

**IEEE P802.22
Wireless RANs**

802.22 PAR modification for portable CPEs				
Date: 2009-09-24				
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Abstract

This document provides a modified IEEE P802.22 PAR in NesCom format plus 5 Criteria.

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PAR FORM

PAR Status: **Modification of existing PAR** ~~New PAR~~

PAR Approval Date: 2004-09-23

PAR Signature Page on File: Yes

1. Assigned Project Number: 802.22

2. Sponsor Date of Request: 2004-07-08

3. Type of Document: Standard for

4. Title of Document:

Draft: Information Technology -Telecommunications and information exchange between systems – Wireless Regional Area Networks (WRAN) - Specific requirements - Part 22: Cognitive Wireless RAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Policies and procedures for operation in the TV Bands

5. Life Cycle: Full-Use

6. Type of Project:

6a. Is this an update to an existing PAR? **Yes**

6b. The Project is a: New Standard

7. Working Group Information:

Name of Working Group: IEEE 802.22 Wireless Regional Area Networks

Approximate Number of Expected Working Group Members: 50

8. Contact information for Working Group Chair:

Name of Working Group Chair: Wendong Hu

Telephone: 408-467-8410 FAX: 408-452-0278

Email: wendong.hu@st.com

9. Contact information for Co-Chair/Official Reporter, Project Editor or Document Custodian if different from the Working Group Chair:

Name of Co-Chair/Official Reporter, Project Editor or Document Custodian:

Telephone: FAX:

Email:

10. Contact information for Sponsoring Society or Standards Coordinating Committee:

Name of Sponsoring Society and Committee: Computer Society Local and Metropolitan Area Networks

Name of Sponsoring Committee Chair: Paul Nikolich

Telephone: 857-205-0050 FAX: 781-334-2255

Email: paul.nikolich@att.net

Name of Liaison Rep. (if different from the Sponsor Chair):

Telephone: FAX:

Email:

Name of Co-Sponsoring Society and Committee:

Name of Co-Sponsoring Committee Chair:

Telephone: FAX:

Email:

Name of Liaison Rep. (if different from the Sponsor Chair):

Telephone: FAX:

Email:

11. The Type of ballot is: Individual Sponsor Ballot

Expected Date of Submission for Initial Sponsor Ballot: ~~2007-01-01~~ 2010-03-22

12. Fill in Projected Completion Date for Submittal to RevCom: ~~2007-06-01~~ 2010-07-19

Explanation for Modified PAR that completion date is being extended past the original four-year life of the PAR:

13. Scope of Proposed Project:

This standard specifies the air interface, including the cognitive medium access control layer (MAC) and physical layer (PHY), of ~~fixed~~ point-to-multipoint wireless regional area networks -comprised of a professional fixed base station with fixed and portable user terminals operating in the VHF/UHF TV broadcast bands between 54 MHz and 862 MHz.

Is the completion of this document contingent upon the completion of another document? No

14. Purpose of Proposed Project:

This standard is intended to enable deployment of interoperable 802 multivendor wireless regional area network products, to facilitate competition in broadband access by providing alternatives to wireline broadband access and extending the deployability of such systems into diverse geographic areas, including sparsely populated rural areas, while preventing harmful interference to incumbent licensed services in the TV broadcast bands.

14a. Reason for the standardization project:

There is a large, untapped market for broadband wireless access in rural and other unserved/underserved areas where wired infrastructure cannot be economically deployed. Products based on this standard will be able to serve those markets and increase the efficiency of spectrum utilization in spectrum currently allocated to, but unused by, the TV broadcast service.

15. Intellectual Property:

Has the sponsor reviewed the IEEE patent policy with the working group? Yes

Is the sponsor aware of copyrights relevant to this project? No

Is the sponsor aware of trademarks relevant to this project? No

Is the sponsor aware of possible registration of objects or numbers due to this project? No

16. Are there other documents or projects with a similar scope? No

Similar Scope Project Information:

17. Is there potential for this document (in part or in whole) to be adopted by another national, regional or international organization? Do not know at this time

If yes, please answer the following questions:

Which International Organization/Committee?

International Contact

Information?

18. If the project will result in any health, safety, or environmental guidance that affects or applies to human health or safety, please explain in five sentences or less.

19. Additional Explanatory Notes: (Item Number and Explanation)

Item 4: "Wireless Regional Area Network" ("WRAN") - a point-to-multipoint network for operation over large, potentially sparsely populated areas (e.g. rural areas) for fixed user terminals, taking advantage of the favorable propagation characteristics in the VHF and low UHF TV bands as well as for portable user terminals operating over a likely smaller

area with sufficient margin to-the fixed base station. The unique requirements of operating on a strict non-interference basis in spectrum assigned to, but unused by, the incumbent licensed services requires a new approach using purpose-designed cognitive radio techniques that will permeate both the PHY and MAC layers. The IEEE 802.18 Study Group chartered to develop this PAR does not believe that any existing IEEE 802 PHY/MAC combination can meet these requirements without extensive modifications. The Study Group has therefore concluded that placing the project in a new Working Group is the most efficient approach.

