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Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — 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

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains — Exigences spécifiques —

Partie 22: Spécifications du contrôle d'accès du milieu sans fil cognitif (MAC) et de la couche physique (PHY) : Politiques et procédures pour le fonctionnement dans les bandes TV

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ISO/IEC/IEEE 8802 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements*

— *Part 1: Overview of Local Area Network Standards*

— *Part 2: Logical link control*

— *Part 5: Token ring access method and physical layer specifications*

— *Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications*

— *Part 1X: Port-based network access control*

— *Part 1AB: Station and media access control connectivity discovery*

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— *Part 1AE: Media access control (MAC) security*

— *Part 1AR: Secure device identity*

— *Part 1AS: Timing and synchronization for time-sensitive applications in bridged local area networks*

— *Part 15-4: Wireless medium access control (MAC) and physical layer (PHY) specifications for low-rate wireless personal area networks (WPANs)*

This corrected version of ISO/IEC/IEEE 8802-22 incorporates the following corrections.

The abbreviation MAC has been corrected in the English title and the part title has been added for the French title.

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Abstract: This standard specifies the air interface, including the cognitive medium access control layer (MAC) and physical layer (PHY), of 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 to 862 MHz.
Keywords: broadband wireless access network, cognitive radio, fixed user terminals, IEEE 802.22, portable user terminals, radio spectrum sensing, regional area network, WRAN standards

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Introduction

This introduction is not part of IEEE Std 802.22-2011, IEEE Standard for 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.

This standard specifies the air interface of broadband wireless access (BWA) systems for fixed and portable user terminals supporting multimedia services. The medium access control layer (MAC) supports a point-to-multipoint architecture. The MAC is structured to support a physical layer (PHY) specification especially suited for operation in TV broadcast bands while avoiding interference to the incumbent broadcast services.

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Contents

1 Overview 1

1.1 Scope 1
1.2 Purpose 2
1.3 Reference application 2

2 Normative references 3

3 Definitions 5

4 Abbreviations and acronyms 10

5 System architecture 13

5.1 Reference architecture 13
5.2 Management reference architecture 17

6 Packet Convergence sublayer 20

6.1 MAC SDU format 20
6.2 Classification 20
6.3 IEEE 802.3/Ethernet-specific part 22
6.4 IP specific part 22

7 MAC Common Part sublayer 24

7.1 General 24
7.2 Addressing and connections 24
7.3 General superframe structure 26
7.4 General frame structure 27
7.5 Control headers 31
7.6 MAC PDU formats 35
7.7 Management messages 45
7.8 Management of MAC PDUs 110
7.9 ARQ mechanism 115
7.10 Scheduling services 125
7.11 Bandwidth management 128
7.12 PHY support 132
7.13 Contention resolution 134
7.14 Initialization and network association 135
7.15 Ranging 159
7.16 Channel descriptor management 164
7.17 Multicast support 166
7.18 QoS 169
7.19 Incumbent protection 212
7.20 Self-coexistence 221
7.21 Quiet periods and sensing 237
7.22 Channel management 246

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7.23 Synchronization of the IEEE 802.22 base stations 249

8 Security mechanism in IEEE 802.22 250

8.1 Security Architecture for the Data/Control and Management Planes 250
8.2 SCM protocol 253
8.3 Key usage 275
8.4 Cryptographic methods 281
8.5 Certificate profile 286
8.6 Security sublayer 2—Security mechanisms for the cognitive functions 293
8.7 CPE privacy 306

9 PHY 307

9.1 Symbol description 307
9.2 Data rates 310
9.3 Functional block diagram applicable to the PHY layer 311
9.4 Superframe and frame structures 312
9.5 CBP packet format 320
9.6 OFDM subcarrier allocation 322
9.7 Channel coding 329
9.8 Constellation mapping and modulation 348
9.9 Control mechanisms 351
9.10 Network synchronization 357
9.11 Frequency Control requirements 358
9.12 Antenna 358
9.13 RF mask 362
9.14 Receiver requirements 363

10 Cognitive radio capability 365

10.1 General 365
10.2 Spectrum Manager operation 366
10.3 Spectrum Sensing Automaton (SSA) 392
10.4 Spectrum sensing 406
10.5 Geolocation 416
10.6 Database service 421
10.7 Primitives for cognitive radio capabilities 423

11 Configuration 440

12 Parameters and connection management 441

12.1 Parameters, timers, message IEs 441
12.2 Well-known CIDs 450
12.3 ARQ parameters 452

13 MIB structure 453

13.1 MIB description 453

Annex A (normative) IEEE 802.22 regulatory domains and regulatory classes requirements 557

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A.1 Regulatory domains, regulatory classes, and professional installation 557
A.2 Radio performance requirements 558
A.3 Channel availability and sensing requirements 560
A.4 Device identification requirements 563
A.5 Channelization based on the regulatory domain 564

Annex B (informative) Multicarrier fine ranging method 568

B.1 General description 568
B.2 Practical embodiment of the proposed multicarrier fine ranging method 573
B.3 References 575

Annex C (informative) Sensing 576

C.1 Blind sensing techniques 576
C.2 Signal specific sensing techniques 585
C.3 References 627

Annex D (informative) Summary of the characteristics of the IEEE 802.22.1 beacon signal and protocols 629

D.1 General 629
D.2 Superframe structure 629
D.3 Beacon frame structure 630
D.4 Synchronization burst 631
D.5 Inter-device communication period (ICP) 632
D.6 PHY specifications 632
D.7 Reference architecture for the WRAN receiver 633
D.8 Sensing and detection at the WRAN receiver 634
D.9 Options for detecting the IEEE 802.22.1 beacon signal 644
D.10 Operation scenarios for the coexistence of IEEE 802.22.1 and IEEE 802.22 646
D.11 References 647

Annex E (informative) Distributed spectrum sensing and authentication to provide protection against thermal noise 648

Annex F (informative) Network security aspects 653

F.1 Availability 653
F.2 Authentication 653
F.3 Authorization 654
F.4 Identification 654
F.5 Integrity 654
F.6 Confidentiality/Privacy 655

Annex G (informative) Bibliography 656

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IEEE Standard for 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

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1. Overview

1.1 Scope

This standard specifies the air interface, including the cognitive medium access control layer (MAC) and physical layer (PHY), of 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 to 862 MHz.

