

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 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

1. Overview	13
1.1 Scope	13
1.2 Purpose	13
2. Normative references.....	14
3. Definitions, acronyms, and abbreviations	14
3.1 Word usage.....	14
3.2 Definitions	14
3.3 Acronyms and abbreviations	15
3.4 Symbols	16
4. Data conventions	19
5. Purpose and use of SCMs.....	19
5.1 General	19
5.2 Capturing spectrum use of RF devices	20
5.3 Capturing spectrum use of RF systems.....	20
5.4 Model-based spectrum management (MBSM).....	20
5.4.1 General.....	20
5.4.2 Loose coupling spectrum management.....	20
5.4.3 Independent modeling of RF systems	22
5.4.4 Common methods for arbitrating compatibility of models.....	22
5.5 Radio spectrum use policy.....	22
6. Spectrum-dependent devices, systems, and sets.....	23
6.1 General	23
6.2 Spectrum-dependent devices	23
6.2.1 General.....	23
6.2.2 Transmitter models	23
6.2.3 Receiver models.....	24
6.3 System models.....	24
6.4 SCM sets.....	24
6.5 SCM messages and data	24
7. Special data structures	26
7.1 General	26
7.2 Specifying confidence	26
7.3 Specifying values by direction.....	27
7.4 Spectrum masks	29
8. Modeling constructs	29
8.1 General	29
8.2 Reference Power.....	30
8.2.1 General.....	30
8.2.2 Purpose and use.....	30
8.2.3 Data elements and their meaning	30
8.2.4 Modeling requirement.....	31
8.3 Spectrum mask	31
8.3.1 Purpose and use.....	31
8.3.2 Data elements and their meaning	32
8.3.3 Modeling requirement.....	35

8.4 Underlay mask.....	35
8.4.1 Purpose and use.....	35
8.4.2 Data elements and their meaning.....	37
8.4.3 Modeling requirement.....	42
8.5 Power map.....	43
8.5.1 Purpose and use.....	43
8.5.2 Data elements and their meaning.....	44
8.5.3 Modeling requirement.....	46
8.6 Propagation map.....	47
8.6.1 Purpose and use.....	47
8.6.2 Data elements and their meaning.....	49
8.6.3 Modeling requirement.....	51
8.7 Intermodulation (IM) mask.....	52
8.7.1 Purpose and use.....	52
8.7.2 Data elements and their meaning.....	52
8.7.3 Modeling requirements.....	53
8.8 Platform.....	55
8.8.1 Purpose and use.....	55
8.8.2 Data elements and their meaning.....	55
8.8.3 Modeling requirement.....	56
8.9 Location.....	56
8.9.1 Purpose and use.....	56
8.9.2 Data elements and their meaning.....	56
8.9.3 Modeling requirement.....	61
8.10 Schedule.....	62
8.10.1 Purpose and use.....	62
8.10.2 Data elements and their meaning.....	62
8.10.3 Modeling requirement.....	63
8.11 Minimum PSFD.....	63
8.11.1 Purpose and use.....	63
8.11.2 Data elements and their meaning.....	63
8.11.3 Modeling requirement.....	63
8.12 Protocol or policy.....	64
8.12.1 Purpose and use.....	64
8.12.2 Data elements and their meaning.....	64
8.12.3 Modeling requirement.....	65
9. Modeling requirements.....	66
9.1 Transmitters.....	66
9.1.1 Model objective.....	66
9.1.2 Data model and modeling requirements.....	66
9.2 Receivers.....	67
9.2.1 Model objective.....	67
9.2.2 Data model and modeling requirements.....	67
9.3 Systems.....	69
9.3.1 System model objectives.....	69
9.3.2 Data model and modeling requirements.....	69
9.4 Sets.....	70
9.4.1 Set objectives.....	70
9.4.2 Consumption sets.....	70
9.4.3 Authorization sets.....	70
9.4.4 Constraint sets.....	70
9.4.5 Data model and modeling requirements.....	71
10. Method used to compute compatibility.....	72
10.1 General.....	72

