Comments on the PHY section P802.15.16t D0.3

**3 Definitions:**

~~9~~ **~~Mobile Station (MS):~~** ~~a mobile remote radio~~

**10 Sector:** an area under the control of a Base Station. All the Remote Stations (Fixed & Mobile) within this

**11** area communicate with the Base Station controlling the sector. ~~A single base station can support more than~~

**~~12~~** ~~one sector.~~

***[Editor’s Note: Can the MS perform a handoff? If so, does it also communicate in neighboring* 13 *sectors?]***

***[ Yes, a MS can perform handoff between multiple BSs.802.16-2017 hand off procedures need to be modified to consider the subchannel groups. ]***

**~~17 Protocol Data Unit (PDU):~~** ~~The data unit transmitted/received over the air.~~ ***~~[Editor: Is this the same as the~~***

**~~18~~ *~~MAC PDU?]~~***

**24 NB ubchannel:**

***To Editor: Please correct the spelling as below:***

**24 NB Subchannel:**

**~~46 Service Data Unit (SDU):~~** ~~The packet transmitted and/or received over an Ethernet or serial interface, e.g.,~~

**~~47~~** ~~an Ethernet frame.~~ ***~~[Editor: is this the same as the MAC SDU?]~~***

**2 Abbreviations and acronyms**

**~~6~~** *~~BS Base Station~~*

**~~7~~** *~~MCS Modulation and Coding Scheme~~*

**~~8~~** *~~MS Mobile Station~~*

**~~9~~** *~~PDU Protocol Data Unit~~*

**10** *~~SS Remote Station~~*

***To Editor: Please replace the “Remote station” with the “SS” in the document.***

**6.3 Data/Control Plane**

***To Editor: Please add the title to section 6.3.37 as below:***

3 **6.3.37 NB-MAC Sublayer**

**8.6 WirelessMAN-NB PHY**

**~~4~~** ~~Figure 1, Figure 2 and Figure 3 (shown below) display three examples of non-continuous and continuous~~

**~~5~~** ~~channels.~~

***[Editor’s Note: This subclause should begin with an explanation of the purpose of effective channels***

***within the context of a WirelessMAN-NB system of base stations and stations, and how they benefit the***

***system design and deployment scenarios. Then, there should be an update to the figures that shows the***

***size of the frequency gaps between the subchannel groups in units of NB subchannels. Is there a***

***minimum size? Is there a maximum size within the band?]***

***The effective channel is the span from the lowest frequency of the lowest NB subchannel to the highest frequency of the highest NB subchannel available to use. The effective channel is further divided into subchannel groups which consist of adjacent or non-adjacent NB subchannels. Examples of NB subchannels are 5 kHz, 6.25 kHz, 7.5 kHz, 12.5 kHz, 15 kHz, 25 kHz and 50 kHz but other sizes are not excluded.***

***To Editor: Please modify the line 19 as below:***

**19** Figure 2 shows an example of a non-continuous effective channel partitioning into subchannel groups,

23***Editor’s Note: Are the non-available subchannels a feature of all non-continuous effective channels, or***

24***only for this example in the figure?***

***It is universal not specific to the figure. This is resolved above in line 19.***

**8.6.2 Channel span**

***To Editor: Please move this section to the definition.***

**8.6.3 Self sufficiency**

***To Editor: Please modify this as “ 8.6.3 Self sufficiency operation”***

**8.6.3.1 Base station**

***To Editor: Please modify this as “ 8.6.3.1 Base Station Self sufficiency operation”***

40 ***Editor’s NOTE: should we define the term “sector base station”?***

***To Editor: Please replace “sector base station” with “base station”.***

***To Editor: Please modify the line 41 as below***

**41** Within the sector the following principles apply:

#### ~~45 Editor’s NOTE: Then we should be clear that all transmissions from subscriber stations that are~~

**~~46~~ *~~inadvertently received by a neighboring sector base station shall be discarded, except for~~***

**~~47~~ *~~transmissions related to handoff.~~***

***Not sure this is needed given a subscriber station only transmits in slots allocated by the base station. The lines 45 to 47 to be removed.***

