereas the corresponding UCD TLV (Table 123a, page 244, line 27) has the name "Block Interleaver Depth". They should be consistent. Also, clause 8.3.1.2.1.2, which describes this interleaver, is titled "Block Interleaver".

**Resolution:** *Rename the DCD TLV, "Byte Interleaver Depth" to be "Block Interleaver Depth"*

## WirelessMAN-SCa System Profiles

*Insert the following text at the appropriate location in Chapter 12:*

### 12.X.Y WirelessMAN-SCa MAC Layer Profiles

The MAC layer profiles for WirelessMAN-SCa shall be the same as those specified for WirelessMAN-SC..

### 12.X.Y WirelessMAN-SCa Physical Layer Profiles

This clause specifies PHY profiles for systems operating with the WirelessMAN-SCa PHY. The scope includes both licensed and license-exempt (WirelessHUMAN) operation. Table A lists minimum SS performance requirements for all profiles; elements not applicable to a particular profile are to be ignored. Likewise, Table B and Table C list the minimum performance requirements for a BS Tx and BS Rx, respectively.

A WirelessMAN-SCa PHY profile is designated as one of two types: either a 'Baseline' or a 'STC' Profile. Baseline PHY profiles are specified in 12.X.Y.1, while STC PHY profiles are specified in 12.X.Y.2.

**Table A –SS Minimum Performance requirements for all WirelessMAN-SCa profiles**

Capability	Minimum Performance
Tx RF frequency	2-11 GHz
Tx RF frequency accuracy	(per 8.3.4.1 of 802.16a) +/- 15 ppm
Tx Dynamic range	(per 8.3.4.5 of 802.16a) ≥ 50 dB +/- 3 dB
Rx Dynamic Range for QPSK	≥ 40 dB
Tx RMS Power Level at Maximum Power Level Setting for QPSK	≥ 15 dBm
Tx Power Level minimum adjustment step	(per 8.3.4.5 of 802.16a) 1 dB
Tx Power level adjustment step accuracy Step size [1, 2) dB	(per 8.3.4.5 of 802.16a) Monotonic, +/- 0.5 dB
Tx Power level adjustment step accuracy Step size [2, 5) dB	+/- 1 dB
Tx Power level adjustment step accuracy Step size ≥ 5 dB	+/- 3 dB
Tx Power Level absolute accuracy	+/- 6 dB
Peak-to-peak symbol jitter, referenced to the previous symbol zero crossing of the transmitted waveform, as percentage of the nominal symbol duration when measured over a 2 second period	(per 8.3.4.3 of 802.16a) 2 %
Tx burst timing step size	+/- 0.25 of a symbol
Tx burst timing step accuracy	+/- 0.125 of a symbol
Spectral mask (OOB)	Local regulation
Ramp up/ramp down time	(per 8.3.4.6 of 802.16a) ≤ 5 us
Output noise power spectral density when Tx is not transmitting	Local regulation or (when unspecified) ≤ -80 dBm/MHz
Modulation accuracy when measured with an ideal receiver without an equalizer for QPSK	12%

Modulation accuracy when measured with an ideal receiver without an equalizer for 16-QAM	6%
Modulation accuracy when measured with an ideal receiver without an equalizer for 64-QAM	(per 8.3.4.4 of 802.16a) 3.1%
Modulation accuracy when measured with an ideal receiver without an equalizer for 256-QAM	1.5%
Modulation accuracy when measured with an ideal receiver without an equalizer for BPSK	10%
Modulation accuracy when measured with an ideal receiver without an equalizer for QPSK	10%
Modulation accuracy when measured with an ideal receiver without an equalizer for 16-QAM	3%
Modulation accuracy when measured with an ideal receiver without an equalizer for 64-QAM	1.5%
Modulation accuracy when measured with an ideal receiver without an equalizer for 256-QAM	0.75%
BER performance threshold for BPSK, BER=10 <sup>-6</sup>	-96.4 + 10log(BW in MHz) dBm
BER performance threshold for QPSK, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -93.4 + 10log(BW in MHz) dBm
BER performance threshold for 16-QAM, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -86.6 + 10log(BW in MHz) dBm
BER performance threshold for 64-QAM, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -80.4 + 10log(BW in MHz) dBm
BER performance threshold for 256-QAM, BER=10 <sup>-6</sup>	-74.2 + 10log(BW in MHz) dBm
Transition time from Tx to Rx and from Rx to Tx	TDD: 2 us H-FDD: 20 us FDD: n/a
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -12 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -9 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -2 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +5 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +12 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -8 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -5 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +2 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +9 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +16 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -8 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -5 dB

