Cl **00** *SC* *P* *L* # 173

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **D**

Enhance BS to BS Communications by using connection based over-the-air approach (inter-BS control connections). Logical inter-BS control connection method provides reliability, efficiency, and security benefits to inter-BS communications.

SuggestedRemedy

Add the text to the draft from the following document:
22-06-0228-00-0000_Scheduling_Connection_Based_Inter_BS_communications.doc.

Proposed Response *Response Status* **W**

Cl **00** *SC* *P* *L* # 174

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Enhance spectrum sensing performance and WRAN system performance by using Simultaneous Sensing and Data Transmissions.

SuggestedRemedy

Include the text to the draft standard from the document on ""Simultaneous Sensing and Data Transmissions"" contributed by STMicroelectronics.

Proposed Response *Response Status* **O**

Cl **00** *SC* *P* *L* # 175

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Enhance BS to BS Communications by using connection based over-the-air approach. Control messages for connection based over-the-air methods are needed.

SuggestedRemedy

Include the text of the related contribution (from STMicro and Huawei) to the draft standard: submitted to January 2007 London meeting.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.1.2.3.3** *P* **186** *L* **11** # 144

Pirat, Patrick France Telecom

Comment Type **T** *Comment Status* **X**

Table 230 : The figures should be updated with the parameters under discussion in 802.22

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.2** *P* **187** *L* **9** # 141

Pirat, Patrick France Telecom

Comment Type **E** *Comment Status* **X**

Table 231: Spreading factor and Transformation matrix are not defined at this stage of the document (optional?).

SuggestedRemedy

Remove Spreading and Transform matrix columns from the table.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.4** *P* *L* # 143

Pirat, Patrick France Telecom

Comment Type **ER** *Comment Status* **X**

The values of the number of sub-channels, size of the sub-channels, pilots should be updated to fit the OFDMA parameters.

The same for the location of the pilots.

SuggestedRemedy

Draft this section without figures and specify the values of the parmeters when agreed.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.4.1.1** *P* **194** *L* # 145
Pirat, Patrick France Telecom

Comment Type **T** *Comment Status* **X**

Equation 7 is confusing. What is ""SubCarrier(n,k)""?. When k<27 the value of SubCarrier(n,k) is negative. How are indexed the sub-carriers?

SuggestedRemedy

Give an example with the sub-carriers location of a specific sub-channel.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.4.1.2** *P* **195** *L* **15** # 149
Pirat, Patrick France Telecom

Comment Type **TR** *Comment Status* **X**

Equation 2 is missing.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.5.3** *P* **201** *L* # 151
Pirat, Patrick France Telecom

Comment Type **TR** *Comment Status* **X**

The parameter NCBPB (number of coded bits per encoded block) is not clearly defined. What is an encoded block? Is it related to the capacity of a sub-channel in an OFDM symbol?

SuggestedRemedy

Define NCBPB.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.5.3** *P* **201** *L* # 150
Pirat, Patrick France Telecom

Comment Type **TR** *Comment Status* **X**

Bit interleaving is an operation that is related to frequency interleaving (sub-channel allocation). The mechanism proposed in this section is similar to the 802.16'one but 802.22 system uses a different sub-channel allocation mechanism.
Efficiency of bit interleaving combined with sub-channel allocation should be demonstrated.

SuggestedRemedy

To be investigated by the ""OFDMA parameters"" working group and harmonized with sub-channel allocation.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.6.1.1** *P* *L* # 147
Pirat, Patrick France Telecom

Comment Type **T** *Comment Status* **X**

Table 235: It seems from this table that a block is the content of one subchannel in one OFDM symbol (see my remark on subclause 8.5.3)

SuggestedRemedy

Provide a definition of a ""block"".

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.6.1.1** *P* **201** *L* **24** # 152
Pirat, Patrick France Telecom

Comment Type **TR** *Comment Status* **X**

Is there only one way of doing the Gray-coded constellation mapping? I suspect not.

SuggestedRemedy

Specify the constellation mapping for each constellation type.

Proposed Response *Response Status* **O**

Cl **00** *SC* **8.9.1.3** *P* **203** *L* # 148
Pirat, Patrick France Telecom

Comment Type **T** *Comment Status* **X**

This section is misleading. This table was presented as the experimental results of an uplink under conditions (1K FFT, 1/4 guard interval, upstream on 1 subcarrier) far from the system specified here.

SuggestedRemedy

Cancel this section.

Proposed Response *Response Status* **O**

Cl **00** *SC* **Nil** *P* **Nil** *L* **0** # 61
Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

In the proposal ""Connection Based Over-the-air Inter Base Station Communications"" (IEEE802.22-06/0111r1), there is no MAC management message design to support the methodology.

SuggestedRemedy

Four MAC management messages, namely Base Station Switch Request, Base Station Switch Response, Base Station Switch Report, and Base Station Switch Acknowledgement, are designed to facilitate the reliable Inter-BS communication.

Proposed Response *Response Status* **O**

Cl **02** *SC* **2** *P* **2** *L* **9** # 1
Chouinard, Gerald Communications Rese

Comment Type **E** *Comment Status* **X**

Line 9: Document number missing.

Line 12: refer to the latest revision

SuggestedRemedy

Line 9: 22-05-0007-46-0001_RAN_Requirements.doc

Line 12: Delete r12

Proposed Response *Response Status* **O**

Cl **03** *SC* **3** *P* **3** *L* **10** # 2
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Correction and improvement to definitions.

SuggestedRemedy

3.6 Downstream: The direction of the transmission from the BS to a CPE.

3.9 Downstream map (DS-MAP): A MAC message from the BS that defines burst start time, burst length and sub-channel usage allocations for the CPEs in the orthogonal frequency division multiplex (OFDM) of the downstream.

3.10 Frame: Comprised of one Downstream (DS) and one Upstream (US) Subframes, by which BS and CPEs communicate with each other.

3.12 MAC PDU: The smallest unit of transmission/reception by the MAC. It is comprised of the MAC header, the payload, and Cyclic Redundancy Check (CRC).

3.13 Security association (SA): The set of security information a base station (BS) and one or more of its CPEs share in order to support secure communications. This shared information includes traffic encryption keys (TEKs) and cipher block chaining (CBC) initialization vectors.

3.14 Security association identifier (SAID): An identifier shared between the base station (BS) and a CPE that uniquely identifies a security association (SA).

3.15 Self-Coexistence: Coexistence between wireless systems of the same type. In the case of 802.22, this means coexistence of multiple overlapping 802.22 cells using the same TV channel.

3.16 Subframe: Formed by a number of bursts to be sent in the same transmission direction.

3.17 Superframe: Group of 16 frames signalled by the transmission from the BS of preambles for synchronization and channel training and the Superframe Control Header (SCH).

3.19 Orthogonal frequency division multiple access (OFDMA) burst: A contiguous portion of a OFDMA data stream using PHY parameters, determined by the Upstream Interval Usage Code (UIUC), that remain constant for the duration of the burst.

3.20 Orthogonal frequency division multiplexing (OFDM) burst: A contiguous portion of a OFDM data stream using PHY parameters, determined by the Downstream Interval Usage Code (DIUC), that remain constant for the duration of the burst.

3.22 TV channel: Refers to a specific physical TV Channel as defined by TV broadcast communication standards (see ITU-R Recommendation xxx).

3.23 Upstream: The direction of the transmission from a CPE to the BS.

3.24 Upstream channel descriptor (UCD): A medium access control message that describes

the PHY characteristics of an upstream channel.

3.25 Upstream interval usage code (UIUC): An interval usage code specific to an upstream. See also: interval usage code.

3.26 Upstream map (US-MAP):A MAC message from the BS that defines burst start time, burst length and sub-channel usage allocations in the orthogonal frequency division multiple access (OFDMA) upstream subframe for the CPEs to access the network.

Proposed Response *Response Status* **O**

Cl **04** *SC* **4** *P* **4** *L* **13** # 3

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

AAS relates to an optional feature to be discussed later.

Missing acronyms.

SuggestedRemedy

Delete AAS from the list for the time being.

Add DCD and UCD.

Proposed Response *Response Status* **O**

Cl **05** *SC* **5** *P* **6** *L* **1** # 108

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Do we need this?

SuggestedRemedy

Discuss within the WG the need or not for a convergence sublayer, and write/remove this section accordingly.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6** *P* **6** *L* **10** # 4

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Indicate TV band incumbents.

Change TDM and TDMA for OFDM and OFDMA.

SuggestedRemedy

Line 10: ""and protection of TV bands incumbent services, as well as for self-coexistence.""

Line 12: ""CMAC regulates downstream medium access by OFDM [frequency and time division multiplex], while the upstream is managed by using a DAMA OFDMA [frequency and time division multiple access] system.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.1** *P* **6** *L* **18** # 5

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Change TDM and TDMA into OFDM and OFDMA.

Change user for CPE.

SuggestedRemedy

Line 18: ""downstream direction (from BS to CPEs) is regulated by OFDM and typically broadcast, while CPEs will listen only to those messages addressed to them. The upstream direction (from CPEs to BS) is shared by CPEs on a demand basis, according to a DAMA OFDMA scheme. Depending on the class of service utilized, the CPE may be issued continuing rights to transmit, or the right to transmit may be granted by the BS after receipt of a request from the CPE.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.1.1** *P* **7** *L* **21** # 6

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Channel bonding and aggregation are to be discussed later and should not appear in the first draft. See Annexes.

SuggestedRemedy

Line 21: The unique and distinctive characteristic of this architecture is that it is scalable and so its capacity can be expanded over time, as the need arises. Hence, it is can be comprised of one or more PHY/MAC air interface module and a new entity called Spectrum Manager (SM). This is supported by the architecture as shown in Figure 1.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.1.1** *P* **7** *L* **34** # 7

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Channel bonding and aggregation are to be discussed later and should not appear in the first draft. See Annexes.

SuggestedRemedy

Line 24: ""The SM has a key role in the overall architecture as it allows the system to take advantage of multiple channels while keeping the simplicity of CMAC (and also of the PHY) and allowing the system to scale (and also evolve) over time. In other words, the SM allows for an effective multiple channel mechanism to be implemented.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.1.1** *P* **8** *L* **8** # 8

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Channel bonding and aggregation are to be discussed later and should not appear in the first draft. See Annexes.

SuggestedRemedy

A simplified version of Figure 2 should be included here to avoid referring to channel bonding and aggregation. This figure should be transferred to the annex on channel bonding.

The title of the figure should read: Figure 2 - Illustrative diagram of spectrum allocations. Proper frequency separation is enforced in order to protect incumbent services.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.10** *P* **102** *L* **30** # 55

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

It is meaningful to introduce HARQ to IEEE 802.22 according to its existing frame structure and coding scheme, since it provides an efficient way to improve system error performance. However, unlike 802.16, the HARQ for 802.22 should be able to provide robust link performance in the presence of interference due to the 802.22 operations.

SuggestedRemedy

On the top of conventional HARQ design, we propose adaptive frequency interleaver (based on soft HARQ) on the retransmission packets such that frequency diversity can be explored while maintaining simple chase-combining at the receiver. Refer to 22-07-xxxx-00-0000_Huawei_HARQ_Adaptive_Freq_Spreading_Updated which will be posted in the Jan. meeting document area for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.11** *P* **102** *L* # 56

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

This comment relates to the current downstream CSIT collection mechanism at the base station for efficient cross-layer scheduling. It is a mandatory requirement in WRAN to maintain QoS requirement (e.g. average delay) for various service flows (namely UGS, rtPS, nrtPS, BE). In order to maintain delay performance while at the same time, exploit cross-layer multiuser diversity gain, it is important for the BS to have both the downstream CSIT (channel state information) as well as QSI (queue state information) for efficient scheduling (delay-sensitive cross-layer scheduling). However, there is no existing mechanism described in the draft on how the WRAN BS can collect the downstream CSIT from all active CPEs. Moreover, brute-force approach of downstream CSIT collection is very expensive in terms of signaling / feedback overhead because the CSI of all subchannels (even those not assigned to the CPE) from all active CPE are required for efficient cross-layer scheduling.

SuggestedRemedy

We propose a low-overhead polling / event-driven downstream CSIT collection mechanism to enable delay-sensitive cross-layer scheduling of various service flows at the base station with small feedback overhead. Refer to 22-07-xxxx-00-0000_Huawei_event-driven_DS_CSIT_collection which will be posted in the Jan. meeting document area for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.11.1** *P* **103** *L* **36** # 186

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Traffice constaints of CBP is not sufficiently an efficient and fair method of WRAN systems coexistence.

SuggestedRemedy

Consider other coexistence methods sucha as on-demand spectrum contention and credit token renting protocol that address fairness and efficiency issues for ""interference free"" scheduling and coexistence.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.13.1** *P* **109** *L* **6** # 106

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Currently, the spec is only defined for TDD (e.g., frame, control messages, etc.). There are no details or support for FDD.

SuggestedRemedy

WG needs to decide whether FDD is going to be supported or not. If so, much work has to be done as to accomodate this duplexing scheme. If not, we need to clean up the text.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.13.5.1** *P* **111** *L* **27** # 30

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Section still need further system work.

SuggestedRemedy

Update text with the latest findings from the discussions.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **115** *L* **40** # 97

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There are a number of subclauses in this section that have not been included. This section is incomplete.

