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IEEE Standard for Method for Modeling Spectrum Consumption

IEEE Communications Society

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Dynamic Spectrum Access Networks Standards Committee

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Dynamic Spectrum Access Networks Standards Committee
of the
IEEE Communications Society

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Abstract: A vendor-independent generalized method for modeling spectrum consumption of any type of use of radio frequency spectrum and the attendant computations for arbitrating the compatibility among models are defined in this standard. 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.

Keywords: DSA, dynamic spectrum access, IEEE 1900.5.2™, SCM, spectrum consumption model

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Introduction

This introduction is not part of IEEE Std 1900.5.2-2017, IEEE Standard for Method for Modeling Spectrum Consumption.

This document is the first complete standard to define a generalized method for modeling spectrum consumption of any type of use of radio frequency 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 to support the determination of compatibility as opposed to being a data standard that seeks to support a particular business process of spectrum management. This standard defines the data requirement for spectrum consumption models. The data elements and their meaning are the critical parts of the modeling and may be expressed by any data schema if content and context are preserved.

Contents

IEEE Standard for Method for Modeling Spectrum Consumption

1. Overview

1.1 Scope

This standard defines a generalized method for modeling spectrum consumption of any type of use of radio frequency (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 to support the determination of compatibility as opposed to being a data standard that seeks to support a particular business process of spectrum management. However, such externally defined spectrum management data standards can beneficially leverage the spectrum consumption modeling defined in this standard.

This standard defines the data requirement for spectrum consumption models (SCMs). The data elements and their meaning are the critical parts of the modeling and may be expressed by any data schema if content and context are preserved.

1.2 Purpose

This standard defines an analytical framework of necessary modeling constructs that can be used to express the boundaries of spectrum consumption by any transmitting or receiving device. These constructs can be combined into a machine readable data exchange schema for the purpose of transferring these SCMs between automated systems. This standard can serve as a loose coupler for the spectrum management enterprise by providing all spectrum communities of interest with a common way to express spectrum consumption. Further, the standard describes algorithms that can rapidly evaluate compatibility among SCMs and enables the creation of algorithms that can quickly perform spectrum management tasks such as finding reuse opportunities or optimizing spectrum assignments to increase 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 information.

The effectiveness of these approaches depends on the quality of the models. The quality of the models depends on the quality of the data on system performance used to build the models and the willingness of the modelers to reveal the true use and vulnerability of the systems to interference. Specifying the required data quality and the accuracy of the models is beyond the scope of the standard.