IEEE P802.19  
Wireless Coexistence

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| Profile O data types | | | | |
| Date: 2013-05-16 | | | | |
| Author(s): | | | | |
| Name | Company | Address | Phone | email |
| Mika Kasslin | Nokia |  |  | mika.kasslin@nokia.com |
| Jari Junell | Nokia |  |  | jari.junell@nokia.com |

Abstract

This document is a submission to IEEE 802.19 TG1 that contains an updated definition of profile O data types.

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# Annex A (normative) Data types

# Profile O

IEEE802191ProtocolDataType DEFINITIONS AUTOMATIC TAGS ::= BEGIN

*-- Data type definitions used in messages*EXPORTS SubscribedService, OperationCode, NetworkTechnology, NetworkType, DiscoveryInformation, AvailableChannelsInformation, ListOfAvailableFrequencies, ListOfSupportedFrequencies, ListOfSupportedChNumber , ListOfOperatingFrequencies, ListOfOperatingChNumber, InterferenceDirection, RadioEnvironmentInformation, NetworkGeometryClass, DeviceLocation, RequiredResource, ListOfAllowedTVWSChNumber, ConstOfChUses, ChClassInfo, FrequencyRange, ReqInfoDescr, ReqInfoValue, MeasurementDescription, MeasurementResult, MobilityInformation, NegotiationInformation, ListOfWinnerCMID, ListOfSlotTimePosition, ReconfigurationParameters, FailedParameters, EventParams, ListOfGeolocation, DatabaseInformation;

