

# 1 **Coexistence CG's Recommendation to IEEE 802.20 WG**

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## 3 **1 Background**

4 In its July meeting, 802.20 WG chose to form a Coexistence Correspondence Group  
5 (CCG) to "study and create a consensus recommendation on how to address the issues of  
6 coexistence of future 802.20 systems with other wireless technologies deployed in the  
7 licensed bands below 3.5 GHz." The goal of the CCG, therefore, was to come up with a  
8 recommendation on the best way to address coexistence within the WG. The coexistence  
9 analyses themselves are outside the scope of the CCG and are left to the coexistence-  
10 related document(s) that the WG is likely to produce.

## 11 **2 Organization and method of the coexistence work**

12 Due to the importance of coexistence and its role in the success of the future 802.20  
13 standard, it is recommended that the 802.20 WG establish a Study Group (SG) to develop  
14 a Coexistence PAR and a charter for a Coexistence Task Group (CTG) that would focus  
15 on performing coexistence analyses and providing deployment guidelines. As a first step,  
16 it is recommended that the 802.20 WG at its November 2003 Plenary session, form a  
17 Coexistence Study Group (CSG), with the goal of developing the PAR and CTG charter.

### 18 **2.1 Coexistence Study Group**

19 It is recommended that the CSG start its work at January interim session. The CSG will  
20 draft a PAR and submit it to the 802 Executive Committee for approval. It is, therefore,  
21 recommended that the WG task the CSG to draft a PAR as its first assignment.

### 22 **2.2 Coexistence Task Group**

23 The CSG should also propose a charter for the CTG which, in addition to working on a  
24 Coexistence specification, shall include the establishment of liaisons with relevant  
25 entities in a timely manner with the purpose of communicating the work progress and  
26 exchanging information. It is anticipated that coexistence issues between technologies  
27 specified by other SDOs will be resolved in a cooperative manner.  
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### 29 **2.3 Document structure**

30 It is recommended that the "Scope" section of the PAR to be drafted by CSG include, as  
31 a minimum, all of the elements recommended in this document. The document(s) to be  
32 produced by the CTG should also reflect the same. Specifically, they should include the  
33 elements contained in section 4 of this document. The internal structure of the  
34 document(s) is recommended to be left to the CTG to decide.

## 35 **3 Scope of coexistence task group**

36 The 802.20 PAR envisions both TDD and FDD variants for the upcoming standards. It is  
37 likely that technologies based on these two variants will be deployed in bands below 3.5

1 GHz that allow such operation. It is also likely that 802.20 TDD and FDD systems will  
 2 be deployed as co-channel in geographically adjacent areas or as adjacent-channel in  
 3 spectrally adjacent manner in the same area. Since such adjacency could cause  
 4 coexistence problems it is, therefore, recommended that the coexistence work undertaken  
 5 by 802.20 include coexistence of 802.20 TDD and FDD variants.

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 7 The spectrum below 3.5 GHz allocated to the Mobile Service is mostly occupied by  
 8 incumbents. It is likely that future 802.20 systems share at least some of the bands with  
 9 these incumbents as co-channel in geographically adjacent areas or in spectrally adjacent  
 10 manner in the same area. Since it would be impractical to analyze coexistence of future  
 11 802.20 systems with every existing technology deployed below 3.5 GHz, it is, therefore,  
 12 recommended that the coexistence task group work will undertake include coexistence of  
 13 802.20 systems with other technologies deployed in “target bands”. “Target bands” are  
 14 the bands that 802.20 systems are more likely to be deployed in, in the near future.

15 Coexistence in all of these “target bands” will be included in the scope of the coexistence  
 16 document produced by the CTG.