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1.2 Purpose

This standard is intended to enable deployment of interoperable IEEE 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.

1.3 Reference application

The Wireless Regional Area Networks (WRANs) for which this standard has been developed are expected to operate primarily in low population density areas in order to provide broadband access to data networks. The WRAN systems will use vacant channels in the VHF and UHF bands allocated to the Television Broadcasting Service in the frequency range between 54 MHz and 862 MHz while avoiding interference to the broadcast incumbents in these bands. A typical application can be the coverage of the rural area around a village, as illustrated in Figure 1, within a radius of 10 km to 30 km from the base station depending on its EIRP and antenna height. The MAC can also accommodate user terminals located as far as 100 km with proper scheduling of the traffic in the frame when exceptional RF signal propagation conditions are present. With the PHY implemented in this standard, WRAN systems can cover up to a radius of 30 km without special scheduling.

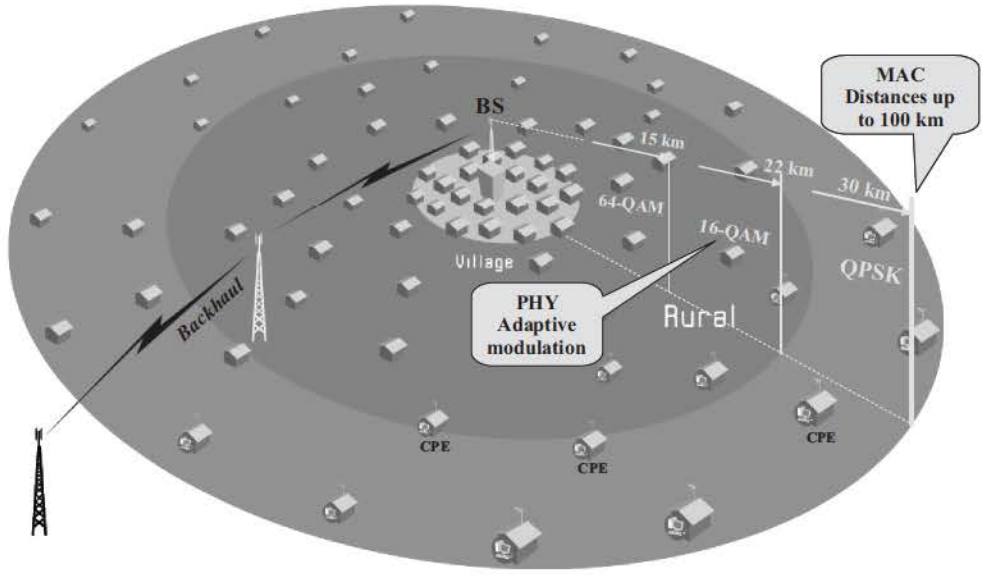

Figure 1 — An IEEE 802.22 WRAN cell with a base station and user terminals

A base station (BS) complying with this standard shall be able to provide high-speed Internet service for up to 512 fixed or portable customer premise equipment (CPE) devices or groups of devices within its coverage area assuming different quality of service (QoS) requirements for various CPEs, while meeting the regulatory requirements for protection of the incumbents.

The standard includes cognitive radio techniques to mitigate interference to incumbents, including geolocation capability, provision to access a database of incumbent services, and spectrum-sensing technology to detect the presence of incumbent services, other WRAN systems, and IEEE 802.22.1 wireless beacons.

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2. Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the references listed below.

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FIPS 197, Advanced Encryption Standard, November 2001.

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IETF RFC 2578, "Structure of Management Information Version 2 (SMIv2)," K. McCloghrie, D. Perkins, J. Schoenwaelder, J. Case, M. Rose, S. Waldbusser, April 1999.

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IETF RFC 4492, Elliptic Curve Crytopgraphy (ECC) for Transport Layer Security (TLS), May 2006.

IETF RFC 5216, The EAP-TLS Authentical Protocol, March 2008.

IETF RFC 5246, The Transport Layer Security (TLS) Protocol Version 1.2, August 2008.

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[1] ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (http://www.ansi.org/).
[2] IEEE publications are available from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854, USA (http://standards.ieee.org/).
[3] The IEEE standards or products referred to in this clause are trademarks of the Institute of Electrical and Electronics Engineers, Inc.
[4] FIPS publications are available from the National Technical Information Service (NTIS), U. S. Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22161 (http://www.ntis.org/).
[5] Internet Requests for Comments (RFCs) are available on the World Wide Web at the following ftp site: venera.isi.edu; logon: anony¬mous; password: user's e-mail address; directory: in-inotes.

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[6] NIST SP 800-38D can be found at http://csrc.nist.gov/publications/nistpubs/800-38D/SP-800-38D.pdf.

[7] At the time this standard published, SEC 4 was still in draft form. The draft can be found at http://www.secg.org/. Alternately, users may contact the IEEE to obtain this draft.

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