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PROJECT	IEEE P802.16 Broadband Wireless Access Study Group		
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TITLE	Proposed PAR for Coexistence		
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ABSTRACT	<p>This document contains recommended wording of the coexistence PAR. It is based on the draft working document, posted 14 April 1999 on the 802.16 website, with modifications. Commentary supporting the proposed modifications is provided.</p> <p>The intent of this contribution is to provide a basis for further discussion and closure on final wording of a PAR at the 10-12 May 1999 meeting of 802.16. The author proposes that the coexistence task group adopt this wording as the new base working version for the PAR, upon which further refinements might be made at the meeting.</p>		
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NOTICE	<p>This document has been prepared to assist the IEEE P802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.</p>		
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## Proposed PAR for Coexistence

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### Introduction

This contribution is a response to the call for contributions regarding the coexistence PAR content. Proposed text for the PAR is given below, with commentary (not part of the proposed text) in indented *blue italics*. Original text from the working draft is shown in *red italics*.

### Proposed PAR Text

#### **Document Type**

Recommended Practice For.

*No change from working draft. As coexistence involves not only equipment, but procedures for coordination, "practice" is a more appropriate description than "standard" of what is being specified. Furthermore, as coexistence may involve equipment non-compliant to the future 802.16 air interface, it is difficult to specify a standard for coexistence, as some equipment may not be compliant. Finally, recommended practices stress "should" rather than "shall". This is appropriate for this document, as specific LMDS operators may wish to deviate from the practice to reach different tradeoff points of cost/robustness.*

#### **Title**

[Recommended Practice for] Telecommunications and Information Exchange Between Systems - LAN/MAN Specific Requirements – Coexistence of Broadband Wireless Access Systems with Minimal Interference.

*The introductory phrase "Recommended practice for... will be added on publication based on how other PARs appear to be written. I have added in the 802 common part of the title. I have removed most of the descriptive part of the working draft, which I feel would be better relegated to the scope or purpose. The title needs to be short and clear, so that the document can be found in a quick scan of available IEEE documents.*

*For convenience, below is the original text from the working draft:*

*Recommended Practice for promoting co-existence among Broadband Wireless Access systems and between those systems and neighboring systems*

### **Target Completion Date**

31 March 2000

*The proposed date of 31 January 2001 in the working draft, which corresponds to the air interface PAR, is too late for this activity, which the industry needs now, before too much gets deployed. I think it is reasonable to finalize something substantial by March 2000. It may be necessary to publish in stages: first coexistence between BWA systems, followed later by an addendum covering protection of BWA systems from satellite and P-P systems.*

### **Scope of Proposed Project**

This project covers development of a Recommended Practice for the design and coordinated deployment of BWA systems to minimize interference so as to maximize system performance and/or service quality. The practice will cover three areas. First, it will recommend limits of in-band and out-of-band emissions from BWA transmitters through parameters including radiated power, spectral masks and antenna patterns. Second, it will recommend receiver tolerance parameters, including noise floor degradation and blocking performance, for interference received from other BWA systems as well as from other terrestrial and satellite systems. Third, it will provide coordination parameters, including band plans, separation distances and power flux density limits, to enable successful deployment of BWA systems (whether they comply with the recommended equipment parameters or not) with tolerable interference. The scope includes interference between systems deployed across geographic boundaries in the same frequency band, and systems deployed in the same geographic area in different frequency bands (including different systems deployed by a single licence-holder in sub-bands of the licencees authorized bandwidth). The scope does not cover self-interference created by frequency re-use within a single BWA system, and does not consider the impact of interference created by BWA systems on non-BWA terrestrial and satellite systems.

*The first sentence states "design and coordinated deployment" to make clear what the subject matter is. I felt that a breakdown of the three main drivers of interference analysis --transmitters, receivers, and how they are deployed--would help make the subject matter clear and*

*pick up the informally-worded material in the trailing paragraphs of the working draft. The phrase "whether they comply with the recommended equipment parameters or not" was put in to reflect the consensus at the March meeting that it should be possible for legacy systems to comply with the recommended practice too; i.e. any system suitably deployed, can be made compliant. The sentence "The scope includes..." covers the cases of cross-boundary, block-to-block and disaggregated spectrum interference. Finally, I feel that interference caused by BWA to foreign systems is beyond the scope of the group, especially considering the urgency of the task, and the difficulty in understanding the performance drivers of all other systems, and therefore would like the scope to make this clear. (To be fair, this issue was not brought to a vote at the March meeting).*

*For convenience in comparison, below is the original text of the working draft:*

*"The scope of the proposed project will be to develop a Recommended Practice for BWA systems to minimize interference so as to maximize system performance and/or service quality. This practice will quantify acceptable limits for undesirable emissions from BWA systems. It will also recommend tolerance levels for interference or other undesired emissions from other terrestrial and satellite systems. Interference parameters will include co-channel interference, adjacent channel interference, and out-of-band emissions.*