1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +2 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +9 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +16 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -4 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -1 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +6 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +13 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +20 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -37 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -34 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -27 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -20 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -13 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -33 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -30 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -22 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -16 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -9 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -33 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -30 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -23 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -16 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -9 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -29 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -26 dB

2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -20 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -12 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -5 dB

**Table B—BS Tx minimum performance requirements for all WirelessMAN-SCa profiles**

<b>Capability</b>	<b>Minimum Performance</b>
Peak-to-peak symbol jitter, referenced to the previous symbol zero crossing of the transmitted waveform, as percentage of the nominal symbol duration when measured over a 2 second period	(per 8.3.4.3 of 802.16a) 2 %
Tx RF frequency	2-11 GHz
Tx RF frequency accuracy	(per 8.3.4.1 of 802.16a) +/- 4 ppm
Spectral mask (OOB)	Local regulation
Spurious	Local regulation
Ramp up/ramp down time	(per 8.3.4.6 of 802.16a) <5 us
Modulation accuracy when measured with an ideal receiver with an equalizer for BPSK	10%
Modulation accuracy when measured with an ideal receiver with an equalizer for QPSK	10%
Modulation accuracy when measured with an ideal receiver with an equalizer for 16-QAM	3%
Modulation accuracy when measured with an ideal receiver with an equalizer for 64-QAM	1.5%
Modulation accuracy when measured with an ideal receiver with an equalizer for 256-QAM	0.75%



**Table C—BS Rx minimum performance for all WirelessMAN-SCa profiles**

<b>Capability</b>	<b>Minimum Performance</b>
Dynamic Range for QPSK	27 dB
BER performance threshold for BPSK, BER=10 <sup>-6</sup>	-96.4 + 10log(BW in MHz) dBm
BER performance threshold for QPSK, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -93.4 + 10log(BW in MHz) dBm
BER performance threshold for 16-QAM, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -86.6 + 10log(BW in MHz) dBm
BER performance threshold for 64-QAM, BER=10 <sup>-6</sup>	(per 8.3.4.9 of 802.16a) -80.4 + 10log(25) dBm
BER performance threshold for 256-QAM, BER=10 <sup>-6</sup>	-74.2 + 10log(BW in MHz) dBm
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -12 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -9 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -2 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +5 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +12 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -8 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -5 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +2 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +9 dB
1st adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +16 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -8 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -5 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +2 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +9 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +16 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -4 dB

1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -1 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) +6 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) +13 dB
1st adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) +20 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -37 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -34 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -27 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -20 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -13 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -33 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -30 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -22 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -16 dB
2nd adjacent channel interference at BER=10 <sup>-3</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -9 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -33 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -30 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -23 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -16 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 3 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -9 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for BPSK	(per 8.3.4.11 of 802.16a) -29 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for QPSK	(per 8.3.4.11 of 802.16a) -26 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 16-QAM	(per 8.3.4.11 of 802.16a) -20 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 64-QAM	(per 8.3.4.11 of 802.16a) -12 dB
2nd adjacent channel interference at BER=10 <sup>-6</sup> for 1 dB degradation C/I for 256-QAM	(per 8.3.4.11 of 802.16a) -5 dB

## **12.X.Y.1 Baseline PHY Profiles**

All PHY profiles with a Baseline designation shall share the common characteristics in 12.X.Y.1.1, and shall be differentiated by the specific characteristics listed in 12.X.Y.1.2. All Baseline profiles include nominal support of the mandatory concatenated FEC, and, through the inclusion of additional descriptors, are also capable of incorporating BTC or CTC FEC options.

