

P1900.5.2

Submitter Email: jstine@mitre.org

Type of Project: New IEEE Standard

PAR Request Date: 11 Jan 2013

PAR Approval Date: TPD

PAR Expiration Date: 31-Dec-2015

Status: PAR for a New IEEE Standard

1.1 Project Number: P1900.5.2

1.2 Type of Document: Standard

1.3 Life Cycle: Full Use

2.1 Title: Method for Modeling Spectrum Consumption

3.1 Working Group: Policy Language and Architectures for Managing Cognitive Radio for Dynamic Spectrum Access Applications (COM/SC/DYSPAN-P1900.5)

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3.2 Sponsoring Society and Committee: IEEE Communications Society/Standards Committee (COM/SC)

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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: 10/2014

5.1 Approximate number of people expected to be actively involved in the development of this project: 15

5.2 Scope: This standard defines a vendor-independent generalized method for modeling spectrum consumption of any type of use of RF spectrum and the attendant computations for arbitrating the compatibility among models. The methods of modeling are chosen to support the development of tractable algorithms for determining the compatibility between models and for performing various spectrum management tasks that operate on a plurality of models. The modeling methods are exclusively focused on capturing spectrum use but are defined in a schema that can be joined with other schemata related to spectrum management

5.3 Is the completion of this standard dependent upon the completion of another standard: No

If yes please explain: NA.

5.4 Purpose: The purpose of this standard is to define an analytical framework of necessary modeling constructs which can be used to express the boundaries of spectrum consumption by any transmitting or receiving device. The standard will further document a machine readable data exchange schema for the purpose of transferring these spectrum consumption models (SCM) between automated systems. This standard would serve as a loose coupler for the spectrum management enterprise by providing all spectrum communities of interest a common way to express spectrum consumption. Further, the standard would enable the creation of algorithms that can rapidly evaluate compatibility among

SCMs and quickly perform spectrum management tasks such as finding reuse opportunities or optimizing spectrum assignments to maximize spectrum utilization. To achieve this goal, the SCMs must be sufficient in that the algorithms can perform these functions using the models alone without dependence on external databases of system or environmental characteristics.

5.5 Need for the Project: This project will provide a common standard to define spectrum use so that spectrum can be shared among government, commercial, and public users as a commodity.

The broad applicability of modeling in the activities of dynamic spectrum access and its role as a loose coupler will make it a catalyst for innovation in regulation, technology development, spectrum commerce, and spectrum management operations.

Methods of spectrum management have changed little over the past 100 years, largely relying on bookkeeping approaches to track frequency assignments. Recent policies have advanced this approach by specifying the use of databases for dynamic access to television whitespace (TVWS). As a result, new businesses have emerged to build and operate databases and to build RF devices that can access these databases to obtain permission to use the spectrum. Recent recommendations on the evolution of spectrum access have promoted the extension of the database system to additional bands of spectrum for the purpose of sharing spectrum among diverse communities.

Current databases are built around well-known performance of very static TV broadcast stations. This allows using static models that define permissible reuse based on potential interference levels. Extending the existing database approach to more dynamic users will require an approach to modeling all types of spectrum uses that capture temporal, spatial, spectral, and behavioral boundaries. The product of this standard will define the constructs that can be used to build these sorts of models.

The spectrum management tools that are most broadly used today are ill-suited for this purpose. These tools require the maintenance of substantial data about how the RF systems operate and definition of the particular methods for arbitrating compatibility between systems. These requirements are an obstacle to sharing. Some users cannot give access to these sorts of details of their system's operation. Arbitrating compatibility is difficult to implement since the methods of computing compatibility must be developed for each new system that is added and be embedded in the management systems. It is very difficult for a plurality of managers to arbitrate the coexistence of spectrum uses among themselves because they must have common data and agree to the methods to define use and to compute compatibility. The product of this standard overcomes these limitations. It provides a means for specifying spectrum consumption without requiring the revelation of system details. It provides a common tractable means for computing compatibility. Multiple spectrum managers can collaborate in managing coexistence by simply sharing models. Spectrum consumption models are a means to commoditize spectrum.

Further, Cognitive Radio, Software Defined Radio, and similar technologies are increasingly being adopted within industry. These radios increase the ability to dynamically access spectrum by moving the reasoning into the end device using policies that can be given to the radios. A limitation to this approach to reusing spectrum is the difficulty of arbitrating the efficacy of policy with existing spectrum assignments. The models defined in this standard are an alternative means for specifying spectrum use policy to RF systems resolving the efficacy problem as it is easy to assess the compatibility of policy defined by models with the database of models of assignments used in spectrum management.

5.6 Stakeholders for the Standard: Stakeholders include wireless devices end users, regulators, operators, and network equipment manufacturers.

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?: No

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 activity under this PAR will extend and standardize the methods of spectrum consumption modeling as defined in the technical report of The MITRE Corporation,

titled "Model-Based Spectrum Management: Modeling and Computation Manual." The current version of this work can be obtained at http://www.mitre.org/work/tech_papers/2011/11_2071/11_2071.pdf. An updated version is being created. MITRE will contribute this work under the applicable IEEE copyright and IEEE patent policy and procedures to the P1900.5.2 project so that the P1900.5 WG can review it and use it as a foundation for the standard. All meetings regarding the development of this standard will be held according to IEEE P&P for individual projects.