CxID ::= ENUMERATED {

cE\_ID,

cM\_ID,

cDIS\_ID,

tVWSDB\_ID

}

OperationCode ::= ENUMERATED {

new,

modify,

remove

}

SubscribedService ::= ENUMERATED {

information,

management,

interCMCoexistenceSetElements,

allCoexistenceSetElements

}

NetworkID ::= ENUMERATED {

bSSID,

…

}

NetworkTechnology ::= ENUMERATED {

iEEE802.11af,

iEEE802.22,

eCMA392,

oneSeg,

…

}

NetworkType ::= ENUMERATED {

fixed,

mode1,

mode2,

…

}

AvailableChannelsInformation ::= CHOICE {

listOfAvailableFrequencies AvailableChannelList,

listOfAvailableChNumber AvailableChNumberList,

databaseInformation DatabaseInformation

}

AvailableChannelList ::= SEQUENCE OF AvailableChannelElement

AvailableChannelElement ::= SEQUENCE {

frequencyRange FrequencyRange,

txPowerLimit REAL, /\* unit [W] \*/

availableStartTime GeneralizedTime,

availableDuration REAL /\* unit [s] \*/

}

FrequencyRange ::= SEQUENCE {

startFreq INTEGER, /\* unit [Hz] \*/

stopFreq INTEGER /\* unit [Hz] \*/

}

AvailableChNumberList ::= SEQUENCE {

listOfAllowedTVWSChNumber ListOfAllowedTVWSChNumber,

listOfAvailableStartTime SEQUENCE OF GeneralizedTime,

listOfAvailableDuration SEQUENCE OF REAL, /\* unit [s] \*/

listOfConstOfChUses SEQUENCE OF ConstOfChUses

}

ListOfAllowedTVWSChNumber ::= SEQUENCE OF INTEGER

ConstOfChUses ::= SEQUENCE OF ConstOfChUse

ConstOfChUse ::= SEQUENCE {

constOfChUseID ConstOfChUseID,

constOfChUseValue ConstOfChUseValue

}

ConstOfChUseID ::= ENUMERATED {

regulationMaxTxPower,

regulationMaxAntGain,

regulationMaxAntHeight,

regulationTVDBUpdateTime,

outOfBandEmissionLimit,

…

}

ConstOfChUseValue ::= CHOICE {

regulationMaxTxPower REAL, /\* absolute value in [W] \*/

regulationMaxAntGain REAL, /\* absolute value \*/

regulationAntMaxHeight REAL, /\* in [m] \*/

regulationTVDBUpdateTime REAL, /\* in [s] \*/

outOfBandEmissionLimit REAL, /\* in [W] \*/

…

}

DatabaseInformation ::= SEQUENCE {

dbIpAddress IA5String,

dbPortNumber INTEGER,

parameters ParametersForDBAccess

}

ParametersForDBAccess ::= CHOICE {

fcc FccParam,

ofcom OfcomParam

}

FccParam ::= SEQUENCE {

deviceFCCID OCTET STRING,

deviceSN OCTET STRING

}

OfcomParam ::= SEQUENCE {

deviceID OCTET STRING,

deviceSN OCTET STRING,

modulation Modulation,

listOfAntenna ListOfAntenna,

listOfSpectrumMask ListOfSpectrumMask

}

MobilityInformation :: = CHOICE {

maxSpeed REAL, /\*unit [km/h] \*/

speedInformation SpeedInformation,

routeInformation RouteInformation

}

SpeedInformation ::= SEQUENCE {

WSOSpeed REAL, /\* unit [km/h] \*/

WSODirection REAL, /\* unit [radian] \*/

}RouteInformation ::= SEQUENCE {

PlannedRoute SEQUENCE of Geolocation,

PlannedTime SEQUENCE of GeneralizedTime

}

DiscoveryInformation ::= SEQUENCE {

geolocation Geolocation,

maxTxPowerPerHz REAL, /\* unit [dBm/Hz] \*/

rxSensitivity REAL, /\* unit [dBm] \*/

rXAntennaGain AntennaGain,

tXAntennaGain AntennaGain,

tXSignalBW Integer, /\* unit [Hz], resolution 1 Hz \*/

minReqSNR REAL, /\* absolute value \*/

TolerableInterferenceLevel REAL, /\* unit [dBm] \*/

}

Geolocation ::= SEQUENCE {

latitude Coordinate,

longitude Coordinate,

altitude Altitude,

antloc AntennaLocationType

}

Coordinate ::= SEQUENCE {

uncertainty REAL, /\* unit [deg, min,s] \*/

coordinate REAL /\* unit [deg,min,s] \*/

}

Altitude ::= SEQUENCE {

uncertainty REAL, /\* unit [m] \*/

coordinate REAL, /\* unit [m] \*/

type AltitudeType

}

AltitudeType ::= ENUMERATED {

meters,

}

AntennaLocationType ::= ENUMERATED {

indoors,

outdoors,

unknown

}

AntennaGain ::= SEQUENCE OF SEQUENCE {

freq\_ant INTEGER, /\* unit [Hz], resolution 1 Hz \*/

antParams AntennaParameters

}

AntennaParameters ::= SEQUENCE OF SEQUENCE {

theta REAL, /\* unit [deg] \*/

phi REAL, /\* unit [deg] \*/

gain REAL /\* absolute value \*/

}

ListOfSupportedFrequencies ::= SEQUENCE OF SEQUENCE {

*-- The frequency borders of each possible sub band or channel*

supportedRXFrequency FrequencyRange,

supportedTXFrequency FrequencyRange,

*-- Extra channel configuration (subchannelization or channel aggregation)*

*--supported or not*

extrachannelizationIsSupported BOOLEAN,

*-- Extra channel configuration description*

rXextrachannelizationDescription ExtraChannelizationDescription OPTIONAL,

tXextrachannelizationDescription ExtraChannelizationDescription OPTIONAL,

*}*

extraChannelizationDescription ::= SEQUENCE{

*-- Maximum number of non-contiguous channels supported in channel*

*--aggregation*

maxNuNonconCH INTEGER,

*-- Maximum number of contiguous channels supported in channel bonding*

maxNuConCH INTEGER,

*--Min channel raster for fine tuning of frequency*

minChRasterINTEGER *OPTIONAL,* /\* unit [Hz], resolution 1 Hz \*/

*-- Maximum supported bandwidth per channel*

maxCHBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Minimum supported bandwidth per channel*

minCHBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Resolution for additional channel bandwidth between minCHBW and*

*--maxCHBW*

resolutionSBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Minimum bandwidth within either maxCHBW or minCHBW. Any number or*