**49*Editor’s NOTE: Are these resources limited to time and frequency***

**50 *dimensions, or do they include spreading code and spatial dimensions as well? How are handoffs***

**51 *accomplished between sectors? Can nearby sector base stations coordinate their transmissions to***

**52 *simultaneously communicate with a subscriber station?***

#### Yes, these resources are limited to time and frequency.

#### We believe there is no spatial allocations on multiple antenna in 802.16-2017 systems we’ll verify and confirm.

#### Handover is addressed previously.

***Dynamic coordination is done with an optional Base Station Controller (BSC). If there is no BSC, a static frequency planning is used to avoid interference***

**8.6.3.2 NB Subscriber Stations**

***To Editor: Please modify this as “ 8.6.3.1 NB Subscriber Station Self sufficiency operation”***

***To Editor: Please modify the lines 54 and 55 as below***

**54** Each of the subscriber stations in the sector receives in only one NB subchannel group, and transmits in only one

**55** NB subchannel group.

**8.6.3.3 NB subchannel groups**

***Editor’s NOTE: Does this mean that all subscriber stations are fixed stations only?***

***[*** ***No. SS can be static or mobile.]***

**8.6.3.4 Self-sufficiency advantages**

***To Editor: The complete section 8.6.3.4 is informative, please move it to the informative section.***

**8.6.4.1 Downlink**

***To Editor: Please modify the 8.6.4.1 section as below:***

**82** Transmission in the downlink direction employs OFDM with a single subcarrier per subchannel. FFT sizes

**83** shall be computed based on the equation given below. A subchannel bit map is used to

**84** turn off any unused subchannel.

FFT Size = 2^(ceil(log2(effectiveChannel/NBSubchannelSize)))

**86** Refer section 8.4.2.1, 8.4.2.3 to 8.4.2.5.

**8.6.4.2 Uplink**

**89** Transmission in the uplink direction employs Single Carrier FDMA (SC-FDMA). ***Editor’s NOTE: Are we* 90 *including the modulation technique specified in another sub-clause, such as WirelessMAN-SC? If so,* 91 *then we need to reference it here, with any modifications specific to WirelessMAN-NB.***

***[This technique is not specified in the WirelessMAN-SC; details of waveform generation are given below ]***

**96** DFT size depending on the number of subchannels used for transmission. Further they are mapped to the **97** subchannels corresponding to data and pilot. ***Editor’s NOTE: you mentioned DFT instead of FFT. Can* 98 *FFT be used?***

***[ DFT is mentioned for subchannel groups that may not have 2's power number subchannels e.g. in a case where one subchannel group has 3 subchannel then we cannot use FFT we need to use the DFT***.***]***

**104** waveforms spanning for a time duration equal to the symbol duration ~~(symbol duration = reciprocal of the~~

**~~105~~** ~~subchannel spacing)~~ along with cyclic prefix addition are summed up to form the resultant waveform.

**106 *Editor’s NOTE: The convention is for a symbol duration to include the FFT output plus a cyclic prefix.***

**107 *Thus, the symbol period is not the reciprocal of the subchannel spacing. Only the length of the FFT***

**108 *output meets this criterion.***

***[Yes correct, let’s remove the incorrect statement in the brackets]***

**8.6.4.2.1 SC FDMA baseband signal generation, Subchannel grouping**

**113** The continuous-time symbol l signal sl(t) is defined by ***Editor’s NOTE: what is meant by “continuous time***

**114 *symbol “l”?***

***[ it represents the lth symbol]***

Equations line 118, 122 and 127 needs to be corrected.