SuggestedRemedy

Use the 802.16 spec as a starting point and update this section with all the needed subclauses.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **115** *L* **41** # 68

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

Before a CPE can be served by a BS, it needs to enter the network and negotiate its capabilities with the BS. This may involve many tasks (e.g., sensing channels) and frame exchanges between the CPE and the BS. This whole procedure is hereby referred to as network entry and initialization. More importantly, during this procedure the CPE needs to ensure that before it transmits to the BS for the first time, its communication will not cause harmful interference with incumbents. In other words, the network entry and initialization procedure has to be designed to be what is hereby referred to as incumbent safe, which essentially means that incumbent system protection shall be guaranteed.

SuggestedRemedy

More details and related solutions can be referred to ""22-06-0126-01-0000_Huawei_Network_Entry_and_Initialization"".

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **116** *L* **9** # 188

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Figure 20 and the associated text have no consideration with respect to the Keep-out Region of either BS or CPE to the DTV protection contour.

SuggestedRemedy

Modify Figure 20 and the associated text with consideration of the Keep-out Region of both BS and CPEs to the DTV protection contour.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **116** *L* **22** # 187

HU, Wendong STMicroelectronics

Comment Type **ER** *Comment Status* **X**

SCH is designed for the optional channel bonding, hence not appropriate for the mandatory single channel case.

SuggestedRemedy

Specify that super frame control header (SCH) is optional or re-designed SCH for single channel operations.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **118** *L* # 267

Caldwell, Winston Fox

Comment Type **TR** *Comment Status* **X**

A section needs to be added detailing the Set up Connections block referred to in Figure 23.

SuggestedRemedy

Add section.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **118** *L* # 265

Caldwell, Winston Fox

Comment Type **TR** *Comment Status* **X**

A section should be added detailing the Perform Key Exchange block referred to in Figure 23.

SuggestedRemedy

Add section.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **118** *L* # 266

Caldwell, Winston Fox

Comment Type **TR** *Comment Status* **X**

A section needs to be added detailing the Perform Registration block referred to in Figure 23.

SuggestedRemedy

Add section.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15** *P* **118** *L* # 264

Caldwell, Winston Fox

Comment Type **TR** *Comment Status* **X**

A section detailing the Authorize CPE block referred to in Figure 23 should be added.

SuggestedRemedy

Add section.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.1** *P* **117** *L* **10** # 57

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

This comment relates to the BS initialization procedure. The current initialization procedure may cause severe interference to the incumbent users due to the following drawbacks.
1. The BS can only select the operating channel based on the sensing result of its own since the CPEs cannot report their sensing results to the BS before initialization. As referred to the function requirement version 48, the channel entry time for a CPE is within 10 seconds, while the permitted channel move time is 2 seconds. In other words, in the worst case the BS should wait for 10 seconds before receiving channel measurement reports from its CPEs, however, the maximum tolerance time for interfering incumbent users is 2 seconds. Therefore, before the CPEs are able to report, the incumbent users may be interfered illegally.
2. Hidden incumbent problem. The CPEs harmfully interfered by the incumbent users may not be able to enter the network. Even when the initialization is finished, the CPEs that are harmfully interfered by the incumbent users may not be able to synchronize with the BS. Hence, they still can not report the BS about the incumbent users.

SuggestedRemedy

The BS increases the power gradually in the initialization procedure. In particular, it starts the initialization procedure in a small region with small power. If no incumbent users are found, it increases the power and operates the initialization procedure in a larger region, so on and so forth. Refer to 22-07-xxxx-00-0000-Huawei_Incumbent_Protecting_Initialization which will be posted in the Jan. meeting document area for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.3** *P* **119** *L* **6** # 189
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Using ""shall"", the text ""the CPE shall perform sensing not only in the set of channels indicated in the SCH, but also in all other affected channels"" implies optional channel bonding feature is used as mandatory.

SuggestedRemedy

Modify the text to eliminate implied mandatory use of Channel bonding.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.3** *P* **119** *L* **6** # 190
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The FRD requires that ""The first time a CPE is turned on, it MUST start by sweeping the RF range in which it is to operate to identify the presence of incumbent operations, as well as to access information from the WRAN networks accessible in the area."" However, the procedure specifies the a CPE shall start with searching for SCH, and then scan channels of N+-15, where N is the working channel of the target BS.

SuggestedRemedy

Modify the CPE initialization procedure to satisfy the FRD.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.3** *P* **119** *L* **6** # 110
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Sentence needs to be corrected

SuggestedRemedy

Replace it with ""After having received an SCH in a channel, the CPE shall perform not only in-band sensing on channels indicated in the SCH, but also out-of-band sensing (...) as to meet the out-of-band emission mask""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.3** *P* **119** *L* **8** # 111
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Correct sentence

SuggestedRemedy

Change from ""incumbent operation"" to ""in-band incumbent operation""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.5.1** *P* **125** *L* **16** # 31
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Matters related to channel bonding should be reported for later.

SuggestedRemedy

Delete following note 2:

2. For multichannel support, the CPE shall attempt initial ranging on every suitable upstream channel before moving to the next available downstream channel.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.15.5.1** *P* **125** *L* **45** # 134
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**

Here the draft says that ""Within the RNG-RSP message shall be the Basic and Primary Management CIDs assigned to this CPE"". In page 126, line 16, the drafrt says that ""For multichannel support, the CPE shall attempt initial ranging on every suitable upstream channel before moving to the next available downstream channel"". Does BS allocate basic, primary management CIDs in each channel of multiple channel support?

SuggestedRemedy

Clarify it.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.20** *P* **134** *L* **4** # 98
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There are a number of subclauses missing in this section.

SuggestedRemedy

Use the 802.16 spec as a starting point and update this section with all the required text.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21** *P* **142** *L* **25** # 191
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

CBP would be questionable to be claimed as an efficient self-coexistence method for overlapping 802.22 cells. CBP also could not provide fair accesses to the spectrum for the coexisting 802.22 cell.

SuggestedRemedy

Need more debate and proof-of-concept on CBP as the baseline self-coexistence method. CBP should not be standardized as a mandatory feature.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1** *P* **143** *L* **11** # 32
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Change MAC management ""frames"" by MAC management ""messages""

SuggestedRemedy

Line 11: ""pool of MAC management messages, ...""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.1** *P* **143** *L* **20** # 33
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

It should be clear that the measurements discussed are for sensing.

The in-band and out-of-band terms should read in-channel and off-channel since it means measurements made inside the TV channel being used and outside and not inside and outside the TV bands.

SuggestedRemedy

Line 20: 6.21.1.1 Sensing Measurements Classification

Line 21:
""Measurements can be of types: in-channel and off-channel. In-band measurements refer to the case when the stations sense the same channels used for normal cell operation. For example if a BS uses channel N to communication with its CPEs, in-channel measurement refers to the incumbent sensing activity which is performed in those channels (e.g., N-t through N+t, where, say, t ú 1), where sensing will be directly affected by the 802.22 operation in channel N. Similarly, out-of-band measurements refer to the case when the incumbent sensing activity is carried out in those channels other than N-t through N+t where sensing will not be affected by the 802.22 operation in channel N.""

Line 30:
""It is important to note, however, that in-channel and ooff-channel sensing measurements have a different meaning when used in the context of CBP measurements. For beacon measurements, all channels other than channel N are classified as being off-channel rather than in-channel since operation in these channels is not prohibited, as it is the case with respect to incumbent protection.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.1** *P* **143** *L* **25** # 192
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Should ""t<=1"" be a typo?

SuggestedRemedy

Should it be ""t>=1""?

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.2** *P* **143** *L* **36** # 34

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

It should be clear that the measurements discussed are for sensing.

SuggestedRemedy

Line 36: 6.21.1.2 Sensing Measurements Management

Page 144, line 9: ""Each single measurement request specifies several parameters such as the periodicity at which the BS ...""

Line 13: ""BLM-REP message which contains measurement results of what ...""

Page 145, line 5: ""(either with incumbents or for self-coexistence).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.2.1.2** *P* **158** *L* **4** # 42

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Looking at this paragraph, is it possible that the CPE may not lose synch with its own BS while sensing for a coexistence beacon? If there is no CBP beacon, there is no reason. If there is one and the BSs are synchronized, there is no reason.

Page 158, line 33: Packet scheduling based on CBP will help in the case of the upstream but not for downstream. Is it possible that upstream coexistence would be aproblem while downstream coexistence is not? If no, upstream scheduling would not help.

SuggestedRemedy

Line 4: Clarify the need for loss of synchronization.

Page 158, line 33: Clarify the need for upstream scheduling only.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.3** *P* **145** *L* **12** # 193

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Only TV services and Part 74 services are considered as incumbent. How about other types of licensed services in the TV bands, such as public safety servics?

SuggestedRemedy

Shall include all other types of licensed services in the TV bands worldwise, such as public safety.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.3** *P* **145** *L* **13** # 35

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

This section mentions the periodic incumbent sensing being done during quiet periods. It should also mention that it can be done for off-channel while the system is in operation (if a separate RF sensing chain is used) and refer to a section where it will be explained.

SuggestedRemedy

Add the following sentences at the end of the paragraph:
""Off-channel sensing can also be done without the need for quiet periods (if a separate RF sensing chain is used). This is explained in section zzz.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.1** *P* **146** *L* **7** # 36
Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Title of section is unclear.

For off-channel sensing, the quiet periods may not be necessary.

The UCS slot will need to contain sufficient symbols to allow channel response capture.

SuggestedRemedy

Change title for: 6.21.1.4.1 Notification Phase for Sensing During Quiet Period

Line 16:
""CPEs that are allocated upstream bandwidth shall use it to send to the BS a report on its overall measurement outcome (e.g., incumbent detected or not, and in which channel). If sensing off-channel, the quiet period may not be necessary. The way ...""

Page 147,line 6:
""... particular CPE or schedule UCS notification slots. This UCS slot shall contain 7 symbols to allow the pilot carriers to fully quantify the transmission channel response.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.1** *P* **146** *L* **7** # 194
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

If the quiet time is long enough, e.g. close to 20ms, and the subsequent frames are devoted for measurement report, the overall service interruption time could be longer than 20ms which is not acceptable for VoIP or other timing sensitive applications. So a dedicated quiet period notification phase with frames immediately follows the quiet period shall not be mandated, and more flexible reporting scheme shall be allowed.

SuggestedRemedy

A dedicated quiet period notification phase with frames immediately follows the quiet period shall not be mandated, and more flexible reporting scheme shall be allowed.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.1** *P* **146** *L* **7** # 196
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It's not clear how the BS acknowledge the measurement reports sent by a CPE?

SuggestedRemedy

Need further specifications.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.1** *P* **147** *L* **12** # 195
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It is not convincing that how these two type of UCS notification windows could improve the reliability and performance of the system.

SuggestedRemedy

Need elaborations. Remove or revise this scheme if needed.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2** *P* **147** *L* **22** # 37
Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Title of section is unclear.

Clarify sentence.

SuggestedRemedy

6.21.1.4.2 Notification Phase for Sensing During Normal System Operation

Line 30: ""During this phase, the BS should allocate the UCS notification slots only for the specific purpose of incumbent notification given the lower expected demand.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2** *P* **147** *L* **23** # 199
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

If the the quiet period notification phase ends when the BS has acquired a reliable picture of the measurement outcome in its cell, it wouldn't make sensng to have urgent situations being reported (if such situation happens, it means the picture is NOT reliable enough).

SuggestedRemedy

Please explain how to define ""reliability"" in this context and why urgent situation would still occur given a reliable reporting result. The reporting method shall be revised or not be standardized as mandatory feature.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2.1** *P* **147** *L* **43** # 197
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It's not clear why only ""a small amount of sensitive traffic (e.g. voice)"" is considered in this context? What if the ""amount of sensitive traffic"" is not ""small""?

SuggestedRemedy

The specified scheme is not robust and shall not be standarded as a mandatory feature. The standard shall have a much more robust solution than what is specified in this subclause.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2.1** *P* **148** *L* **2** # 198
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How can the BS disregard an urgent measurement report from a CPE if this is the only report received by the BS? This would be dangerous!!

SuggestedRemedy

The BS shall never disregard an urgent measurement report from a CPE even if this is the only report from CPEs. The reporting method shall be revised or not be standardized as mandatory feature.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2.2** *P* **148** *L* **15** # 200
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How reliable is it to use UCS slot for reporting in the congestive reporting situation?

SuggestedRemedy

Please elaborate.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.4.2.2.2** *P* **148** *L* **35** # 201
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Why should CDMA UCS notification be supported?

SuggestedRemedy

Need elaborations or the CDMA UCS notification can be eliminated.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.5** *P* **149** *L* **9** # 202
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Incumbent Detection Recovery protocol is too complex.

SuggestedRemedy

It shall be modified toward a simplified scheme or shall not be mandated.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.5** *P* **151** *L* **1** # 38
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Error in Figure 42. A Yes node in the middle of the diagram becomes No.

SuggestedRemedy

Correction to the diagram.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.5.1** *P* **152** *L* **3** # 203

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The section is not consistent with the spec in 6.21.1.5. The procedures are too complex. No idea how these two different approaches can be merged.