**Comment:** Proposed by Mark Klerer.

## 18 4 Elements of coexistence work

### 19 4.1 Equipment characteristics

20 Base station, repeater and mobile terminal characteristics, including the following basic  
 21 characteristics, shall be provided to and utilized by the CTG to perform coexistence  
 22 analyses

**Comment:** Proposed by Al Wiczorek.

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#### 23 4.1.1 Receiver

24 FER Sensitivity (dBm)

25 Antenna gain (dBi)

26 Co-channel rejection ratio (dB)

27 Adjacent channel immunity (dBm)

28 Intermodulation immunity (dBm)

29 Blocking immunity (dBm)

30 IF filter characteristics (ENBW)

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#### 31 4.1.2 Transmitter

32 Occupied bandwidth (MHz)

33 Adjacent and alternate adjacent channel power (dBm)

34 Out of band emission mask

35 Spurious emissions (dBm)

36 Antenna gain (dBi)

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## 37 4.2 Interference scenarios

38 It is recommended that the 802.20 coexistence document include section(s) on possible  
 39 interference scenarios both among 802.20 variants as well as between 802.20 and non-  
 40 802.20 systems in the “target bands”.

**Comment:** Proposed by Reza Arefi.

### 4.3 Deployment guidelines

It is recommended that the CTG perform necessary calculations and simulations to arrive at deployment guidelines that reduce or eliminate unacceptable interference for the analyzed coexistence scenarios in “target bands”.

**Comment:** Proposed by Reza Arefi.

**Comment:** Proposed by Jim Tomcick.

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### 4.4 References to the works of other bodies

It is recommended that the 802.20 coexistence document include references to the works of other bodies, inside or outside 802, which are relevant to the coexistence work in 802.20.

## 5 Relationship of coexistence with other ongoing work in 802.20

### 5.1 Coexistence and requirements

Coexistence guidelines and coordination processes depend on the regulatory regime of the countries that future 802.20 systems will be deployed in. These regulatory regimes often put restrictions on or otherwise require coexistence or coordination processes for various bands and services. Future 802.20 systems, therefore, are required to comply with those regulatory regimes. It is, therefore, recommended that the future CTG work with the requirements CG to make sure this requirement be clearly reflected in the requirements document.

### 5.2 Coexistence and evaluation criteria

The Correspondence Group discussed differing views on this issue at length but did not reach consensus on the issue of requiring the inclusion of coexistence into the proposal evaluation process. The Evaluation Criteria CG, however, may want to take this issue into consideration in their development of the criteria for evaluating future proposals for the 802.20 standard.

**Comment:** Proposed by Reza Arefi.

### 5.3 The two differing viewpoints the CG received on this issue are included in the Appendix, Coexistence and channel modeling

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Future coexistence work of 802.20 is not expected to have an impact on the selection of channel models for testing the 802.20 specifications. The output of the channel model CG, however, could be used in the process of selecting propagation model(s) for the specified coexistence scenarios.

### 5.4 Coexistence and traffic modeling

Future coexistence work of 802.20 is not expected to have an impact on the selection of traffic models for testing the 802.20 specifications.

## 1 5.5 Coexistence and minimum performance standards

2 The 802.20 minimum performance specifications are an essential input for the  
3 coexistence work that will be undertaken under an "802.20 Coexistence PAR". We  
4 believe that these specifications, however, must be created by the 802.20 Working Group  
5 in the process of developing the 802.20 standard. The document produced under the  
6 separate "802.20 Coexistence PAR" would not include the minimum performance  
7 standards.

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### 8 Appendix

9 This appendix contains comments submitted to the Coexistence CG regarding section 5.2.

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Joanne Wilson:

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How would this be demonstrated? Would technology proponents have to identify which technologies they could coexist with and would they then have to provide a coexistence analysis and/or simulations to back up this claim. This sounds like a large burden on proponents without a meaningful way of comparing results. For example, what if two proposals included claims that they each could coexist well, but with different technologies in the adjacent band. There would be no basis of comparing those two claims and incorporating that into the evaluation of the systems.

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Joanne Wilson:

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The Evaluation CG may want to take this point into consideration in their development of the criteria for evaluating future proposals for the 802.20 standard.

