

Spectrum Consumption Modeling and Model-Based Spectrum Management

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Tutorial

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Model-Based Spectrum Management (MBSM) is spectrum management based on the creation and exchange of spectrum consumption models (SCMs). SCMs define the boundaries of spectrum use so that the compatibility of uses can be arbitrated objectively. SCM are machine readable and are complemented with algorithms that can be used with the models to compute compatibility, to optimize spectrum assignments, and to find reuse opportunities. SCM can enhance spectrum management and reuse in several ways:

In regulation, SCM can be used to define a user's spectrum usage rights.

In commerce, SCMs are a means to capture the quanta of spectrum that are traded.

In technology, SCMs can be used to convey spectrum assignments and spectrum policy to RF systems.

In operations, SCMs can enable very dynamic and flexible management thus increasing spectrum reuse.

These combined capabilities make SCMs a means to enable dynamic spectrum sharing among government and commercial users. Due to the great promise of this approach to spectrum management especially to enable sharing, there is a standardization effort underway within the

IEEE Dynamic Spectrum Access Networks Standards Committee (DySPAN SC) 1900.5 workgroup. The objective of the tutorial is to familiarize students with the modeling and algorithms so that they can exploit these concepts in their work and research and can contribute to their further development and the standardization effort.

The tutorial will provide an overview of MBSM and the use of SCMs to resolve many of the harder problems of DSA. It will describe the technical details of the modeling constructs and describe how these constructs are used to model system use of spectrum in both technical and operational contexts. It will describe the computations required for computing the compatibility of systems based on their models and provide an introduction to the algorithms being developed to perform this and other spectrum management tasks.

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