**136** Equivalently, in the discrete time, the samples can be obtained by performing IFFT operation on the DFT **137** applied symbols after it has been mapped on to the subchannels. Further, cyclic prefix is added followed by **138** half subchannel shift. ***Editor’s NOTE: Need a better description of this equivalence.***

***[ The process is described in the figure 18 UL transmitter SC-FDMA blocks, this is given to simplify the equations if it is not clear it can be removed ]***

**8.6.5.1 TDD Frame Structure**

**147** (preamble, ALLOC-MSG) are decoupled from the frame, i.e., they are not present in every frame. ***Editor’s* 148 *NOTE: Need a full explanation for how this decoupling works, both at the base station (including its* 149 *impact on scheduling), and at the subscriber station (including its impact on sleep cycles). Does the* 150 *ALLOC-MSG replace the DL-MAP and/or UL-MAP? Does it contain pilot symbols? If so, what is the* 151 *structure for them?***

***[ An explanation of this decoupling is given in the MAC section. Yes ALLOC-MSG replaces the DL/UL MAPs. ALLOC-MSG is transmitted in the same manner as the data with Robust FEC it uses the same pilot structure as data slots.]***

***To Editor: Please modify the line 159 as below***

**158** Preamble, pilots ALLOC-MSGs are transmitted within every subchannel group. They are not required to be

**159** transmitted at every frame. Their periodicity is configurable:

***To Editor: Please move the below highlighted section to the informative section.***

**160** a) Preamble and pilot signal periodicity is determined by RF channel dynamics as needed to maintain

**161** synchronization, e.g., static vs mobile application. ***Editor’s NOTE: Need more explanation as to***

#### 162 how this mechanism works, and on what frame number offset the periodicity begins.

***[ Preamble and Pilot signal periodicity is configured based on the pre-known deployment scenario at both the BS and MS. Details of preamble periodicity are given in section 8.6.7.6]***

**163** b) ALLOC-MSG’s periodicity is determined by upper layers. ***Editor’s NOTE: Need to define a PHY***

#### 164 API that allows for this configuration change.

***[*** ***Does ieee802.16 include API between PHY and MAC layer?]***

**8.6.5.2 Frame Duration**

#### 172 Editor’s NOTE: Need to show a PHY API that allows for this configuration change.

***[based on the discussion yesterday we don’t recommend MAC to PHY API]***

**8.6.6.1 Bins and slots**

**178** a) The minimum air interface resource allocation in the downlink and in the uplink is the slot. It is

**179** constructed using configurable bins such that one slot contains 48 data symbols. ***Editor’s are these***

#### 180 data symbols arranged in time or frequency? What is the time duration of a slot? We need to see

**181 *what the slots look like within a downlink and/or uplink resource grid.***

***[Data symbols are arranged in time. The time duration of the slot depends on the symbol rate, which depends on the subchannel bandwidth as mentioned in an earlier section. Figure 8 shows one example of a slot. Different configurations of slots will be provided in annex XX. We’re having the same structures in DL and UL.]***

**188** the spectral efficiency by increasing the data symbols to pilot ratio. ***Editor’s NOTE: Where are the***

#### 189 pilots? How many are they?

***[Figure 7 shows that there is one pilot per 8 data symbols over a single carrier]***

**8.6.6.2 Modulation and FEC Rates:**

**194** b) Convolutional Coding (CC) and convolutional Turbo codes (CTC) is used with various rates as

**195** listed in Table 2. ***Editor’s NOTE: Are we not concerned about burst errors?***

***[ For handling the burst errors interleaving is present. Apart from interleaving repetitions can help in mitigating the burst errors. Please note the channel coding is maintained same as we’ve in 802.16-2017 except we’re using only CC and CTC]***

**8.6.7.1.4 Modulation**

***To Editor: Please modify the line 222 as below***

**222** Modulation shall be performed as described in clause 8.4.9.4. In addition, 256-QAM modulation may be ~~optionally~~ **223** supported. ***Editor’s NOTE: How is the use of this modulation signaled by the sector base station to the subscriber* 224 *stations.***

***[Need to update this in the MAC document where DIUC and UIUC values]***

**8.6.7.1.5 Repetition**

Figure 11 is correct.

Figure 12 needs to be corrected.

**8.6.7.5 TX signal filtering**

This section needs to be updated.