### **12.X.Y.1.1 Common features of Baseline PHY Profiles**

All PHY profiles with a Baseline designation shall share characteristics listed in the ensuing descendent clauses.

For WirelessHUMAN operation, the channel BW shall be 5 MHz. Otherwise, the channel BW may use values consistent with clause 8.3 of 802.16a, which specifies “for licensed bands, channel bandwidths allowed shall be limited to the regulatory provisioned bandwidth divided by any power of 2 no less than 1.25 MHz.

#### **12.X.Y.1.1.1 Conventions for MAC Management Messages for profiles**

The following rules shall be followed when reporting parameters in MAC Management messages:

Roll-off Factor shall not be reported in UCD or DCD messages.

RS Information Bytes (K) and RS Parity Bytes (R) shall not be reported in UCD or DCD messages.

Transmit Diversity Type, STC Parameters, and shall not be reported in UCD or DCD messages.

DL Burst Transition Gap shall not be reported in DCD messages

#### **12.X.Y.1.1.2 UCD and DCD parameter transmission order**

The following sections define the order in which systems meeting a Baseline profile shall transmit the TLV encoded parameters in the respective messages. Systems implementing the profile shall only include the parameters listed under the respective message in its transmission of said messages. Parameters with defined default values should be omitted if the desired value coincides with the default one.

##### **12.X.Y.1.1.2.1 DCD**

- BS EIRP
- Channel Nr (omitted if not WirelessHUMAN)
- TTG (omitted for FDD)
- RTG (omitted for FDD)
- MAC version
- Downlink Burst Profile(s)
- Modulation Type
- Exit Threshold
- Entry Threshold
- CC/CTC-specific Parameters
- Preamble Length
- Unique Word Length
- Pilot Word Parameters
- Block Interleaver Depth (omitted if Modulation Type does not specify use of a block interleaver)
- BTC Code Selector (omitted if Modulation type does not specify use of a BTC)

##### **12.X.Y.1.1.2.2 UCD:**

- Symbol Rate (omitted for TDD)
- Frequency (omitted for TDD)
- SS Transition Gap

- Contention-based Reservation Timeout
- Initial Maintenance SSTG (if omitted, value is same as SS Transition Gap)
- Uplink Burst Profiles(s)
- Modulation Type
- Preamble Length
- Block Interleaver Depth (omitted if Modulation Type does not specify use of a block interleaver)
- CC/CTC-specific Parameters
- Unique Word Length
- Pilot Word Parameters
- BTC Code Selector (omitted if Modulation type does not specify use of a BTC)

### **12.X.Y.1.2 Specific Baseline PHY Profiles**

Specific Baseline PHY profiles are described in the following descendant clauses.

#### **12.X.Y.1.2.1 FDD Specific PHY Profile Features.**

Mandatory features:

- FDD operation
- BS must respect half-duplex nature of half-duplex SSs
- Center Frequency and symbol rate for UL must be reported in UCD channel encoding

#### **12.X.Y.1.2.2 TDD Specific PHY Profile Features**

Mandatory features:

- TDD operation
- Center Frequency and symbol rate for UL are not reported in UCD channel encoding

#### **12.X.Y.1.2.3 WirelessHUMAN Specific PHY Profile Features**

Mandatory features:

- TDD operation
- Center Frequency and symbol rate for UL are not reported in UCD channel encoding
- Channel Nr is reported in DCD channel encoding

#### **12.X.Y.1.2.4 WirelessMAN-SCa Baseline PHY Profile A**

Profile identifier: profP1a-baseA.

Recommended applications and notes: general usage; no pilot words on DL.

Mandatory features:

- QPSK, 16-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

Pilot Words with Length 1-2 UW and Interval 1024 symbols

No Pilot Words on DL

**12.X.Y.1.2.5 WirelessMAN-SCa Baseline PHY Profile B**

Profile identifier: profP1a-baseB.

Recommended applications and notes: general usage; frequent DL pilot words that can be used as cyclic prefixes.