SuggestedRemedy

Shall consider simple but effective recovery schemes. These procedures shall not be mandated.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.5.1** *P* **152** *L* **3** # 107

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Needs integration.

SuggestedRemedy

Integrate this section with the previous one. Ask the MAC team to undertake this task.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.5.1** *P* **152** *L* **14** # 39

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Modify this section to describe sensing process for TDD. FDD option should be removed from the standard.

SuggestedRemedy

Line 14:
- Case 0: When IU is detected by both BS and CPE
- Case 1: When IU is detected by BS
- Case 2: When IU is detected by CPE

Align Figure 44 for TDD operation.

Page 153, line 4: Delete paragraphs and modify tables to deal with TDD.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.6** *P* **155** *L* **2** # 204

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Dynamic Frequency Hopping (DFH) is a control method of DFS hence it should be included in this subclause.

SuggestedRemedy

Consider adding DFH.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.1.7** *P* **155** *L* **8** # 205

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

This section, ""class B CPE for the protection of part 74 services"", is out of the scope of 802.22.

SuggestedRemedy

Remove this section from 802.22 standard.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **155** *L* **10** # 245

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

For IEEE 802.22 WRAN self coexistence, inter base stations on demand channel contention between one contention source BS (requestor) and multiple contention destination BSs (offerer) should differentiate and integrate mechanisms considering intra and inter operators situation.

SuggestedRemedy

Include the text of the following contribution to the draft standard: ""Inter Base Stations Adaptive On Demand Channel Contention for IEEE 802.22 WRAN Self Coexistence"" submitted to January 2007 London meeting (Doc: IEEE 802.22-07/0xxx)

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **155** *L* **10** # 246

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

For IEEE 802.22 WRAN self coexistence, inter base stations channel renting between one offrer BS and multiple renter BSs should differentiate and integrate mechanisms considering intra and inter operators situation (

SuggestedRemedy

Include the text of the following contribution to the draft standard: ""Inter Base Stations Adaptive Channel Renting for IEEE 802.22 WRAN Self Coexistence"" submitted to January 2007 London meeting.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **155** *L* **11** # 66

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

Contrary to other IEEE 802 standards where self-coexistence issues are only considered after the specification essentially is finalized, the IEEE 802.22 takes the proactive approach (as specified in its Requirements Document) and mandates that the MAC shall include self-coexistence protocols and algorithms as part of the initial standard conception and definition.

SuggestedRemedy

Some algorithms are introduced in ""22-06-0124-01-0000_Huawei_Inter-BS_Synchronization"".

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **155** *L* **17** # 40

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Use of directional TX/RX antennas should not be implementation dependent.

SuggestedRemedy

Line 17: ""Even if directional antennas are used at the CPEs, self-coexistence issues are not at all overcome (see Figure 54).""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **155** *L* **22** # 206

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It is not convincing that the CBP and inter-BS communication can address sufficiently the appropriate self-coexistence amongst collocated 802.22 cells.

SuggestedRemedy

These two scheme shall not be standardized as mandatory features. These two schemes shall be carefully verified and proven. If needed, they shall be modified or integrated with more effective schemes (such as spectrum contention, logical control connections, etc.) in order to address the self-coexistence requirements.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2** *P* **176** *L* **13** # 64

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

The IEEE 802.22 takes the proactive approach (as specified in its Requirements Document) and mandates that the MAC shall include self-coexistence protocols and algorithms as part of the initial standard conception and definition. WRAN system utilizes cognitive radio technologies to identify vacant frequency bands to communicate. Therefore when many CPEs need to make use of confined frequency resources, it makes WRAN system cell be overloaded. To reduce this cell load, the BS needs to move some CPEs in this overlapping area to another neighbor cell. Thus before load balancing, it is needed that BSs can provide the functions to CPEs in the overlapping area to synchronize and to co-exist.

When multiple CPEs are located inside overlapping area of multiple BSs, they need to notify S-BS on whether they can be served by other BSs. This procedure will be performed in two stages: initial ranging stage and normal operation stage. At initial ranging stage, CPEs may send BS Id which covers the CPE to S-BS. At normal operation, CPEs shall send this information to S-BS aperiodically. S-BS and CPEs shall save this data information in memory and update it periodically.

When there are new CPEs which are trying to access a network, if their bandwidth allocation requests exceed this cell bandwidth limit, S-BS shall redirect CPEs in overlapping area to other collocated cells. Firstly S-BS needs to judge how many CPEs can be served by other BSs through collocated BSs load information. Then S-BS shall negotiate with C-BS. S-BS sends Load Shunt Request (LS-REQ) to C-BS. This request includes number of load and number of subcarriers. After C-BS receives this request, a response message will be fed back to S-BS.

SuggestedRemedy

Proposed Solution
1. CPE's candidate BS Notification
CPE can notify S-BS of a list of BSs which can be candidate BSs serving this CPE's in initial ranging stage and normal operation stage.

BS ID notification message is sent to S-BS by a CPE within overlapping area, which can notify S-BS of how many BSs can serve it. S-BS and CPE need to store this data information and update it.

In initial ranging stage, after CPE finishes synchronization, ranging, negotiation, authorization and registration, CPE will send BS ID notification message to S-BS in optional initialization steps to inform S-BS of how many C-BS can serve the CPE and C-BS ID.

In normal operation stage, C-BS can adjust its coverage area to avoid interfering incumbent users by changing the number of CPEs covered within overlapping area. Hence in normal operation CPE also sends this message to S-BS aperiodically so that S-BS can update data information.

2. Load balance negotiation
When S-BS is overloaded, it needs to send LS-REQ message to C-BS through bridge CPEs in the overlapping area, which includes the numbers of shunt CPEs, number of subcarriers and slots which need to be borrowed. After C-BS receives this message from S-BS, it shall calculate the number of its own vacant channels. Then it selects channels from the set of vacant channels according to S-BS's request and sends IDs of these channels to S-BS. Then it sends LS-RSP message to S-BS through bridge CPEs in the overlapping area. After S-BS receives feedback information from C-BS, it sorts all the information from other cells in ascending order. If the numbers of CPE shunt are smaller than the largest number of vacant channels, S-BS selects a cell with the largest number of vacant channels as a target cell. If some of the numbers of CPEs shunt are bigger than the largest number of vacant channels, S-BS selects a target cell according to the numbers of vacant channels from highest to lowest. Then S-BS will redirect CPE within overlapping area to target C-BS.

S-BS sends LSReq message to C-BS through inter-BS communication mechanism to request CPE belonging to S-BS to access network of C-BS.

C-BS sends LSRsp message to S-BS through inter-BS communication mechanism to identify whether C-BS can share load with CPE belonging to S-BS.

3. CPE Redirect
After S-BS receives LS-response and finishes choosing a target cell, it shall start redirection procedure. S-BS shall communicate with C-BS through shunt CPEs to finish this procedure, which is named inter-cell communication. To address the reliable inter-cell communication, a novel inter-cell communication scheme where reliable communication can be guaranteed is introduced. The inter-cell communication proposal can reference to STM proposal ""22-06-0111-02-0000_STM-MOT-ConnectionBased-InterBS-Comm"".

After these CPEs finish redirection procedure, they will release their channels used before redirecting and pause connection with S-BS until load balance process of S-BS is completed. This procedure solves overload problem of S-BS. Also, when some of the numbers of shunt CPEs are bigger than the largest number of vacant channels, the same procedure can be applied. The only difference is that S-BS needs to communicate with multiple cells synchronously.

4. Conclusions
(1) S-BS can compare load status of its own cell with other C-BS and select a target cell flexibly. While solving overload, this proposed solution can achieve the purpose of utilizing frequency resource more efficiently.
(2) Before switching CPEs, S-BS will keep serve with shunt CPEs, which will not interrupt CPEs service and can assure CPEs service continuity and QoS.
(3) Extra cost does not need to be increased and S-BS can directly utilize CPEs in overlapping area to finish synchronization and signaling alternation.
Refer to 22-06-0126-01-0000_Huawei_Network_Entry_and_Initialization for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 213

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The spec defines a time where the CPEs shall not perform any transmission but simply listen to the medium for CBP packets and, possibly, BS SCH beacons. This is achieved by synchronized BSs.
Question: This is to schedule a time window for all beacons to be transmitted. Again, reliable? Efficient? How about the transmission delay?

SuggestedRemedy

Address the questions. Enhance the scheme by integrating with Logical Control Connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 221

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding CBP:
Require static BW allocations for CPEs, meaning BW allocation for CPEs shall not be changed for consecutive a number of frames.
Another issue is that it requires guard band in the coexistence window due to propagation delay.

SuggestedRemedy

Address the issues. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 215

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Traffic contraint of CBP requires that Downstream/upstream bandwidth allocations made by BS to CPEs in a certain frame shall not change for a number of consecutive frames.
Question: This requirements bring in undesirable limitations. Can we do better job providing flexibility?

SuggestedRemedy

Address the issue and question. Enhance CBP with spectrum contention algo for flexibility.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 207

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It is not convincing CBP shall be a mandatory coexistence feature itself due to its limitations and unsatisfactory efficiency.

SuggestedRemedy

Integrate CBP with Logical control connection (connection based inter BS communication method) for enhancement.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 220

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding CBP:
Beaconing during coexistence time window?
It makes sense but it could be very likely to have collisions.
Beaconing during quiet period?
Does not look feasible because of synchronized quiet periods and interference to sensing, etc.

SuggestedRemedy

Address the issue. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 219

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding CBP:
Beaconing during normal operations? Issues include interferences to other cells and unknown TX time make it difficulty to receive CBP packets.

SuggestedRemedy

Address the issues. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 218

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding CBP:
How multi-channel inter-BS communications are facilitated? More serious reliability and efficiency issue can be raised.

SuggestedRemedy

Address the issues. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 217

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding CBP:
This is a Best Effort, Contention Based Beaconing Mechanism, that has inherent reliability and efficiency issues.

SuggestedRemedy

Addess the issues. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **7** # 214

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Traffic contrait of CBP: CBP allow that future upstream bandwidth reservation requests can contain time allocation constraints, for example, a CPE can specify: ôGive me 100Kb of airtime, but not between T1 and T2ö.
Question: Is this fair? what if it is always unacceptably large between T1 and T2 (no room for spectrum sharing for other WRANs)?

SuggestedRemedy

Address the question. Enhance CBP with spectrum contention algo for fairness.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **9** # 208

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the following text - ""The CBP is a best-effort protocol based on coexistence beacon transmissions."" It follows the best-effort model, successful reception of coexistence beacons is not guaranteed. Reliability and Efficiency are big issues for addressing a variety of coexistence requirements.

SuggestedRemedy

Integrate CBP with Logical control connection (connection based inter BS communication method) for enhancement.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **10** # 212

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the following text - ""CPEs do not continuously stay locked to a BS"".
How to handle the interference issue when a beacon is transmitted while CPEs in other cells are transmitting/receiving?

SuggestedRemedy

Address the question. Enhance CBP by integrating with Logical Control Connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **10** # 211

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the following text - ""CPEs do not continuously stay locked to a BS"".
In fact, a CPE would have to perform more work, such as out-of-band sensing and in-band sensing, rather than being dedicated to CBP listening. This would decrease the probability CBP beacons can be received by CPEs.

SuggestedRemedy

Address the issue. Enhance CBP by integrating with Logical Control Connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **10** # 210

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the following text - ""CPEs do not continuously stay locked to a BS"".
Does a CPE searches CBP packets in other channels? In essence, the question is how the multi-channel CBP communications can be facilitated, in other words, how to facilitate that a transmission on a channel can be received by another WRAN that is operating on anther channel? This would add more uncertainties to the inter-BS communications.

SuggestedRemedy

Address the questions. Enhance CBP by integrating with Logical Control Connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **10** # 209

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the following text - ""CPEs do not continuously stay locked to a BS"". Simulations on this? How much time has a CPE need to monitor for beacons in order to achieve the satisfactory reception?

SuggestedRemedy

Provide convincing simulation results.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.1** *P* **156** *L* **14** # 41

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Optional mechanisms should be introduced in the standard when they have been discussed and agreed upon.

SuggestedRemedy

Line 14: Delete the following paragraph:
""Several mechanisms are implemented on top of CBP, such as the renter/offerer algorithm and etiquette for channel assignment.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.3** *P* **159** *L* **15** # 100

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

As it agreed by the group over telcos, emails and face-to-face, CBP is the mandatory mode on top of which all mechanisms presented under this subclause are to operate. This is not clear from this write-up and hence needs to be included for clarity and understandability.

SuggestedRemedy

Include introductory text (see below) in this section to clarify this point, and then refer to the Appendix where more information about the specific technologies can be found.

1) Include the following paragraph:
""The CBP protocol is the mandatory and default self-coexistence protocol on top of which the mechanisms described in this section are implemented. In addition to the basis resource sharing functionality of CBP, it can also be used to negotiate which (if any) of the schemes described in Appendix A.4 are supported by the different 802.22 systems. Figure <XXX> illustrates the self-coexistence architecture of this standard.""