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Jim Tomcick:

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The third sentence states co-existence is seldom considered as an air interface evaluation criterion in licensed bands. I disagree with this statement. Other organization do review co-existence in evaluating the feasibility of emerging standards proposals. It is an integral part of the air interface development process. For example ITU-R has produced M.1225 which details methods for evaluating technology proposals. The guidelines could be incorporated into the 802.20 evaluation and proposal process.

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Coexistence Considerations are an Integral Part of the 802.20 Evaluation and Technology Selection Process.

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Coexistence considerations can have negative impacts on spectral efficiency if (for example) large guard bands are needed to insure that already deployed systems are not adversely impacted. This may reduce the ability of proposed systems to meet the spectral efficiency requirements currently in debate by the requirements CG.

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2 If, instead 802.20 systems have to coexist by reducing radiated power, this may  
3 also reduce the ability of a proposed technology to meet the cell-site reuse  
4 requirement in the 802.20 project documents.

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6 Different technologies proposed for 802.20 standardization may indeed have  
7 different coexistence characteristics and this fact can influence whether or not a  
8 candidate technology is favored or eventually selected for the 802.20 standard. I  
9 have stated previously that coexistence needs to be addressed in the Evaluation  
10 criteria. I continue to hold that view.

11  
12 I believe that our (coex CG's) recommendation to the Evaluation Criteria CG is  
13 that the evaluation criteria needs to contain:

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15 a. a list of several likely incumbent technologies where 802.20 technology  
16 proposers will be required to provide coexistence evaluations. I suggest that we  
17 evaluate 802.20 against IS-95, cdma2000, and WCDMA (both FDD and TDD  
18 versions).

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20 b. definition of the detailed coexistence scenarios of interest for the technologies  
21 selected in (a). There is a great deal of previous work in this area, so this is more  
22 of a "selection" from the possibilities, than a development of new work.

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24 c. definition of canonical rf transmitter/receiver modeling structures so that  
25 coexistence studies may be performed in a coherent manner (there is much  
26 material on this in existence)

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28 d. definition of the coexistence parameters to be reported to assure that 802.20  
29 systems are deployable, and when deployed, that they will meet the promised  
30 requirements of the PAR without adverse impact to already deployed systems.

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32 e. a requirement that technology proposers provide an accounting of how their  
33 proposed technology will coexist under the defined conditions, with an incumbent  
34 system.

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36 For example each technology proposer could be required to provide 2 items for  
37 each technology/coexistence scenario; (1) a mapping of Capacity Degradation vs.  
38 Adjacent Channel Interference Ratio (ACIR), and (2) a mapping of ACIR to  
39 center frequency spacing. This will allow evaluation of the needed guard bands to  
40 achieve a required capacity degradation.

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42 f. A metric for evaluation of different proposals, such as the number of "carriers"  
43 that could be deployed in a given frequency block.

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45 We should also include a section on impacts of coexistence on the eventual  
46 802.20 specification. It will be necessary at some point to define basic RF

1 parameters and minimum performance for anticipated deployments of 802.20.  
2 These should be included (as far as we know them) in the written 802.20  
3 standard. As new bands/deployment possibilities emerge, future amendments to  
4 the baseline 802.20 specification may be made to accommodate different  
5 regulatory domains and anticipated deployments. There is ample precedent for  
6 this approach in other 802 working groups.  
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8 Joanne Wilson:

9 I continue to disagree with Jim Tomcik's proposal for how to  
10 incorporate coexistence analysis into the evaluation of candidate technologies.  
11 Now that he's added more detail, it should be fairly obvious that it tremendously  
12 increases the amount of work required to create a technology proposal for the  
13 802.20 standard. Additionally, Jim does not propose how all this information  
14 would be used in the evaluation process or how there would be any assurance that  
15 the comparisons with the various other systems would be done consistently and  
16 accurately.  
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