*1.What does it mean?:*

*2.A. Separation distance, antenna techniques, power levels, unwanted (OOB*

*and spurious) emissions, susceptibility levels, RX selectivity, etc. This*

*practice addresses interference issues such as like and un-like systems,*

*operating in the same or other frequency blocks, in same or other geographic areas.*

*B. This practice does not address interoperability issues or self-interference caused by frequency re-use approaches."*

### **Purpose of Proposed Project**

The purpose of this recommended practice is to facilitate quick deployment of robust BWA systems. The deployment guidelines will be of

benefit to licence holders, service providers, deployment groups, and system integrators. The equipment parameter specifications will benefit equipment and component vendors and industry associations by providing design targets. The benefits of this practice will include:

- Coexistence of systems from different manufacturers with higher assurance that system performance objectives will be met.
- Minimal need for case-by-case interference studies.
- Preservation of a favorable electromagnetic environment for deployment and operation of BWA systems, including future systems compliant to the 802.16 interoperability standard.
- Minimum separation distances and hence maximum spectrum utilization
- Minimal cost systems.

*This is close to the working draft, with some clean-up of wording. I removed the "safe harbor for licence-holders" clause, as I feel that interference caused to foreign systems is beyond the scope of the group—see comment under "scope". Also, I don't know if compliance to an IEEE practice would constitute any legal protection against interference liability claims.*

*For convenience, below is the original text from the working draft:*

*The purpose of this practice is to provide guidelines for minimizing interference between BWA users as well as minimizing interference between BWA users and other wireless services. This practice will benefit license holders, service providers, equipment suppliers, deployment groups, system integrators, industry associations, component suppliers and network planners by providing a consistent co-existence plan.*

*A Co-existence Practice definition will facilitate quick deployment of robust BWA systems and will provide a safe harbor for license holders against interference claims.*

*The intended users include license holders, service providers, equipment suppliers, deployment groups, system integrators, industry associations, component suppliers and network planners.*

*Benefits to User:*

*A.Facilitates co-existence for different systems from different manufactures with higher assurance that system performance objectives are met.*

*B.It will minimize the need for case-by-case interference studies.*

*C.Creates favorable conditions for deployment and operation of BWA systems.*

*D.Facilitate minimum separation distances (space, frequency, time etc) by maximizing efficient utilization of spectrum.*

*E.Provides for minimal cost systems.*

### **Are you aware of other standards or projects with a similar scope?**

The Radio Advisory Board of Canada is drafting a document which recommends a coordination practice for co-channel cross-border interference between BWA systems. However, this document does not treat the case of out-of-band emissions, or coexistence among systems in the same geographic area. It also does not recommend equipment parameters, although typical values are provided. While the RABC document provides a good basis for a coexistence practice, it is not comprehensive enough to meet the scope of this proposed PAR, and it is not an international standard.

### **Is this standard planned for adoption by another international organization?**

Yes. ITU-R

*It would be useful to promote wide dissemination of this practice.*

## **Proposed Responses to 802's Five Criteria**

### ***Broad Market Potential***

The PAR approved for the 802.16 air interface standard justified the market potential for BWA systems. It should be noted, however, that successful deployment of BWA systems compliant to the future 802.16 air interface standard will depend, in part, on a hospitable electromagnetic interference environment. As such, the guidelines developed in this project, which can be applied to existing systems in advance of the air interface standard, will benefit the future success of systems compliant to that standard in the market.

### ***Compatibility with IEEE802 Architecture***

This recommended practice will cover both existing BWA systems and systems compliant to a future 802.16 air interface standard. As these

latter systems will be compliant to the IEEE802 architecture, this practice is applicable to 802.

There will be nothing in this practice which contradicts or forces any deviation from IEEE802 architecture in compliant systems.

### ***Distinct Identity***

The 802.16 air interface standard will cover interoperability of hub and subscriber stations. This practice covers coexistence of systems which are not interoperating, although they may or may not be capable of interoperation. As such, the subject is distinct from the air interface project.

### ***Technical Feasibility***

The 802.16 air interface PAR addressed technical feasibility of BWA systems. A recommended coexistence practice is also technically feasible. There are precedents in cross-border coordination procedures, e.g. Radio Advisory Board of Canada is drafting an LMDS/LMCS cross border agreement. Another precedent is the FCC part 15 spectral "etiquette" for unlicensed systems in the band 1910-1930 MHz.

### ***Economic Feasibility***

The 802.16 air interface PAR addressed economic feasibility of BWA systems. This recommended coexistence practice will enhance economic feasibility by reducing the need for case-by-case interference analysis that would otherwise add to the deployment cost of BWA systems. As well, identification of equipment performance parameters will help focus component suppliers on design targets, which promotes lower cost equipment.

END OF DOCUMENT