2) Include the Figure <XXX> (see above) that depicts the self-coexistence architecture. I have the figure available and can provide it upon request.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.2.4** *P* **159** *L* **17** # 216

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Regarding Inter-BS Communications using CBP, it specifies that BS may either periodically listen to or even schedule downstream/upstream per frame quiet periods with the goal of detecting SCH frames transmitted by other BSs within its transmission range. Another possibility is that a BS receives CBP packets (either during normal operation or during quiet periods).
Questions: How can a CBP packet be received/transmitted during a quiet period, considering quiet periods of all collocated WRANs are synchronized?
How can a beacon be detected in a reliable way if the time of beacon transmissions is unknown to other BSs?
So it seems that it only makes sense to TX/RX coexistence beacons during the synchronized coexistence time slots (intervals).

SuggestedRemedy

Address the issues and questions. Enhance CBP with logical control connection (inter-BS control connections).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3** *P* **159** *L* **36** # 223

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Out-of-band sensing should also been performed whenever it is possible, regardless of the BS is communicating with its CPEs or not. This is true, for example, CPEs can simultaneously perform sensing in the DL when they're receiving.

SuggestedRemedy

Address the comment, and revise the text if appropriate.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3** *P* **159** *L* **36** # 222

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Considering the following text - ""Whenever not engaged in communication with its BS during normal cell operation, CPEs shall perform out-of-band sensing first, and then opportunistic in-band sensing (see 6.21.3.3). ""

Out-of-band sensing should also been performed whenever it is possible, regardless of the BS is communicating with its CPEs or not.

SuggestedRemedy

modify the text.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3** *P* **159** *L* **45** # 43

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""For out-of-band measurements, quiet periods are not necessary ..."" [Not necessary true: sensing may not be done during CPE burst transmission because of the large signal differential, and even during reception if a single RF path is used for RX and sensing.]

SuggestedRemedy

Clarify sentence accordingly and include the above explanation and any other material from the Sensing Tiger Team.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3** *P* **160** *L* **2** # 224

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How long is the time for resync and channel estimation? This time, together with reporting time, DFS signaling time, and quiet sensing time, add into the service interruption time.

SuggestedRemedy

Address the issue. Consider DFH for enhancing the performance.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3** *P* **160** *L* **3** # 93

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

It is not 'transmit a preamble'

SuggestedRemedy

Replace 'a preamble' by 'both the short and the long training sequences'

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.1** *P* **160** *L* **13** # 225

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Why don't we simply consider GPS for sharing a common clock among coexisting WRAN systems? Cost is not an critical issue for BSs.

SuggestedRemedy

Consider using GPS for WRAN systems synchronization.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **160** *L* # 70

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

It is based on a two-stage sensing approach: fast sensing and fine sensing. The fast sensing is done before the fine sensing, and typically uses a quick and simple detection algorithm such as energy detection. It is done primarily over in in-band channels, and the outcome of these measurements determines the need and the duration of the upcoming fine sensing.""

In order to detect signals of LU, QP (Quiet Period) is used by the WRAN. But in the QP, the whole system is required to keep quiet which means the whole system shall not perform any transmissions. This brings some points to be considered for performance improvement:
1) higher stringent requirement to the WRAN system;
2) because of the multipath, QP may be longer than tens milliseconds which affects the interference detection result;
3) because in the QP the whole system shall not perform any transmissions, this is a waste of the system resource;
4) in order to detect LU in time, using QP frequently is needed while this causes a lot of waste of the system resource.

SuggestedRemedy

More details and some algorithms are explained in 22-06-0262-00-0000_Huawei_Orthogonal_Interference_Detection.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **160** *L* **49** # 226

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The text - ""how can a 802.22 network protect incumbents through quieting channels while, at the same time, supporting the expected QoS required by 802.22 users?"", is one of the motivation of DFH, which can effectively address the issue.

SuggestedRemedy

Consider DFH as the solution to the issue described here.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **4** # 227

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

SuggestedRemedy

Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory. Consider DFH as the solution to the requirements for both incumbenet sensing and QoS support of WRAN.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **14** # 228

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How can energy detection in micro seconds achieves the sensing requirement of -116dBm and the required(Pd, Pfa) performance? Reality is likely that energy sensing would never feasible for such stringent sensing requirements.

SuggestedRemedy

Address the feasibility and practicalily of using ""fast sensing"" for weak signal energy detection. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **14** # 231

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

For relatively weak signals (e.g. below the noise floor), it doesn't make sensing to have fast sensing because it doesn't help. Fine sensing is always needed in many situations.

SuggestedRemedy

Address the issue. Consider DFH as the alternative to the problem being addressed. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **17** # 94

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Specific numbers should not be mentioned

SuggestedRemedy

- Replace 'a few' by 'in the order of'
- Delete the text between parenthesis '(e.g., 20usec ....)'

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **20** # 229

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

If the energy in the affected channel is always below the threshold, Can we conclude that the channel is incumbent free such that the fine sensing can be cancelled? It seems not making sense.

SuggestedRemedy

Address the issue. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **22** # 230

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

At lease quiet time for 1 chnanel is needed if there is any doubt. Fine sensing quiet time would be 24ms/channel!!! QoS issue is still unsolved.

SuggestedRemedy

Address the issue. Consider DFH as the solution for the problem. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **28** # 233

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Dynamically appearance of fine sensing doesn't actually resolve the QoS requirement issue. Quiet periods of more than 20ms are still needed in many situations.

SuggestedRemedy

Address the issue. Consider DFH as the alternative solution to the problem being addressed. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **31** # 232

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Why 3 orders?

SuggestedRemedy

Address the question.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **37** # 234

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Fine sensing shall not ends at the end of the channel detection time because extra time is needed to be reserved for sensing reporting on the same channel.

SuggestedRemedy

Address the issue and revise the scheme. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **41** # 44

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Fast sensing may be sufficient to indicate presence of incumbent. Then the WRAN system can change channel and do the fine sensing off-channel since this could possibly be done while the system operates normally if a separate sensing RF chain is used.

SuggestedRemedy

Line 41: Add the following sentences:
""IF fast sensing gives sufficient information on incumbent, fine sensing may not be needed on-channel. The system could change channel and carry out the fine sensing off-channel.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **161** *L* **46** # 235

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

This would only make sense if the incumbent signal is strong enough most of the time. Otherwise, fast sensing will never help for both incumbent protection and WRAN QoS.

SuggestedRemedy

Address the issue. Consider DFH as the alternative to the problem being addressed. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **162** *L* **6** # 125

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

here the standard says that ""It is done primarily over in in-band channels, and the outcome of these measurements determine the need and the duration of the upcoming fine sensing."". This is controdictory with synchronization among overlapped cells (some cells do not need fine sensing and some cells need fine sensing).

SuggestedRemedy

Fix it.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **163** *L* **7** # 236

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How to synchronize ""dynamically allocated"" fine sensing periods of overlapping WRANs? Imagine some WRANs need fine sensing but others don't. How can fine sensing be effective conducted for those WRANs that need it when others who don't need it are transmitting data?

SuggestedRemedy

Address the issue. Consider DFH as the alternative to the problem being addressed. Considering the efficiency and effectiveness issues, the Two Stage Mechanism for Quiet Period Management shall not be mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2** *P* **163** *L* **11** # 45

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

So all WRAN systems would synchronize their frames and quiet periods in an area. How would the SCH be detectable by adjacent cell BS and CPEs in a nearly synchronized case if they all occur at the same time? How would the fine tining be done?

SuggestedRemedy

Augment the paragraph to explain the mechanism for the fine super-frame alignment.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2.1** *P* **163** *L* **26** # 46

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""More specifically, the RTG window shall be used to perform the fast sensing, as this it will be more than sufficient to, for example, perform a simple energy detection.""
Not sure! The RTG may be as small as 46 usec and removing the channel time spread and filter ringing, it would not be sufficient to secure a quiet channel. A larger RTG would then be needed but would be wasteful since on-channel sensing does not occur necessary on every frame. I t would cost too much in overhead.

""For this scheme to be implemented, the BS has to inform CPEs in which frame fast sensing is to be performed. Not only that, the BS should also specify in which channel to perform fast sensing ...""
It would be known since it is on-channel sensing! Off-channel sensing is another story since it could be done by a CPE if a separate sensing chain is used when the BS has indicated in its DS-MAP that there is no data addressed to it in the current frame.

""... and how large the Sensing RTG window has to be.""
RTG is not a variable. It is set by the PHY parameters of the system. The last slots of the frame could be declared as 'quiet' however.

SuggestedRemedy

Line 27: Add text to the paragraph to clarify the use of the last slots of a frame for sensing rather than the RTG.

Line 30: Clarify why it would need to indicate the channel and describe the off-channel sensing scheme.

Line 31: Clarify that RTG has a set length for a given cyclic prefix and that last data slots could be used for sensing.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2.2** *P* **164** *L* **14** # 237

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Figure 59 needs to be changed for single channel operation instead of channel bonding.

SuggestedRemedy

Change the figure 59.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.3.2.3** *P* **164** *L* **16** # 238

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Considering the text - ""Once the BS receives the reports from enough CPEs about their fast sensing measurements, it can make a decision with respect to the following fine sensing stage(s). "" What criteria is used for the decision?

SuggestedRemedy

Specify the criteria that are used to decide if fine sensing is need.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4** *P* **165** *L* **22** # 239

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

""this can be done through clustering"" - Why is clustering mentioned in particular?

SuggestedRemedy

Address the question and revise the text where appropriate.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4** *P* **165** *L* **26** # 126

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Since the explicit channel management mode provides more flexible (unicast/multicast/broadcast, being sent out at any time) and the same spectrum utilization (broadcast). The 802.22 do not need embedded channel management mode.

SuggestedRemedy

remove embedded channel management mode from the draft.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4.1** *P* **166** *L* **9** # 240

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Active set 1 and set 2: Channels used for BS and CPEs can be different only when optional features such as channel aggregation and channel bonding are employed.

SuggestedRemedy

Such categorization would only make sense as optional. The specification shall not be mandated. Address the issue.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4.2** *P* **167** *L* **31** # 127

Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**

The channel in the sets other than occupied set should become useless as incumbent service appears.

SuggestedRemedy

modify 1) accordingly.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4.2** *P* **167** *L* **36** # 128

Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**

This item should be redefined. Otherwise the candidate channel set will include only one channel with best quality.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.4.3** *P* **167** *L* **4** # 241

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How effective is it that a WRAN detect the collision, given a 33km coverage radius and much longer interference radius of a WRAN? It could interfere but not be able to detect the existence of another WRAN in the neighborhood. It may be able to detect but the response time could be quite long given a long propagation delay of the signal. If collision happens, interference may not be acceptable for WRANs. When a WRAN backoff when it detects a collision, its services have to be interrupted and such service interruption way hurt the QoS of the WRAN.

SuggestedRemedy

Address the issues. The scheme should not be standardized as a mandatory feature.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5** *P* **168** *L* **3** # 242

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The ""Synchronization of Overlapping BSs"" precedure is too complex and has limitations. Suggest to use GPS for synchronizing the BS by sharing a common clock.

SuggestedRemedy

Suggest to use GPS for synchronizing the BS by sharing a common clock.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5** *P* **168** *L* **3** # 53

Ji, Baowei Samsung Telecom. A

Comment Type **TR** *Comment Status* **X**

The method of synchronization of overlapping BSs in the current 802.22 spec. draft does not address the propagation delays between a CBP transmitter and a CBP receiver. The precision of net synchronization is directly limited by this kind of propagation delay. In other words, two neighbor cells could be off synch by up to hundreds of microseconds, which is far from the desired precision (say 25Ásec).

SuggestedRemedy

Please insert a new section 6.21.5.4 right above Section 6.21.6.1 on Page 172, Line 32. The suggested text for this new section is on Slides 28 - 30 of the document 22-07-0021-01-0000_Revisit_CBP_and_Synchronization_of_Overlapping_WRAN.ppt.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5** *P* **168** *L* **3** # 244

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

OFDMA based spectrum sharing requires accurate sychronization which would need a common system clock for every base station.

So the sychronization method proposed in this subclause is not necessary and not appropriate since a method to provide more accurate common systme clock will have to be provided.

SuggestedRemedy

Achieve BS synchronization by sharing a common system clock. Such common system clock is provided by Global positioning system (GPS).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5** *P* **168** *L* **20** # 47

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""This will further enhance the incumbent detection probability, which can otherwise be compromised if it occurs randomly.""
One could imagine that the WRAN cell closest to the incumbent would first detect this incumbent and change frequency. This would then allow the second closest cell to then detect the incumbent and change channel and so on. This is true for DTV but not necessarily for Part 74 microphone operation.

SuggestedRemedy

Larify paragraph as to the possibility of a progressive sensing of the incumbent based on proximity but possible difficulty with Part 74 microphones.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5.1** *P* **169** *L* **6** # 95

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

This section is no longer required given that all of the assumptions have been fully addressed and overcome in the current draft.

SuggestedRemedy

Delete section 6.21.5.1

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5.1** *P* **169** *L* **6** # 48

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Clarify the assumptions used and make sure they are aligned with the characteristics of the standard.

SuggestedRemedy

Modify the two paragraphs as follows:

""For any synchronization scheme to be mostly effective, some constraints need to be imposed on the overall frame timings. In the specific case of the 802.22 CMAC, the superframes shall have the same length in terms of time, that is 16 frames. Individual frames within a superframe shall also have the same size, that is 10 ms. This will facilitate not only in establishing synchronization amongst overlapping cells, but, most importantly, in keeping it with very low overheads.

