# P1900.7

**Submitter Email:** harada@nict.go.jp
**Type of Project:** New IEEE Standard
**PAR Request Date:** 09-Dec-2010
**PAR Approval Date:** 16-Jun-2011
**PAR Expiration Date:** 31-Dec-2015
**Status:** PAR for a New IEEE Standard

**1.1 Project Number:** P1900.7
**1.2 Type of Document:** Standard
**1.3 Life Cycle:** Full Use

**2.1 Title:** Radio Interface for White Space Dynamic Spectrum Access Radio Systems Supporting Fixed and Mobile Operation

**3.1 Working Group:** White Space Radio (COM/SC/DYSPAN-1900.7)
**Contact Information for Working Group Chair**
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None

**3.2 Sponsoring Society and Committee:** IEEE Communications Society/Standards Committee (COM/SC)
**Contact Information for Sponsor Chair**
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None

**4.1 Type of Ballot:** Individual
**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:** 06/2014
**4.3 Projected Completion Date for Submittal to RevCom:** 03/2015

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 70
**5.2 Scope:** This standard specifies a radio interface including medium access control (MAC) sublayer(s) and physical (PHY) layer(s) of white space dynamic spectrum access radio systems supporting fixed and mobile operation in white space frequency bands, while avoiding causing harmful interference to incumbent users in these frequency bands. The standard provides means to support P1900.4a for white space management and P1900.6 to obtain and exchange sensing related information (spectrum sensing and geolocation information).

**5.3 Is the completion of this standard dependent upon the completion of another standard:** Yes
**If yes please explain:** IEEE P1900.4a Draft Standard for Architectural building blocks enabling network-device distributed decision making for optimized radio resource usage in heterogeneous wireless access networks - Amendment: Architecture and interfaces for dynamic spectrum access networks in white space frequency bands

**5.4 Purpose:** This standard enables the development of cost-effective, multi-vendor white space dynamic spectrum access radio systems capable of interoperable operation in white space frequency bands on a non-interfering basis to incumbent users in these frequency bands. This standard facilitates a variety of applications, including the ones capable to support high mobility, both low-power and high-power, short-, medium, and long-range, and a variety of network topologies. This standard is a baseline standard for a family of other standards that are expected to be developed focusing on particular applications, regulatory domains, etc.

**5.5 Need for the Project:** White space dynamic spectrum access radio systems supporting fixed and mobile operation are expected to have broad international market potential. This standard will enable various applications of such radio systems by defining radio interface for white space frequency bands.
More information is provided in Section 8.1.

**5.6 Stakeholders for the Standard:** Manufacturers and users of semiconductor, personal computer, enterprise networking devices, consumer electronic devices, mobile wireless devices.

**Intellectual Property**
**6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?:** No
**6.1.b. Is the Sponsor aware of possible registration activity related to this project?:** No

**7.1 Are there other standards or projects with a similar scope?:** Yes
**If Yes please explain:** More information is provided in Section 8.1.
ECMA-392 standard specifies local area network (LAN) based MAC and PHY for operation in TV white space.
IEEE P802.22 draft standard specifies MAC and PHY for point-to-multipoint wireless regional area networks comprised of a professional fixed base station with fixed and portable user terminals operating in TV white space.
IEEE P802.11af draft standard defines modifications to 802.11 MAC and PHY to meet the legal requirements for channel access and coexistence in the TV White Space.
IEEE standard 802.16h specifies improved mechanisms, as policies and medium access control enhancements, to enable coexistence among license-exempt systems based on IEEE Standard 802.16 and to facilitate the coexistence of such systems with primary users.

**and answer the following**
**Sponsor Organization:** IEEE ECMA International
**Project/Standard Number:** ECMA-392
**Project/Standard Date:**
**Project/Standard Title:** MAC and PHY for Operation in TV White Space
**7.2 Joint Development**
**Is it the intent to develop this document jointly with another organization?:** No

**8.1 Additional Explanatory Notes (Item Number and Explanation):** The information provided below elaborates on the terms "White Space Dynamic Spectrum Access Radio System," "white space frequency bands," and "white space"

The term Dynamic Spectrum Access is defined in IEEE standard 1900.1 as follows:

"Dynamic spectrum access: The real-time adjustment of spectrum utilization in response to changing circumstances and objectives.

NOTE--Changing circumstances and objectives include (and are not limited to) energy-conservation, changes of the radio's state (operational mode, battery life, location, etc.), interference-avoidance (either suffered or inflicted), changes in environmental/external constraints (spectrum, propagation, operational policies, etc.), spectrum-usage efficiency targets, quality of service (QoS), graceful degradation guidelines, and maximization of radio lifetime."

According to definition many types of radio systems are included into Dynamic Spectrum Access.

The scope of this standard is limited to a particular type of dynamic spectrum access radio system namely white space radio system.

The term "white space radio system" refers to a radio system that operates on a secondary basis in white space frequency bands. The term "white space frequency bands" refers to frequency bands in which radio regulations allow radio systems to operate in temporally unused parts of these frequency bands. Examples of white space frequency bands are TV bands and radiolocation service bands. The term "white space" refers to the temporally unused parts of the frequency bands.

The information provided below elaborates on the information provided in Section 5.5 and Section 7.1

The proposed standard will support P1900.4a for white space management and P1900.6 to obtain and exchange sensing related information (spectrum sensing and geolocation information). It may use policy languages developed within P1900.5. Also, the proposed standard may support other standards, for example, P802.19.1 for white space coexistence.

With regard to ECMA-392, IEEE P802.22, IEEE P802.11af, and IEEE 802.16, physical layer features, MAC sublayer features, and cognitive features that are important for dynamic spectrum access in white space frequency bands have been analyzed. Below are the conclusions derived from of these analyses.

It is beneficial to develop a new white space radio system standard due to the following reasons.
Compared to ECMA-392 it is expected to have the following new features:
*Full mobility support including handover
*Support of cellular topology
*Support of multiple frequency channels including non-adjacent channels

*Interface with geolocation device
*Support of inter-system coexistence.
Compared to P802.22 it is expected to have the following new features:
*Full mobility support including handover
*Support of mesh topology
*Support of multiple frequency channels including non-adjacent channels
*Power efficiency for mobile and low power users
*Support of inter-system coexistence.
Compared to P802.11af it is expected to have the following new features:
*Support of cellular topology
*Support of multiple frequency channels including non-adjacent channels
*Interface with spectrum sensors
*Quiet periods for spectrum sensing
*Support of inter-system coexistence
*Simultaneous support of long range and high data rate.
Compared to 802.16h-2010 it is expected to have the following new features:
*Support of mesh topology
*Support of multiple frequency channels including non-adjacent channels
*Interface with geolocation device
*Interface with TVWS database.

By incorporating the above mentioned features, the new standard will enable efficient implementation of various usage models including the following:
*Wide Area Connectivity
*Transportation Logistics
*Land Mobile Connectivity
*High Speed Vehicle Broadband Access
*Maritime Connectivity.

7.1 (con't):
Sponsor Organization: IEEE
Project/Standard Number: P802.22
Project/Standard Date: September 2004
Project/Standard Title: 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

Sponsor Organization: IEEE
Project/Standard Number: P802.11af
Project/Standard Date: December 2009
Project/Standard Title: Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications; Amendment: TV White Spaces Operation

Sponsor Organization: IEEE
Project/Standard Number: 802.16h
Project/Standard Date: July 2010
Project/Standard Title: Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 16: Air Interface for Broadband Wireless Access Systems; Amendment 2: Improved Coexistence Mechanisms for License-Exempt Operation