Mandatory features:

- QPSK, 16-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

Pilot Words with Length 1 UW and Interval 256 symbols

**12.X.Y.1.2.6 WirelessMAN-SCa Baseline PHY Profile C**

Profile identifier: profP1a-baseC.

Recommended application and notes: General usage; less frequent DL pilot words that can be used for cyclic prefixes and/or channel estimation.

Mandatory features:

- QPSK, 16-QAM, 64-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths of 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

DL Pilot Words with Length 1-2 UW and Interval 1024 symbols

**12.X.Y.1.2.7 WirelessMAN-SCa Baseline PHY Profile D**

Profile identifier: profP1a-baseD.

Recommended application and notes: general usage; sparse use of pilot words on DL for distributed channel estimate updates.

Mandatory features:

- QPSK, 16-QAM, 64-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths of 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

DL Pilot Words with Length  $\geq 2$  UW and Interval  $> 1024$  symbols

### **12.X.Y.1.2.8 WirelessMAN-SCa Baseline PHY Profile DS**

Profile identifier: profP1a-baseDS.

Recommended application and notes: longer delay spread channels.

Mandatory features:

- QPSK, 16-QAM, 64-QAM on DL
- BPSK, QPSK, 16-QAM, 64-QAM on UL
- Roll-off Factor = 0.25
- RS outer code with  $T = 8$
- shortened last RS code word operation.
- RS block lengths of  $N = 255$  (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths of 16, 64, 256 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

DL Pilot Words with Length 1-2 UW and Interval  $> 1024$  symbols

### **12.X.Y.1.2.9 WirelessMAN-SCa Baseline PHY Profile HT**

Profile identifier: profP1a-baseHT.

Recommended applications and notes: higher throughputs.

Mandatory features:

- QPSK, 16-QAM, 64-QAM, 256-QAM on the DL
- QPSK, 16-QAM, 64-QAM, 256-QAM on the UL
- Roll-off Factor = 0.25
- RS outer code with  $T = 8$
- shortened last RS code word operation.
- RS block lengths of  $N = 255$  (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths of 16 symbols and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

No DL Pilot Words or DL Pilot Words with Length 1-2 UW and Interval 1024 symbols

## **12.X.Y.2 STC PHY Profiles**

All PHY profiles with a STC designation shall share characteristics listed in 12.X.Y.2.1, and shall be differentiated by the specific characteristics listed in 12.X.Y.2.2. All STC profiles include nominal support of the mandatory concatenated FEC, and, through the inclusion of additional descriptors, are also capable of incorporating BTC or CTC FEC options.

### **12.X.Y.2.1 Common features of STC PHY Profiles**

All PHY profiles with a STC designation shall share characteristics listed in the ensuing descendant clauses.

For WirelessHUMAN operation, the channel BW shall be 5 MHz. Otherwise, the channel BW may use values consistent with clause 8.3 of 802.16a, which specifies “for licensed bands, channel bandwidths allowed shall be limited to the regulatory provisioned bandwidth divided by any power of 2 no less than 1.25 MHz.

#### **12.X.Y.2.1.1 Conventions for MAC Management Messages for profiles**

The following rules shall be followed when reporting parameters in MAC Management messages:

Roll-off Factor shall not be reported in UCD or DCD messages.

RS Information Bytes (K) and RS Parity Bytes (R) shall not be reported in UCD or DCD messages.

#### **12.X.Y.2.1.2 UCD and DCD parameter transmission order**

The following sections define the order in which systems meeting a STC profile shall transmit the TLV encoded parameters in the respective messages. Systems implementing the profile shall only include the parameters listed under the respective message in its transmission of said messages. Parameters with defined default values should be omitted if the desired value coincides with the default one.