If a GPS device is available at the 802.22 BSs, synchronization can be accomplished by imposing an additional requirement that BSs shall only initiate superframes at specific absolute points in time. But for the purpose of this standard, no mandatory GPS device is assumed at the BS.""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5.1** *P* **169** *L* **38** # 49

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""... where NSTQP is the Number of Superframes within an Incumbent Quiet Period.""

If a quiet period is allowed to include a number of super-frames, it is unlikely that the QoS will be provided. Sensing should not require more than a few 10s of ms, not multiple of 160 ms!

SuggestedRemedy

Change NSTQP in NSIQP in the extracted phrase and clarify text.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.5.3** *P* **172** *L* **21** # 50

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""... the BS shall schedule self-coexistence windows with an appropriate guard band, which is recommended to be at least three slots.""
If the complete characterization of the channel response is to be made, then the self coexistence window needs to be at least 7+3= 10 slots.

SuggestedRemedy

Modify the extracted phrase accordingly.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.6** *P* **172** *L* **32** # 243

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The ""Clustering"" procedure and algorithm are too complex to implement and have limitations. The algorithm shall not be standardized.

SuggestedRemedy

Address the issue. Clustering procedure shall not be mandated. The specific clustering algorithm shall not be included in the standard.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.21.6.2** *P* **177** *L* **3** # 129

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Since clustering algorithm is only implemented in each BS. No cooperations are required among neighboring BSs, BS and CPEs. It is a totally implementation issue. So it is not necessary to indicate a mandatory algorithm.

SuggestedRemedy

clearly says that the standard do not need to define a clustering algorithm and the k-means clustering algorithm is a informative algorithm.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.3** *P* **9** *L* **29** # 176

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The specified Superframe structure is designed for the optional channel bonding feature.

SuggestedRemedy

The specified Superframe structure shall be optional or redeisgned for mandatory features.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.3** *P* **9** *L* **33** # 9

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Channel bonding and aggregation are to be discussed later and should not appear in the first draft. See Annexes.

SuggestedRemedy

Line 33:
À A PHY preamble (composed of a synchronization symbol and two channel training symbols)- see 8
À A Superframe Control Header (SCH) - see 6.5.1
À 16 frames, of which the first frame comes without a preamble and is shortened so that its total length is still equal to the nominal frame length (10 ms) when the superframe preamble and the SCH are included - see 6.4

Line 37:
At the beginning of every superframe, the BS shall transmit a special preamble and channel training symbols and SCH (with a known modulation/coding). Any device tuned to the TV channel that synchronizes and receives the SCH, is able to obtain the information it needs in order to establish communication with the BS. During the lifetime of a superframe, 16 MAC frames are transmitted. During each MAC frame, the BS has the responsibility to manage the upstream and downstream directions, which may include ordinary data communication, measurement activities, coexistence procedures, and so on.

Line 46:
The superframe shall have a fixed and pre-determined size of 16 frames (see Table 27 for a list of frame sizes). This is needed to guarantee that overlapping 802.22 BSs can efficiently coexist and share resources through the numerous coexistence mechanisms described in 6.21.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.3** *P* **10** *L* **1** # 10
Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

Channel bonding and aggregation are to be discussed later and should not appear in the first draft. See Annexes.

SuggestedRemedy

Figure 3 needs to be re-done to depict the super-frame structure without the 'bonding' mechanism. Include illustration of the shorter first frame.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **10** *L* **3** # 177
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Sliding self-coexistence slots shall be only appeared in the US subframe and located in between the US and DS subframes. Figure 4 has error.

SuggestedRemedy

Sliding self-coexistence slots shall be only appeared in the US subframe and located in between the US and DS subframes. Fix such error in Figure 4.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **10** *L* **3** # 178
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Self-coexistence slots shall not be slided and shall be in fixed sized and well-known/synchronized locations in the frame.

SuggestedRemedy

Self-coexistence slots shall not be slided and shall be in fixed sized and well-known/synchronized locations in the frame. Specify fixed sized self-coexistence slots.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **10** *L* **11** # 11
Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Self co-existence slot should be at the end of the frame, not at the TTG which varies based on US/DS capacity split.

SuggestedRemedy

Modify Figure 4 accordingly.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **11** *L* **4** # 12
Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Remove the ""possible contention intervals for coexistence"" in the DS sub-frame.

Shouldn't the notion of sub-channels be added in the text around line 8 to reflect the OFDMA structure rather than the TDMA structure?

SuggestedRemedy

Line 3:
""the downstream and upstream capacity can be easily done. The downstream subframe consists of only one downstream PHY PDU. An upstream subframe consists of contention intervals ...""

Line 8:
of fixed size (MAC) slots, which are, in turn, an integral number of modulation symbols and sub-channels (currently, 1 MAC slot = 1 modulation symbol x 1 sub-channel).""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **11** *L* **30** # 13

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Line 30: Clarification of the sentence.

Also, remenber, in OFDMA, the bursts are defined in terms of time slots and sub-channels, not only time slots.

Line 33: Why is the SSS a sliding window. This window should occupy the last time slots of the US subframe.

SuggestedRemedy

Line 30:
""allocation and use the resource for some other purpose. Preceding upstream CPE PHY bursts, in this case, the BS may schedule up to four contention windows (see 6.14) before the next scheduled upstream CPE PHY burst. The initialization window is used ...""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **12** *L* **5** # 14

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Why does the SS need to slide? Its place should be at the end of the US sub-frame.

SuggestedRemedy

Line 5:
""together with coexistence beacons (i.e., through CBP) shall be employed. The SSS window (depicted in Figure 4) is scheduled at the end of the upstream subframe for simpler multiplexing and to accommodate simpler receiver designs. These beacons are transmitted by ...""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.4** *P* **12** *L* **15** # 15

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

CBP bursts are to signal the possibility of coexistence situation ""on the same channel"". This is done through on-channel decoding.

SuggestedRemedy

Line 15:
Whenever a CPE is neither receiving nor sending data to its BS, it is capable to, first, perform out-of-band measurements (see 6.21.1.5), and/or, depending on whether sensing is performed by the same RF chain or a different one, decode CBP packets transmitted by nearby CPEs belonging to other BSs operating on the same TV channel ...

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.5.1** *P* **12** *L* **29** # 179

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Super frame control header, designed for optional featurs such as channel bonding, should be optional or re-designed for single channel operations.

SuggestedRemedy

Specify that super frame control header (SCH) is optional or re-designed SCH for single channel operations.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.5.1** *P* **12** *L* **30** # 16

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Bonding: later option
AAS: later option
Better coexistence with FCC Part 74 systems: not clear since Part 7 devices are sensed all the time for the beacon sync burst

SuggestedRemedy

Line xx:
""802.22 cell and brings with it many benefits including control over the time a device takes to join the network, better self-coexistence, support for quiet periods, better coexistence with incumbents and FCC Part 74 systems employing beacon signals, eventual support for channel bonding (see annex X), and so on.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.5.1** *P* **12** *L* **45** # 17

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Table 1:
Second parameter seems to be redundent since by definition 802.22 Standard will carry 80.22 system type. Footnote on page 12 goes against what 802.22.1 is developing as beacon for Part 74 devices.

Insert new 4th parameter: BSID. It will replace the later TxID since SCH is only transmitted by BS. Reordering makes it consistent with other similar tables.

Old 5th parameter (FS) is redundant if we decide that the number of frames in a super-frame is 16. Should it be variable?

Bonding is an option to be discussed later (see annexes). Parameters for bonding should be marked ""Reserved"" in the Table 1.

Parameter GIF connot be only 1 bit since it has 5 option.

SuggestedRemedy

Delete second parameter (ST=0)

Insert new 4th parameter:
SID 48 bits Address that uniquely identifies the transmitting BS.

Remove FS parameter in Table 1 unless it is decided that the number of frames in a super-frame is a variable.

Change parameter PP for ""Reserved""

Remove parameter TxID

Change parameter CN for ""Reserved""

Change parameter NC for ""Reserved""

Change parameter BFD for ""Reserved""

Change the size of parameter GIF to 3 bits.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.5.2** *P* **15** *L* **7** # 18

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Table 4:

The modulation/coding for the FCH has to be decided upon.

DS-MAP Length: 8 bit addressing => up to 256 bits, this is not suffifient to map 30 sub-channels with the CIDs of 16 bit each. It only allows for 16 CID's and then there is no room for the burst start and length for each CID.

US-MAP Length: 8 bit addressing => up to 256 bits, up to 256 bits, this is not sufficient to map 60 sub-channels with the CID's of 16 bit each?

Repetition Indication parameter is not clear.

There will likely be an agreement on the absence of the training symbol following a Super-frame header. No need for the Short Training Sequence Present parameter.

SuggestedRemedy

Change the note for the FCH in Table 4 to:
Transmitted with modulation/coding QPSK rate ¢.

Increase the addressing size for the DS-MAP Length.

Increase the addressing size for the DS-MAP Length.

Clarify or remove Repetition Indication parameter.

Remove the Short Training Sequence Present parameter.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.6.1.2** *P* **17** *L* **3** # 180

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

CBP Beacons, base station beacons are designed for CBP (coexistence beaconing protocol), which is not sufficiently an efficient and fair coexistence method.

SuggestedRemedy

CBP should not be standardized as a mandatory feature. Consider negotiation based coexistence protocols such as on-demand spectrum contention protocol or/and credit token renting protocol instead. Or consider integrate CBP with on-demand spectrum contention or/and credit token renting protocols.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.6.1.2** *P* **18** *L* **21** # 19

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Table 8:

Explanation is needed for parameters 5 to 11.

Same channels would be used for DS and US in a TDD system.

SuggestedRemedy

If these parameters relate to bonding, replace them by ""Reserved"". If they relate to the stack of reserved channels for DFS, then clarify the wording.

Remove parameters 9 to 11 since the parameters 5-8 apply also to US in a TDD system.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.7.3** *P* **22** *L* **8** # 20

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

What is the unit of power in Table 19.

SuggestedRemedy

Indicate unit of power in Table 19 in the definition of the value.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.1.1** *P* **25** *L* **10** # 21

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Table 26:
TTG parameter should be expressed as a fraction of a time slot since it is 210 usec to absorb the round-trip delay for 30 km while the time slot is 330 usec.

RTG is redundent since it will represent the left-over of the 10 ms frame once all the header, DS and US slots are known.

The 802.22 WG is likely to adopt a single frame period.

The numbering of the Super-frames is limited to 8 bits, giving a repetition period of 40.8 sec. A longer period may be necessary to avoid repetitions.

The ""Number of Channel for Backup"" parameter should indicate the number of backup channels available in the stack in case incumbents appear on one or more operational and backup channels. It is not clear why it should be 1 to maximize the probability of the channel to be vacant as indicated in the Table. Once this parameter is given, then the list of these backup channels should be included in a following parameter.

The parameter Sensing RTG is unlikely to be useful since the RTG is likely to be very short (46 usec for CP= 1/8). The filter ringing and channel spreading is likely to make such RTG useless for sensing. This feature should be removed.

SuggestedRemedy

Code the TTG in number of sampling periods.

Remove the RTG parameter.

Remove the Frame Duration Code.

Increase the length of the Action Super-frame Number parameter.

Change the note for the parameter: Number of Channels for Backup to: Number of backup channels in the BS stack to align the CPE stack.

Insert a new parameter with a loop based on the previous parameter to list the backup channels stored in the BS stack.

Remove parameters Sensing RTG and Channel Number for Sensing RTG.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.1.1.1** *P* **27** *L* **5** # 22

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

""In addition, in the TDD case, note that the RTG and TTG guard intervals must be included in a frame.""

The 802.22 WG should decide that the WRAN standard only addresses TDD. That RTG and TTG guard intervals have to bve included inb a frame is motherhood.

The 802.22 WG should decide on 10 ms for the frame period.

SuggestedRemedy

This section 6.8.1.1.1 should be deleted.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.15.3.3.2** *P* *L* # 26

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

The parameter that need to be monitored by the WRAN system is the EIRP and not the output power. The gain of the transmit antenna will need to be known by the manufacturer and controlled through tamper-proof equipment.

The range that can be covered by 8 bit address is -64 dBm to 64 dBm in 0.5 dBm steps.

SuggestedRemedy

In the title and the text of this section, the word power should read EIRP.

The step size should be changed to 0.5 dB

In Table 122, Value should read:

Byte 0: Maximum transmitted power for QPSK
Byte 1: Maximum transmitted power for 16-QAM
Byte 2: Maximum transmitted power for 64-QAM.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.15.3.3.4.1** *P* *L* # 27

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

The 802.22 WG agreed to limit the systemto 2k FFT. This section is no longer necessary.

SuggestedRemedy

Delete section 6.8.15.3.3.4.1

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.2** *P* **28** *L* **9** # 62

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

Referring to Section 6.8.2, it states ""If the length of the DS-MAP message is a non-integral number of bytes, the length field in the MAC header is rounded up to the next integral number of bytes. The message shall be padded to match this length, but the CPE shall disregard the four pad bits"". However, since byte-processing is always preferable, the 4 pad bits can be removed.