The Working Group will maintain ongoing communications with the joint effort of the IEEE Communications and EMC Societies as it determines the technical definition of non-interference, harmful interference, their measurement and acceptable mitigation.

It is in the best interest of users and the industry to strive for a level of coexistence between wireless systems. The IEEE 802.22 WG provides mechanisms for coexistence with other systems in the TVWS band. One approach is a common coexistence mechanism that may be used by other TVWS systems; other approaches are also possible.

CRITERIA FOR STANDARDS DEVELOPMENT (FIVE CRITERIA)

Broad Market Potential

A standards project authorized by IEEE 802 shall have a broad market potential. Specifically, it shall have the potential for:

- a) Broad sets of applicability.*
- b) Multiple vendors and numerous users.*
- c) Balanced costs (LAN versus attached stations).*

IEEE 802 standards for wireless devices are widely implemented and widely used for numerous applications, such as local area networking, wireless internet hotspots, streaming video, and even “first mile” access applications. Tens of millions of WLAN radios have been shipped, from multiple vendors, and costs are attractive enough that they are now built into “stations” as diverse as laptop PC’s and video cameras. Extending 802 wireless networking to other parts of the spectrum will further broaden this range of applicability.

Opening up presently unused blocks of spectrum, coupled with the attractive propagation characteristics of the VHF/UHF TV bands, will extend the availability of broadband services and applications by enabling longer-distance and non-LOS links. This is especially necessary for economic viability of broadband services in low population density rural (and other unserved or underserved) areas. This will also provide additional capacity to help alleviate spectrum congestion in more densely populated areas through scalability (lower transmit power and lower antenna heights to gain cellular-like frequency reuse).

The TV bands are being studied for re-allocation on a global basis both in the ITU-R and in individual countries as they transition from analog to digital broadcasting and spectrum is freed up accordingly. Pursuing global harmonization will further broaden the applicability and increase the economies of scale of wireless networking in this region of the spectrum to the benefit of manufacturers, service providers, and users alike.

While only fixed broadband wireless access operation was to be allowed by regulation in the US at the time of the original PAR, the regulatory environment has since been clarified with the publication of the FCC R&O 08-260 where cognitive personal/portable operation has also been allowed under specific conditions. Indications are that the same trend is taking place in other countries as well (e.g. OFCOM in UK). The addition of these devices in the TV bands will expand the type of applications and this clarification is proposed accordingly to allow the development of the 802.22 standard to accommodate fully interoperable cognitive fixed and portable user terminals operating under the control of 802.22 cognitive fixed base stations in a master/slave relationship.

Compatibility

IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: 802 Overview and Architecture, 802.1D, 802.1Q, and

parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802. Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

The proposed standard will take advantage of the better non-LOS propagation characteristics and longer reach potential at these lower frequencies, and will provide robust and reliable mechanisms to prevent harmful interference to licensed operations in the TV bands. Where feasible for the application, it will draw on concepts and technologies from existing 802 wireless standards. By extension, it will be compatible with the 802 architecture, including 802.1D, 802.1Q, and parts of 802.1f.

Distinct Identity

Each IEEE 802 standard shall have a distinct identity. To achieve this, each authorized project shall be:

- a) Substantially different from other IEEE 802 standards.*
- b) One unique solution per problem (not two solutions to a problem).*
- c) Easy for the document reader to select the relevant specification.*

No current 802 wireless standard specifies operation in the VHF and lower portion of the UHF spectrum, i.e., the TV bands, where, because of the more favorable propagation characteristics, it is possible to cover extensive areas in LOS and non-LOS conditions, making it economically feasible to serve even sparsely populated rural areas. Also, no current 802 wireless standard includes the ability to determine the presence of licensed users in the TV band and adjust its frequency of operation, power level, and/or other operational characteristics so as to avoid harmful interference to these operations.

Technical Feasibility

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

- a) Demonstrated system feasibility.*
- b) Proven technology, reasonable testing.*
- c) Confidence in reliability.*

The favorable propagation characteristics at VHF and lower UHF frequencies are well documented in the literature, and demonstrated in the field by decades of practical operational experience, both in urban and rural environments.

Existing 802 wireless standards (e.g. 802.11h) have demonstrated that detection and avoidance of operation in spectrum occupied by licensed users is technically feasible.

As a result of the migration of TV stations from analog to DTV operation, there is a large body of work documenting the appropriate co- and adjacent-channel D/U power ratios that would avoid harmful interference with TV services.

There is a similar body of work documenting the appropriate co- and adjacent-channel D/U power ratios that would avoid harmful interference for land mobile and other licensed services.

Long term experience with hundreds of millions of mass produced WLAN devices and consumer TV devices demonstrates that the technology is highly reliable.

Economic Feasibility

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated), for its intended applications. At a minimum, the proposed project shall show:

- a) Known cost factors, reliable data.*
- b) Reasonable cost for performance.*
- c) Consideration of installation costs.*

The economic feasibility of IEEE 802 wireless devices is well-documented. The cost factors for system components used in mass-market consumer TV devices are well established. As these devices will autonomously

determine the presence of licensed operations and avoid them, installation costs will be minimal or non-existent. The resulting standard would even bring economically viable broadband access to lower population density rural areas, supporting the societal goal of bridging the 'digital divide'.