10.2 Time overlap.....	73
10.3 Spectrum overlap.....	73
10.4 Link budget computations using models.....	73
10.4.1 General.....	73
10.4.2 Transmitter model link budgets.....	74
10.4.3 Receiver model link budgets.....	75
10.4.4 Choosing a pathloss model.....	77
10.5 Power margin between a spectrum mask and an underlay mask.....	77
10.5.1 General.....	77
10.5.2 Methods of computing power margin.....	78
10.5.3 Selecting the appropriate underlay mask.....	86
10.6 Assessing image frequency and IM effects.....	87
10.6.1 General.....	87
10.6.2 Power margin with receiver IM masks that indicate susceptibility to image frequencies.....	87
10.6.3 Power margin with a transmitter IM mask.....	88
10.6.4 Power margin with a receiver IM mask.....	90
10.7 Meeting protocol or policy criteria.....	90
10.8 Criteria for planar approximations.....	90
10.9 Constraining points.....	91
10.10 Assessing aggregate compatibility.....	92
10.10.1 General.....	92
10.10.2 Aggregate interference.....	92
10.10.3 Aggregate interference with transmitter IM.....	97
10.10.4 Aggregate interference at receivers with receiver IM.....	97
10.11 Interference from surfaces and volumes with multiple transmitters.....	98
11. Assessing compatibility.....	98
11.1 General.....	98
11.2 Model precedence.....	98
11.3 Assessment process.....	98
11.3.1 General.....	98
11.3.2 Compatibility with an authorization set.....	99
11.3.3 Compatibility with constraint or consumption set.....	101
11.4 Using Confidence.....	102
11.4.1 General.....	102
11.4.2 Confidence attributes.....	102
11.4.3 Probability of model states.....	104
11.4.4 Assessment of compatibility of SCM that use confidence in their constructs.....	105
12. Extended algorithms.....	107
12.1 General.....	107
12.2 Determining maximum secondary transmitter power.....	107
12.3 Adjusting location to achieve compatibility.....	107
12.4 Assigning channels to achieve compatibility.....	107
12.5 Managing time of channel use.....	108
12.6 Visualizing spectrum availability in space.....	108
12.7 Measuring spectrum consumption.....	108
Annex A (informative) Bibliography.....	109
Annex B (informative) The World Geodetic System of 1984 (WGS 84) ellipsoid datum.....	110
Annex C (informative) Rotation matrices.....	112
C.1 General.....	112
C.2 Coordinate rotations.....	112

C.2.1	Rotation of Earth surface coordinates (propagation maps coordinates) relative to the Earth-centric coordinates	112
C.2.2	The rotation of travel direction coordinates relative to Earth surface coordinates	113
C.2.3	Rotation of platform coordinate systems relative to the direction of travel.....	113
C.2.4	The rotation of power map coordinates relative to platform coordinates.....	113
C.3	Directional computations	114
C.3.1	Convert Earth’s surface directions to platform power map directions	114
C.3.2	Convert platform power map directions to Earth’s surface directions	115
Annex D	(informative) Coordinate conversions.....	116
Annex E	(informative) Location modeling exemplars	118
E.1	General.....	118
E.2	Converting non-convex areas of operation to convex areas.....	118
E.3	Subdividing the area of operations based on time.....	118
E.4	Subdividing the area of operation based on propagation conditions	121
E.5	Differentiating antenna pointing based on time	122
E.6	Combinatorial assessments of multiple location-associated constructs	124
Annex F	(informative) Computation exemplars.....	125
F.1	Modeling	125
F.1.1	Scaling an underlay mask to specify the total power of allowed interference	125
F.1.2	Create a power map for a scanned antenna.....	126
F.1.3	Create height-rated propagation maps	126
F.2	Compatibility assessment	127
F.2.1	Determine power margin for underlay masks using the total power method.....	127
F.2.2	Determine power margin using the maximum power spectral density method	129
F.2.3	Determine compatibility with multiple interferers in the case of an underlay mask specified for total power computations	130
F.2.4	Determine compatibility with multiple interferers for bandwidth-rated underlay masks	131
F.2.5	Determine compatibility with duty-cycle-rated underlay masks	133
F.2.6	Determine compatibility of frequency-hop systems with BTP-rated underlay masks.....	135
F.2.7	Determine power flux density for a direction	137
F.2.8	Determine power flux density from a transmitter	137
F.2.9	Determine the PSFD at a distance from a transmitter.....	138
F.2.10	Determine the distance-based pathloss to a receiving antenna using height-rated propagation maps.....	139
F.2.11	Translate an underlay mask for image frequencies.....	139
F.2.12	Determine the IM interference broadcast by a transmitter.....	140
F.2.13	Determine IM interference created within a receiver	141
F.2.14	Determine the range of receiver protection given a minimum PSFD and a reference receiver underlay mask	143
F.2.15	Computing the interference from a location with a density of transmitters.....	143
F.2.16	Example listen before talk policy	147
F.2.17	Example spectrum sharing access protocol	147
F.2.18	Converting power flux density to a field strength.....	149
F.3	Using confidence.....	150
F.3.1	Computing average power level	150
F.3.2	Create confidence-rated propagation maps.....	150

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.