SuggestedRemedy

Refer to 22-06-0086-01-0000 Huawei_MAC_Overhead_Reduction_for_Downlink_Bursts for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.2** *P* **66** *L* **3** # 63

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

This comment relates to the current MAC management messages which is described in Section 6.8.22

The MAC management messages in the current draft do not address discontiguous channels, which will impose a heavy overhead penalty on the systems that need to specify such kinds of channels for sensing. Specifically, a lot of overhead is needed to specify discontinuous to sense. In particular, one BLM-REQ message can only facilitate one continuous set of channels. Therefore, N BLM-REQ messages with almost identical contents are required to specify N discontiguous channel intervals for sensing, which add a lot of overheads to the system.

It is possible that the incumbents are not fixed TV incumbents but only strong incumbent signals which may leave after some time (e.g. a television station's remote-news van, which is dispatched to somewhere in the WRAN cell and sends a signal back to the station). In this case, the base station does not have a priori information of its presence from the database. But due to the strong signal of the incumbent, only few CPEs are sufficient to detect its presence very reliably. Most of the CPEs can save the sensing period to sense the other channels whose statuses are more uncertain. In this case, BS needs to specify discontiguous channels

SuggestedRemedy

Refer to 22-06-0084-03-0000 Huawei_MAC_Management_Messages_for_Efficient_Sensing for details.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.1.1** *P* **69** *L* **2** # 154

Shellhammer, Steve Qualcomm

Comment Type **T** *Comment Status* **X**

Entry 6 is titled ""Beacon (Part 74) Measurement Request."" This needs to be more specific.

SuggestedRemedy

Change Entry 6 to ""IEEE 802.22.1 Beacon Measurement Request""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.1.1** *P* **69** *L* **2** # 153

Shellhammer, Steve Qualcomm

Comment Type **T** *Comment Status* **X**

The sencond row of Table 150 is a ""Part 74 System Related Measurement Request"" This needs to be more specific

SuggestedRemedy

Change to ""Wireless Microphone Related Measurement Request ""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1** *P* **72** *L* **6** # 155

Shellhammer, Steve Qualcomm

Comment Type **T** *Comment Status* **X**

Once again the reference to Part 74 is too vauge.

SuggestedRemedy

Change entry 130 to ""Wireless Microphone Measurement Report ""
Change entry 134 to ""IEEE 802.22.1 Beacon Measurement Report ""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1.1** *P* **72** *L* **10** # 28

Chouinard, Gerald Communications Rese

Comment Type **ER** *Comment Status* **X**

The type of measurement needs to be known from a number of possible options (e.g., RSSI, SINR, etc.

SuggestedRemedy

Add the parameter to Table 162:
Type of Measurement

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1.1** *P* **73** *L* **1** # 158

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

Table 163 does not say what is to be reported. It only says the ""value of the measurement"" and gives an example of SINR. This cannot be implemented since the standard needs to specify what is to be reported and in what format.

SuggestedRemedy

Specify exactly what is to be reported and in what format. I recommend that an estimate of the field strength be reported and that a reasonable range and of field strength values be specified so it is clear how to format the report.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1.1** *P* **73** *L* **1** # 159

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

The entry entitled ""precision"" is not specific enough to be implemented. Also, it is not clear if precision is what is useful here or would it be better to change this to accuracy. Precision tends to inply the numerical resoluion and not the accuracy.

SuggestedRemedy

Change ""precision"" to ""accuracy"" and define it as the standard deviation of the field strength estimate. Specify the mapping from bits to field strength.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1.2** *P* **73** *L* **6** # 92

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Sentence is not fully complete

SuggestedRemedy

add 'and/or BSs' right after 'other CPEs'

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.22.3.1.6** *P* **77** *L* **14** # 29

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

The parameter ""Duration"" in Table 171 is not clear. Is it the duration of each measurement for each channel or the total duration of the group of measurements?

The way the channels are specified in the table only allow measurement on a group of contiguous TV channels. It should allow a list of specific TV channels such as those on the stack of backup channels.

SuggestedRemedy

Clarify the ""Duration"" parameter in the Notes of Table 171. Clarify the unit for this duration.

Instead of having a starting ans a number of channels, it should have a list of specific channels where the measurements have been done for more flexibility and more optimized measurement process.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.23** *P* **78** *L* **6** # 182

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The Scheduling Contraint is spectified to support CBP which is not sufficiently an efficient and fair method for self coexistence and spectrum sharing.

SuggestedRemedy

The scheduling contraint feature shall not be specified as mandatory.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.25** *P* **80** *L* **9** # 184

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Frame synchronization of WRAN systems benefits WRAN self-coexistance. Using frame sliding, however, complicates the process of frame synchronization by iteratively exchanging CBP packets and performing computation, and has limitation that only BSs that can reliably exchange control messages are able to synchronize.

SuggestedRemedy

Frame sliding method is not appropriate to be standardized as a mandatory feature. GPS shall be used instead for frame synchronization such that all BSs are synchronized without the above mentioned limitations and complexity. Frame slide message is not needed.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.25** *P* **80** *L* **9** # 183

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Frame slide message is transmitted by BS only. This constrains message exchange among base stations, however, base stations may not reliably hear one another even though self-coexistence is needed, i.e. they have overlapping coverage areas.

SuggestedRemedy

Frame slide message shall be able to be transmitted by CPEs as well, which behave as relays.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.3.1** *P* **31** *L* **5** # 23

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

In a TDD system, the US frequrency is the same as the DS frequency.

SuggestedRemedy

In Table 38, the Frequency parameter should be deleted.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.30** *P* **98** *L* **1** # 185

HU, Wendong STMicroelectronics

Comment Type **T** *Comment Status* **X**

DFH Messages is needed to be filled in in this section.

SuggestedRemedy

Fill in DFH messages.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.4.1** *P* **34** *L* **14** # 24

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

The algorithm for mapping the US data capacity has to be changed to correspond to the symbol granularity so that each US burst contains all the necessary pilots to train for the channel. The linear laying of the capacity as proposed will not work.

In Table 43, there seems to be a confusion between channel and sub-channel.

The 802.22 WG will likely agree that there is no preamble for the US burst.

SuggestedRemedy

Rewrite the first paragraph of the section and the detailed allocation algorithm given in Table 43 to align with the new capacity allocation scheme.

Table 43: all the words ""channel"" in the table need to be changed for ""sub-channel"".

Table 43: delete the parameter ""Preamble Present""

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.4.1.2.1** *P* **36** *L* **1** # 25

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

At various places in the Draft 0.5, the granularity of the power levels and TPC is indicated as 0.25 dB, 0.5 dB and also 1 dB. Can we agree that it will be 0.5 dB in all cases?

SuggestedRemedy

Table 46, Power Control parameter, indicate that the signed integer will be in 0.5 dB.

Align the other tables as well (e.g., Table 110 and section 6.8.15.3.3.2).

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.7.3.7.9** *P* **43** *L* **9** # 157

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

In Table 70 on of the entries is ""Part 74."" That is too vauge since there are mulitple Part 74 devices.

SuggestedRemedy

In Table 70 change the entry entitled ""Part 74"" into two entries:

1. Wireless Microphones
2. IEEE 802.22.1 beacons

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.8.7.3.7.9** *P* **43** *L* **9** # 156

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

The title of Table 70 is ""System Profiles."" This title is very confusing. What is listed in the table are all the signal types that need to be sensed. So I think a better title is needed.

SuggestedRemedy

Change the title of Table 70 from ""System Profiles"" to ""Signal Types."" Change all references in the text accordinging.

Proposed Response *Response Status* **O**

Cl **06** *SC* **6.88.22.1** *P* **66** *L* **19** # 181

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Measurements management is designed for contigueous channels only.

SuggestedRemedy

Measurement management shall be modified for supporting non-contigueous channel set as well.

Proposed Response *Response Status* **O**

Cl **06** *SC* **figure 41** *P* **151** *L* # 124

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

It is difficult to understand figure 63. There are the following problems:
1) connect two input events/messages directly,
2) connect decision criterion and input event/signal directly.
3) not clear which timer is used.

SuggestedRemedy

Fix these problems to make the figure clear.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 1** *P* **13** *L* # 116

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

FS field is not needed since the superframe shall have a fixed and pre-determined size of 16 frames as defined in L46, P9.

SuggestedRemedy

Delete FS field from Table 1

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 1** *P* **13** *L* # 117

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

In SCH, some felds are used for superframe control. Some fields are used for CBP. These fields should be replaced by two IEs: SCH IE and CBP IE. Fields used by both SCH and CBP should be fixed fields. This can decrease SCH related message length.

SuggestedRemedy

define SCH IE and CBP IE and reorganize SCH accordingly.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 1** *P* **13** *L* # 118
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
It is difficult to parse the SCH.

SuggestedRemedy
reorganize the SCH fields to make message parsing more easier.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 162** *P* **74** *L* # 135
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
""start frame""in table 162 has 8 bits length, but ""start frame""in table 164 has 16 bits length. Which one is correct?

SuggestedRemedy
Clarify it.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 21** *P* **22** *L* # 120
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
It is not clear what do ""REQ-REQ"" and ""REQ-RSP"" mean.

SuggestedRemedy
Provide the meaning of ""REQ-REQ"" and ""REQ-RSP""

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 25** *P* **25** *L* # 121
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
It is not clear what does ""n"" mean.

SuggestedRemedy
Add the meaning of ""n"" to the table.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 30** *P* **27** *L* # 122
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
It is not clear what does ""n"" mean.

SuggestedRemedy
Add the meaning of ""n"" to the table.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 37** *P* **31** *L* # 123
Chu, Liwen STMicroelectronics

Comment Type **T** *Comment Status* **X**
It is not clear what does ""n"" mean.

SuggestedRemedy
Add the meaning of ""n"" to the table.

Proposed Response *Response Status* **O**

Cl **06** *SC* **table 8** *P* **18** *L* # 119
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**
Backup channels normally are disjoint channels, so channel number+number of channels is not a good structure.

SuggestedRemedy
use number of channel+channel numbers to indicate backup channels.

Proposed Response *Response Status* **O**

Cl **07** *SC* **7** *P* **179** *L* **8** # 109
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**
This section seems to be far from complete.

SuggestedRemedy
Start from the 802.16 spec and fill in this section accordingly.

Proposed Response *Response Status* **O**

Cl **07** *SC* **7.4.2** *P* **182** *L* **29** # 130

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

here the standard says that ""All MAC management messages shall be sent in the clear to facilitate registration, ranging, and normal operation of the MAC."". But Line 2 in page 183 says that ""all critical management packets are digitally signed, and their integrity is checked by the receiver before further use: there is thus no mean for an attacker to craft such a packet.""

So I have the following questions:
1) does 802.22 provide security to the MAC management packets?
2) if yes what are the defination of critical management packets?
3) does 802.22 provide partial protection of a management packet to guarantee the security and provide enough information for new CPEs to join the cell?

SuggestedRemedy

Clarify all these questions.

Proposed Response *Response Status* **O**

Cl **08** *SC* **8** *P* **182** *L* **34** # 51

Chouinard, Gerald Communications Rese

Comment Type **TR** *Comment Status* **X**

Align the PHY section with the outcome of the PHY discussions in 802.22.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **08** *SC* **8.3** *P* **187** *L* **10** # 247

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Superframe incurs an additional level of complexcity to the system design and hardware design. Superframe is not necessary function-wise.

SuggestedRemedy

Superframe is not needed function-wise and should be made optional or removed.

Proposed Response *Response Status* **O**

Cl **08** *SC* **8.3** *P* **187** *L* **10** # 58

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

The preambles defined in the current draft are formed by QPSK symbols with I and Q components generated by two binary PN sequences, respectively. However, the frame and superframe preambles defined in this way have high peak-to-average-power ratios (PAPR) (> 7 dB). High-PAPR preambles may be clipped by the power amplifier, resulting in lower synchronization and channel estimation accuracy and hence degraded detection performance. The PAPR of preambles should be minimized as much as possible so as to allow improved performance by boosting up the transmission power of preambles, especially when some effective methods (e.g. clipping, coding, companding) for reducing the PAPR of the data modulation signals may be applied.
Furthermore, to reduce the adverse effect of adjacent cell interference on the synchronization and channel estimation accuracy, a set of low-PAPR preambles with low cross-correlation is desirable.

SuggestedRemedy

Based on the unified construction of polyphase perfect or constant amplitude zero auto correlation (CAZAC) sequences, sets of low-PAPR polyphase preambles with low cross-correlation energy are obtained. Since the design criterion for preambles is very similar to that for the polyphase sounding sequences specified in the current draft, it is possible to use the same lookup table for generating both the sounding sequences and the proposed preambles. Consequently, the improved PAPR gain can be obtained at the price of affordable complexity and memory. Refer to 22-07-0002-00-0000 Huawei_sequences_low_PAPR for details.

Proposed Response *Response Status* **O**

Cl **08** *SC* **8.3.1.2** *P* **190** *L* **24** # 96

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

It is not 'short and long preamble'

SuggestedRemedy

Replace it by 'short and long training sequences'

Proposed Response *Response Status* **O**

Cl **11** *SC* **11.3** *P* **280** *L* **5** # 65

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

Digital Video Broadcasting-Terrestrial (DVB-T), the European Standard on digital TV radio, has already been adopted by more than 30 countries. So it is reasonable to develop DVB-T sensing algorithms for IEEE 802.22 WRAN system. There are some distinct characteristics of DVB-T signal, such as OFDM, Cyclic Prefix (CP), Pilot symbols etc.