##### **12.X.Y.2.1.2.1 DCD**

- BS EIRP
- Channel Nr (omitted if not WirelessHUMAN)
- TTG (omitted for FDD)
- RTG (omitted for FDD)
- MAC version
- Downlink Burst Profile(s)
- Modulation Type
- Exit Threshold
- Entry Threshold
- CC/CTC-specific Parameters
- Preamble Length
- Unique Word Length
- Pilot Word Parameters
- Transmit Diversity Type (omitted if STC is not being used by a burst)
- Block Interleaver Depth (omitted if Modulation Type does not specify use of a block interleaver)
- DL Burst Transmission Gap (omitted if STC is not being used for a burst)
- STC Parameters (omitted if STC is not being used by a burst)
- BTC Code Selector (omitted if Modulation type does not specify use of a BTC)

##### **12.X.Y.2.1.2.2 UCD:**

- Symbol Rate (omitted for TDD)
- Frequency (omitted for TDD)
- SS Transition Gap
- Contention-based Reservation Timeout
- Initial Maintenance SSTG (if omitted, value is same as SS Transition Gap)
- Uplink Burst Profiles(s)
- Modulation Type
- Preamble Length
- Block Interleaver Depth (omitted if Modulation Type does not specify use of a block interleaver)
- CC/CTC-specific Parameters



- Unique Word Length
- Pilot Word Parameters
- Transmit Diversity Type (omitted if STC is not being used by a burst)
- STC Parameters (omitted if STC is not being used by a burst)
- BTC Code Selector (omitted if Modulation type does not specify use of a BTC)

### **12.X.Y.2.2 Specific STC PHY Profiles**

Specific Baseline PHY profiles are described in the following descendent clauses.

#### **12.X.Y.2.2.1 FDD Specific PHY Profile Features.**

Mandatory features:

- FDD operation
- BS must respect half-duplex nature of half-duplex SSs
- Center Frequency and symbol rate for UL must be reported in UCD channel encoding.

#### **12.X.Y.2.2.2 TDD Specific PHY Profile Features**

Mandatory features:

- TDD operation
- Center Frequency and symbol rate for UL are not reported in UCD channel encoding

#### **12.X.Y.2.2.3 WirelessHUMAN Specific PHY Profile Features**

Mandatory features:

- TDD operation
- Center Frequency and symbol rate for UL are not reported in UCD channel encoding
- Channel Nr is reported in DCD channel encoding

#### **12.X.Y.2.2.4 WirelessMAN-SCa STC PHY Profile A**

Profile identifier: profP1a-stcA.

Recommended applications and notes: General STC usage; smallest hardware memory requirements.

Mandatory features:

- QPSK, 16-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- Shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

No Pilot Words on non-STC DL bursts

256 symbol STC blocks with STC block burst profile '0' on DL and UL

Pilot Words Distribution (if any) for STC bursts designated by Pilot Word Parameters

#### **12.X.Y.2.2.5 WirelessMAN-SCa STC PHY Profile B**

Profile identifier: profP1a-stcXB.

Recommended applications and notes: general STC usage, small hardware memory requirements but reduced throughput.

Mandatory features:

- QPSK, 16-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

Pilot Words with length 1 UW and Interval 256 symbols on non-STC DL bursts

256 symbol STC blocks with STC block burst profile '0' on DL and UL

Pilot Words Distribution (if any) for STC bursts designated by Pilot Word Parameters

**12.X.Y.2.2.6 WirelessMAN-SCa STC PHY Profile C**

Profile identifier: profP1a-stcC.

Recommended applications and notes: General STC usage; larger hardware memory requirements but enhanced throughput.

Mandatory features:

- QPSK, 16-QAM, 64-QAM, 64-QAM on UL and DL
- Roll-off Factor = 0.25
- RS outer code with T = 8
- Shortened last RS code word operation.
- RS block lengths of N = 255 (with exception of shortened last RS code word)

Symbol rate (Msymb/s) = (BW in MHz - .088)/(1.25)

UW Lengths of 16 and 64 symbols

DL Preamble composed of 3 UW and 4 ramp-up symbols

Pilot Words with Length 1-2 UW and Interval 1024 on non-STC DL bursts

1024 symbol STC blocks with STC block burst profile '0' on DL

256 symbol or 1024 symbol STC blocks with STC block burst profile '0' on UL

Pilot Word Distribution (if any) for STC bursts designated by Pilot Word Parameters