SuggestedRemedy

Several sensing algorithms based on these characteristics are proposed in the document referenced here. They are cyclic prefix based sliding correlation detection,, time domain pilot signals ,based sliding correlation, time domain pilot signals in cyclic prefix based sliding correlation and multi-antennas detection. These algorithms should be included in the standard. All of these algorithms are described and corresponding simulation results are presented in ""22-06-0263-00-0000_Huawei_Sensing_Scheme_for_DVB-T"".

Proposed Response *Response Status* **O**

Cl **6.13.** *SC* *P* **111** *L* **1** # 137

Mazzarese, David Samsung

Comment Type **TR** *Comment Status* **X**

Revisions are required to the method that determines the maximum allowed transmitted EIRP for one WRAN device, taking in account TV operations in nearby TV channels in the vicinity of the WRAN device, which is described in Section 6.13.5 of 22-06-0259-00-0000_v0.2_with_line_numbers.doc. FRD 195 and FRD 168 in 22-06-0138-05-0000-Compliance_with_FRD.doc mandate a limit on maximum transmitted EIRP on channels adjacent to a TV channel operation when the CPE or the BS is located inside the TV protected contour, and co-channel when the CPE or the BS is located at some distance of the TV protected contour. Section 6.13.5 requires updating based firstly on the most recent calculations on required separation distances to meet the D/U ratios at the TV protected contour, and secondly on a more accurate description of the decision process (flowchart and tables) and language suitable to describe requirements in technical specifications. Changes are also required to precisely identify mandatory and optional features of TPC for maximum transmitted EIRP.

SuggestedRemedy

The proposed text changes are presented in section 2.0 of document 22-06-0219-01-0000_Proposed_text_changes_to_P802-22_D0.1_Final_Section_6_13_5.doc. Sub-sections 6.13.5.1 and 6.13.5.2 are submitted as a replacement of section 6.13.5 in 22-06-0259-00-0000_v0.2_with_line_numbers.

Proposed Response *Response Status* **O**

Cl **6.4** *SC* **Figure 4** *P* **10** *L* **10** # 87

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Figure 4 needs to be updated to indicate the Self-coexistence window at the end of the frame

SuggestedRemedy

I have the updated figure and can provide it upon request.

Proposed Response *Response Status* **O**

Cl **6.8.2** *SC* **Table 143** *P* **65** *L* **14** # 90

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

The CHO-UPD does not provide priority amongst channels. This should be added to the table.

SuggestedRemedy

Under the for() loop, add a 2 bit 'Priority' field that can take the following values: i) Low; ii) Medium; iii) High; vi) Undefined.

Proposed Response *Response Status* **O**

Cl **6.8.2** *SC* **Table 151** *P* **69** *L* **7** # 91

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Since the Threshold value may change over time and is dependent on factors such as CPE distribution, it would be important to amend this table to allow for the specification of this possibily time varying threshold.

SuggestedRemedy

Include a 'Threshold' (15 bits) and 'Threshold valid' (1) bit in this table.

Proposed Response *Response Status* **O**

Cl **6.8.2** SC **Table 30** P **28** L **4** # 88
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**
Message should be an integer number of bytes

SuggestedRemedy
Delete Padding Nibble of 4 bits

Proposed Response *Response Status* **O**

Cl **6.8.2** SC **Table 32** P **28** L **9** # 89
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**
Message should be an integer number of bytes

SuggestedRemedy
Delete padding nibble of 4 bits

Proposed Response *Response Status* **O**

Cl **8.4** SC P **192** L # 146
Pirat, Patrick France Telecom

Comment Type **T** *Comment Status* **X**
Adjacent subcarrier permutation is not described.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **8.6** SC P **201** L **19** # 142
Pirat, Patrick France Telecom

Comment Type **E** *Comment Status* **X**
Usually the section on frequency interleaving (or sub-channel allocation, section 8.4 of the document) is placed just before this section

SuggestedRemedy
Swap sections 8.4 and 8.5

Proposed Response *Response Status* **O**

Cl **99** SC P L # 131
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**
Add 22-06-0228-00-0000_Scheduling_Connection_Bsed_Inter_BS_Communications.doc to the draft standard

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **99** SC P L # 136
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**
Synchronization of BSs by common clock provided by GPS should be included in the 802.22 standard.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **99** SC P L # 132
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**
Add 22-06-0229-00-0000_Spectrum_Contention_Algorithm_Submission.doc to the draft standard

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **99** SC P L # 115
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**
SCH makes frame parsing difficult.

SuggestedRemedy
Delete SCH from the standard

Proposed Response *Response Status* **O**

Cl **99** *SC* *P* *L* # 114
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The protocol should provide basic non hopping mode and DFH mode.

SuggestedRemedy

Provide basic non hopping mode and DFH mode.

Proposed Response *Response Status* **O**

Cl **99** *SC* *P* *L* # 113
Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

CMAC put coexistence in pretty important position. Inter-cell communication play a important role in CMAC. The inter-cell communication should be encrypted to guarantee security. Current draft does not support this kind of security.

SuggestedRemedy

Provide authentication, encryption to the inter-cell communication.

Proposed Response *Response Status* **O**

Cl **99** *SC* **Contents** *P* *L* # 263
Caldwell, Winston Fox

Comment Type **TR** *Comment Status* **X**

Need a new Section in the Draft describing Network Prohibition and Exit Procedures (like Nework Access and Initialization) in a problematic event, such as an incumbent signal is detected or the CPE has moved.

SuggestedRemedy

Add section.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.1** *P* **208** *L* **19** # 249
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Considering the following text - ""When in the multiple channel mode of operation, the BS shall transmit in each TV channel the SCH frame preceded by the superframe preamble as shown in Figure 3. Within the SCH the BS shall indicate which TV channels are being grouped together, which will allow CPEs to detect the multiple channel mode of operation."" The ""multiple channel mode"" implies ""channel bonding"" mode with the specially designed SCH in the text. In fact, ""multiple channel mode"" would include channel aggregation and dynamic frequency hopping, hence the text describing multiple channel support with SCH is not sufficient to support all other multiple channel modes.

SuggestedRemedy

Eliminate/modify the ""channel bonding"" oriented description/procedure in the text and accommadate other types of multiple channel operation such as channel aggregation and dynamic frequency hopping.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.1** *P* **208** *L* **25** # 250
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Superframe and SCH are ""channel bonding"" oriented. The text enforce a ""shall"" which is not appropriate for ""channel bonding"" oriented description.

SuggestedRemedy

Any ""channel bonding"" oriented descriptions (text, figures, terminologies, etc.) shall be made optional in the text.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.2** *P* **209** *L* **7** # 251
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

""the MAC shall never change the MAC frame size"" - this makes optional ""channel bonding"" mandatory (fixed MAC frame size for the three-channel bonding case).

SuggestedRemedy

Any ""channel bonding"" oriented descriptions (text, figures, terminologies, etc.) must be made optional.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.3** *P* **209** *L* **12** # 253

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

No definition for termologies such as ""active set"", FA, Spectrum Manager, etc.
Not clear how ""channel grouping and matching"" would benefit overhead reduction.

SuggestedRemedy

Need more information to be convienced. Remove ""channel grouping and matching"" if this method does not benefit the system operation with justified complexity.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.3** *P* **209** *L* **12** # 252

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

This section, ""channel grouping and matching"", is designed for FDD mode, which is not specified in the spec.

SuggestedRemedy

it has to clarify if FDD is supported, and how it is supported if it is supported.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.4.1** *P* **211** *L* **16** # 254

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The ""Hidden Incumbent Scenarios"" should not exist, given the fact that keep-out distances of BS and CPE to the DTV protection contour are enfored.

SuggestedRemedy

This feature as described in subclause A.1.4 would not be appropriate. Revise or remove the A.1.4.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.5** *P* **214** *L* **1** # 255

HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

This feature is to support optional channel bonding. So it shall make it clear that this feature is also optional.

SuggestedRemedy

Replace ""shall"" with ""may"" or words along the line to indicate the optional nature of this feature.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.6** *P* **215** *L* **4** # 112

Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

I believe that 802.22 WG is not assuming that 802.22 will be the only system operating in the TV white spaces. If that is the case, consider a scenario where we have a number of 802.22 networks and non-802.22 networks operating in vicinity. In addition, assume that some (or all) of the 802.22 networks operate using DFH.

In this scenario, isn't true to say that the DFH-enabled 802.22 networks may constantly step onto the other non-802.22 wireless systems operating in the same band? After all, it is unlikely that these systems will coordinate.

To make matters worse, would it not be possible that the non-802.22 systems using the same band can also employ something similar to DFH and harm 802.22 operations in a similar way?

Please note that the problem may be particularly worse here than in other existing unlicensed bands due to the much higher transmit powers of 802.22 devices.

SuggestedRemedy

The WG needs to discuss this and come to a resolution on the best approach to employ DFH. Do we need some sort of etiquette?

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.6** *P* **215** *L* **4** # 256
HU, Wendong STMicroelectronics

Comment Type **ER** *Comment Status* **X**

DHF text and figures need to be refine.

SuggestedRemedy

More editorial work on the DHF text and figures.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.7** *P* **222** *L* **3** # 257
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

The ""out-band distributive sensing scheme for active set 2"" scheme would increase the probability of false alarm by reporting incumbent appearances out side the interference arrange of a WRAN device.

SuggestedRemedy

Address the issue of over-protection (increased Pfa). Revise the scheme.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.1.7.2** *P* **224** *L* **7** # 99
Cordeiro, Carlos Philips

Comment Type **ER** *Comment Status* **X**

There is no need for a 'Conclusion' section here

SuggestedRemedy

Delete this section

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.2.3** *P* **226** *L* **5** # 248
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Figure A.22 is based on the optional channel bonding feature, hence it is appropriate for the mandatory case where single channel is in use by the system.

SuggestedRemedy

Modify Figure A.22 to reflect the mandatory single channel case.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.3** *P* **227** *L* **20** # 258
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

With quiet period allocated within a channel detection time (2s), channel can be vacated with guarantee within the required time limit. Why do we need extra effort to vacate channel faster than what is acturally needed?

SuggestedRemedy

Address the issue and question and revise the related mehtod.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.3** *P* **227** *L* **26** # 259
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

How to synchronized sensing frames of overlapped WRANs so that clean sensing is guaranteed for opportunistic sensing?

SuggestedRemedy

Address the issue by revising the related mehtod.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.3** *P* **227** *L* **29** # 260
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

""Note that the Channel Detection Time Interval need not be of fixed duration. The sensing duration also need not occupy exactly one frame."" - Why is this important?

SuggestedRemedy

Address the question and revise the text if appropriate.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.3** *P* **228** *L* **14** # 261
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Consider the text - ""whenever a CPE is neither transmitting nor receiving it shall first perform out-of-band sensing through the method depicted in Figure 43. "" Actually out-of-band sensing can be conducted when a CPE is receiving.

SuggestedRemedy

Resolve the issue by revising the method.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.1** *P* **229** *L* **17** # 101
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There is no specification for this scheme. How does it work? What are the frame exchanges?

SuggestedRemedy

It needs to be specified and integrated with the CBP protocol. Ask MAC team to undertake this task.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.2** *P* **229** *L* **25** # 102
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There is no specification for this scheme. How does it work? What are the frame exchanges?

SuggestedRemedy

It needs to be specified and integrated with the CBP protocol. Ask the MAC team to undertake this task.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.3** *P* **230** *L* **4** # 103
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

Is this an implementation issue?

SuggestedRemedy

In case this is about implementation, this section should be deleted. Otherwise, the algorithm has to be specified. Ask the MAC team to undertake this discussion.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.4** *P* **230** *L* **12** # 262
HU, Wendong STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Update the text for Spectrum Contention Algorithm.

SuggestedRemedy

Replace subclause A.4.4 with text from the following document: 22-06-0229-00-0000_Spectrum_Contention_Algorithm_Submission.doc.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.4** *P* **230** *L* **12** # 104
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There is no specification for this scheme. How does it work? What are the frame exchanges?

SuggestedRemedy

It needs to be specified and integrated with the CBP protocol. Ask the MAC team to undertake this task.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.4.5** *P* **233** *L* **11** # 105
Cordeiro, Carlos Philips

Comment Type **TR** *Comment Status* **X**

There is no specification for this scheme. How does it work? What are the frame exchanges?

SuggestedRemedy

It needs to be specified and integrated with the CBP protocol. Ask the MAC team to undertake this task.

Proposed Response *Response Status* **O**

Cl **A** *SC* **A.5.1** *P* **236** *L* **22** # 133

Chu, Liwen STMicroelectronics

Comment Type **TR** *Comment Status* **X**

Here the draft says that ""Upon initialization, this CPE shall scan the desired channel for a multiple number of the maximum superframe size in search for SCH packets transmitted by 802.22 BSs"". What does ""multiple number"" mean?

SuggestedRemedy

Clarify it.

Proposed Response *Response Status* **O**

Cl **AA** *SC* **AA.A.2** *P* **224** *L* # 59

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

In upstream, the polling strategy for BW requesting of the CPEs in the extended coverage is not efficient. This is because the BS shall waste time polling the AAS-CPEs which do not have BW request while the CPEs do have a BW requesting may wait for quite a long time before the BS poll them. It may be necessary to extend the existing upstream access to include a more efficient BW requesting mechanism for upstream of AAS-CPE.

SuggestedRemedy

To remedy the comment, the BS can maintain N fixed beams and capture the bandwidth request from CPEs from all the beams simultaneously (using N parallel correlators). The N fixed beams shall cover the whole cell and hence, each AAS-CPE may belong to one of these beams. When an AAS-CPE sends an autonomous upstream bandwidth request, at least one of the N correlators at the BS could capture the request. Refer to 22-07-xxxx-00-0000_Huawei_Random_Access_Adaptive_Antenna which will be posted in the Jan. meeting document area for details.

Proposed Response *Response Status* **O**

Cl **AA** *SC* **AA.c.3** *P* **253** *L* **1** # 69

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

When the narrowband incumbent (i.e. wireless microphone) users operate in a single TV channel, they only occupy portion of the TV channel, and the rest vacant channel can be used by other IU or RU users with guard band from the narrowband incumbent users. However, not only the rest vacant channel but also the neighboring TV channel can not be used by the WRAN system in fractional usage mode or channel bonding mode. This would waste the vacate spectrum resource.

SuggestedRemedy

One solution for this case is to divide a WRAN sub-band into M fractional sub-bands with the width 1MHz. The core idea of the fractional bandwidth usage is that WRAN system will transmit preamble, pilot and data in fractional sub-bands that will be used. The fractional bandwidth usage mode can be divided into two types according to whether or not preamble be segmented, segmented preamble insertion type and full preamble insertion type.

Segmented Preamble Insertion:
BS assigns pseudo random sequence PNi whose length equals to length of subcarrier band in fragment sub-band that will be used, then transmit pilot and data in this part of fragmented sub-band. These M preamble sequences will form a full OFDM preamble sequence in sub-band. The fractional bandwidth usage mode can be identified by detecting whether PN sequence exits in corresponding fragmented sub-band. This detection method can be implemented by frequency domain correlation and compare correlation values with predetermined threshold after OFDM demodulation.

Full Preamble Insertion:
First of all, receiver is notified of the mode of fractional bandwidth in advance (the method of segmented preamble insertion), The next step is inserting the longer or flexible PN sequence in corresponding fragmented sub-band. The difference between segmented and full insertions is that receiver will take out received data in unused fragmented sub-band before frequency domain correlation, and using the rest of data for correlation and synchronization.

Proposed Response *Response Status* **O**

Cl **AA** *SC* **AA.C.6** *P* **258** *L* **1** # 60

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

The existing schemes do not fully utilize the information provided by limited feedback, which can already be used for the following:
1. Power adaptation
2. MCS adaptation
3. Mode selection (number of spatial streams)
Furthermore, the current schemes do not take into account the potential spatial correlation between antennas. This is important because antennas are likely to be correlated when the operating frequency is low.

SuggestedRemedy

We propose an integrated framework of joint optimizing the MCS, mode and precoder adaptation design for WRAN systems with limited feedback. Two MAC management messages are show proposed to support our limited feedback design. Refer to 22-07-xxxx-00-0000_Huawei_MIMO_Limited_Feedback which will be posted in the Jan. meeting document area for details.

Proposed Response *Response Status* **O**

Cl **AA** *SC* **AA.D.11.3** *P* **280** *L* **5** # 67

Chang, Soo-Young Huawei Technologies

Comment Type **TR** *Comment Status* **X**

When channel measurement is mandated by the BS, CPEs shall make the required channel measurement. The channel measurements can range from simple received signal strength measurements (RSSI) or signal energy in a given TV band or frequency, or the detection of the characteristics of the signal. The RSSI can be used for quality measurement of the signal from the BS station, or for detecting the presence of any other signal in a TV band.

One point which can be improved as following: Because a WRAN system needs to detect interference from other system, every CPE should have the capability of sensing. The basic sensing methods of WRAN are coarse power detection and fine/feature detection. But, WRAN will be used in many countries and regions, coexistence environments are different in different regions, and the coexistence requirements will change in the same region. For example, the LU to be detected is ASTC in the U. S. A., while the LU is DVB in China. Moreover, the LU is DVB at present in China, but DMB may be used as the technology is developed. Hence, as the coexistence environment changes, it is needed that WRAN can detect new LU systems. In this case, WRAN system will deploy CPEs with the capability of detecting new LU systems. So, CPEs with capabilities of detecting different LU systems will coexist in the same cell. In addition, new advanced sensing technologies will be developed for old LU systems as the technologies of WRAN system advanced. CPEs with new sensing technologies will exist in markets, and then CPEs with different capabilities of detection will coexist in a WRAN cell. For that case, BS does not know detecting capabilities of every CPE, which means that BS does not know detecting methods of CPEs to detect signals of LUs. Otherwise, in the process of data fusion, WRAN needs to distinguish sensing reports from every CPE, especially in fine detection phase. For example, there are some CPEs (set 1) with old ATSC system fine characteristics detection method called Method 1,and some CPEs (set 2) with the latest ATSC system fine characteristics detection method called Method 2. When BS requests the CPEs of set 1and set 2 to detect ATSC signals, because Method 2 is more veracious than Method 1, in data fusion, the BS must have more trust in the sensing result of CPEs in set 2 than in set 1. So it is very important for the whole sensing judgment process that the BS knows sensing capabilities of every CPE in advance.

SuggestedRemedy

The procedure to improve sensing capability for this case as follows:
First, every CPE notifies detection capability to BS. BS cluster CPEs with different sensing goal (for example, BS can notify CPEs in an area to detect a specific type of interference signals). When BS requests CPEs in every cluster to send sensing reports back to BS, it will assign detection methods to CPEs. Finally, CPEs send sensing reports to BS, and BS judges the existence of interferences by data fusion.

Proposed Response *Response Status* **O**

Cl **AA** *SC* **AA4.3** *P* **230** *L* **4** # 54

Ji, Baowei Samsung Telecom. A

Comment Type **TR** *Comment Status* **X**

Spectrum Etiquette was included in the WG draft v0.1 (Section 6.21.2.3.3), and has been moved to A.4.3 with all other optional features. However, the details in the original contribution have not been captured in the draft from the begining. Those details are necessary for the completeness of the standard.

SuggestedRemedy

Please replace section A.4.3 with the text suggested in Section 2.0 of the document 22-07-0023-00-0000_Proposed_text_changes_on_Spectrum_Etiquette.doc.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* *P* **240** *L* # 138

Mazzarese, David Samsung

Comment Type **TR** *Comment Status* **X**

""Multiple CPE joint TPC"" was identified as ""URGENT work - results needed for green zone"" in 22-06-0200-01-0000_Table_of_Options_in_P802-22_D0.1. The current version of Annex B.2 in 22-06-0259-00-0000_v0.2_with_line_numbers is not technically accurate.

The current transmitted EIRP control mechanism guarantees the transmission from each individual WRAN device meets the D/U ratio requirement at the TV protected contour. However, when multiple WRAN devices are scheduled to transmit within one TV channel simultaneously, the interferences induced at the TV protected contour aggregate. A method is proposed herein for the mandatory joint transmitted power control of multiple WRAN devices simultaneously transmitting on the same TV channel, in order to control the aggregate interference created at the edge of the TV protected contour, when these devices are located in a certain vicinity of each other.

SuggestedRemedy

Section 2.0 in the companion document of this comment [22-07-016-00-0000_Proposed_text_changes_to_22-06-0259-00-0000_v0.2_AnnexB2] presents the proposed text for inclusion as sections 6.13.5.3 and 6.13.5.4, in replacement of Annex B.2. Sections 6.13.5.1 and 6.13.5.2 have been submitted in a separate comment supported by the document 22-06-0219-01-0000_Proposed_text_changes_to_P802-22_D0.1_Final_Section_6_13_5.doc, as a replacement of section 6.13.5 in 22-06-0259-00-0000_v0.2_with_line_numbers.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3** *P* **280** *L* **5** # 160

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

The section states ""The channel measurements can range from simple received signal strength measurements (RSSI) or signal energy in a given TV band or frequency, or the detection of the characteristics of the signal. The RSSI can be used for quality measurement of the signal from the BS station, or for detecting the presence of any other signal in a TV band. The measurement messages are specified in 6.8.22""

However, there are no specifics about what the CPE is to report in Clause 6.8.22.

SuggestedRemedy

Change text to ""The measurement messages are specified in 6.8.22""

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.1** *P* **280** *L* **13** # 161

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

The text states ""(iii) signal detection block to process the signals and detect the presence of interested signal or identify the signal types""

However, there is no support for ""identifying the signal types"" in the document.

SuggestedRemedy

Change text to ""(iii) signal detection block to detect the presence of various signal types.""

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.1** *P* **280** *L* **1825** # 162

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

The text says that ""The unoccupied channel selection may be done by one step or two step approach ... In the two step approach, multiple unoccupied channel candidates are first determined by energy detection method""

However, the working document does not have any support for specifying what detection technique is used, so there is no way of implementing a two step approach. Also, it is not clear what value a two step approach has. If the ED does not detect a signal it is likely that another technqiue would need to be attempted subsequently anyways. So the ED is only useful for identifying channels that are definatley occupied by something, not necessarity a licensed system.

SuggestedRemedy

Either drop the entire secion on the ""two step approach"" or add support for specifying the detection technique in the document.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.2.1** *P* **281** *L* # 163

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

This section decribes how to calcuate the RSSI and states that the RSSI is reported to the BS. In the section on measurement reporting there are no reports of the RSSI, as far as I can tell. It is not clear at all that RSSI is a useful report for sensing.

Also, since the equation for p(k) divides by the number of samples, it seems that this might be a measure of the power and not the energy.

SuggestedRemedy

Do one of the following,

1. Show that RSSI is a useful report and then added support for RSSI reporting to the document.

2. Delete this section.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.22** *P* **282** *L* # 164

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

I have not seen any simulation results for this technique. So it is unclear how well it works.

SuggestedRemedy

Do one of the following,

1. Supply simulation results.

2 Delete this section.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.1** *P* **282** *L* # 165

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

This seems like another section on energy detection. It is not clear to me what the phrase ""fine energy-based detection"" means. What does it mean to be ""fine?""

SuggestedRemedy

If they is anything new in this section add to the engergy detection section, otherwise delete.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.2.1** *P* **283** *L* # 166

Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

I do not believe I have seen any results for this approach, so I am not clear how well it works.

SuggestedRemedy

Supply simulation results for this approach.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.2.2** *P* **283** *L* # 167
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

This approach has been shown to have issues. However, if the running mean and variance are removed and replaced with a max() operation on the output of the correlator, this approach has been shown to work and simulation results have been presented. Also, an improved method that uses ""peak combining"" has been shown to give better performance than the max of the correlator output, if for longer sensing times.

SuggestedRemedy

Replace the text with the running mean and variance with a max operation. Also, add text on the ""peak combining"" technique.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.2.3** *P* **285** *L* # 168
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

This is an interesting idea. However, the CPE is required to track the BS clock, which is accurate to within 2 ppm. It is not clear that having a more accurate clock is useful. It may be useful, but I have not seen any results to show that it is useful.

SuggestedRemedy

Supply some simulation results showing that this is a useful feature.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.2.3** *P* **288** *L* # 169
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

Table 239 is a useful table. If is my impression that after the DTV transition is complete that only two of the rows in this table will still apply. Since 802.22 can only be deployed after the completion of the DTV transition, this table needs to be updated.

SuggestedRemedy

Update this table to be correct after the completion of the DTV transition. I think this table should be in a section giving backgroup information on ATSC and not this section. Of course, it should be in an informative section.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.3** *P* **288** *L* # 170
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

I have not seen any results for this approach.

SuggestedRemedy

Supply simulation results for this approach.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.3.4** *P* **290** *L* # 171
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

It is not clear to me the purpose of this section. If does not give any specific sensing technique.

SuggestedRemedy

Explain what the purpose of this section is.

Proposed Response *Response Status* **O**

Cl **Annex** *SC* **11.3.4** *P* **291** *L* # 172
Shellhammer, Steve Qualcomm

Comment Type **TR** *Comment Status* **X**

I do not believe I have seen any simulation results for any of the ideas described in this section.

SuggestedRemedy

Supply simulation results for the approaches described in this section.

Proposed Response *Response Status* **O**

Cl **C4** *SC* **C4.1** *P* **251** *L* **4** # 52

Benko , John France Telecom

Comment Type **T** *Comment Status* **X**

The duo-binary turbo is missing some parts. Specifically the interleaver parameters (P,P1,P2,P3) are not defined for relevant block sizes for 802.22. In addition the block concatention scheme is not defined (which is required for OFDMA). The missing parts are included in an updated version of the duo-binary turbo code. The changes are only the addition of the interleavers parameters, the concatention scheme, and a puncturing scheme for a rate 5/6 code. Everything else remains the same.

SuggestedRemedy

Incorporate sections of updated duo-binary turbo code in 22-07-0030-00-0000.doc

Proposed Response *Response Status* **O**