*--location, which fits within either maxCHBW or minCHBW is allowed.*

minUnderlayBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Offset of the start frequency in the case of maxCHBW*

offsetFreqMaxCHBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Offset of the start frequency in the case of minCHBW*

offsetFreqMinCHBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

*-- Offset always based on the Primary Channelization or not*

OffsetPerPrimaryChannelization BOOLEAN

}

ListOfOperatingFrequencies ::= SEQUENCE OF SEQUENCE {

operFreq FrequencyRange,

occupancy REAL,

totalOccupancy REAL OPTIONAL

}

RequiredResource ::= SEQUENCE OF SEQUENCE {

requiredBandwidth INTEGER, /\* unit [Hz], resolution 1 Hz \*/

requiredOccupancyShare REAL /\* absolute value \*/

}

MeasurementCapability ::= ENUMERATED {

sinr,

fer,

ipnf,

signalDistribution,

spectrum,

ownNetworkChannelLoad,

totalChannelLoad,

otherUsers

}

InterferenceDirection ::= ENUMERATED {

mutual,

source,

victim

}

InterfererData ::= SEQUENCE OF SEQUENCE {

estimationFrequency INTEGER, /\* unit [Hz], resolution 1 Hz \*/

interfererBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

-- at master/device location of interfered part

Imdata InterferenceValues,

-- at the worst location of interfered part

Iwdata InterferenceValues

}

InterferenceValues ::= SEQUENCE {

-- power spectral density at interfered location

pSD REAL, /\* unit [dBm/Hz] \*/

-- Direction of arrival

dOA REAL /\* unit [deg], (N=0, W=90, S=180, E=270) \*/

}

RadioEnvironmentInformation ::= SEQUENCE OF SEQUENCE {

--Identifier of the CE for which information is given

ceID CX\_ID,

CHOICE {

--information of the own network

ownNet OwnNetwork,

--802.19.1 type networks

coexNets CoexSetNetworks,

--Other networks outside 802.19.1

otherNets OtherNetworks,

--unused frequency locations

unusedFreqs UnusedFrequencies,

--Unknown frequency usage

unknownUsage UnknownFrequencyUsage

}

}

OwnNetwork ::= SEQUENCE {

-- CM identifier for a source CE which CSEs are reported

cMID CxID,

-- CM IP address

cMIPAddress OCTET STRING,

-- CM port number

cMPortNum OCTET STRING,

-- Network technology, e.g., 802.11af, 802.22

networkTechnology NetworkTechnology,

-- Coexistence service subscription

subscribedServ SubscribedService,

-- List of supported resources: channel numbers or frequencies

-- List of allowed channels for the source CE

listOfAllowedTVWSChNum ListOfAllowedTVWSChNumber,

--Frequencies supported by the source CE

listOfSupportedResources CHOICE {

-- List of supported channel numbers

listOfSuppChNumber ListOfSupportedChNumber,

-- List of supported frequencies

listOfSuppFreq ListOfSupportedFrequencies

},

-- Indicates whether scheduled transmission is supported

txScheduleSupported BOOLEAN,

-- Indicates whether the coexistence set element releases resources

--Coexistence value of the network

coexistenceValue REAL, /\* absolute value \*/

operResources ListOfOperatingResourceValues

}

ListOfOperatingResourceValue ::= SEQUENCE {

CHOICE {

-- Operating channel number

operChNumber INTEGER,

-- Operating frequency location

operFreq FrequencyRange },

occupancy REAL OPTIONAL, /\* absolute value \*/

txSch TxSchedule OPTIONAL,

totalOccupancy REAL OPTIONAL, /\* absolute value \*/

channelIsShared BOOLEAN OPTIONAL,

txPowerLimit REAL OPTIONAL /\* unit [W] \*/

}

ListOfOperatingResourceValues ::= SEQUENCE OF listOfOperatingResourceValue

TxSchedule ::= SEQUENCE {

scheduleStartTime REAL, /\* GeneralizedTime \*/

scheduleDuration REAL, /\* unit [s] \*/

numberOfScheduleRepetitions INTEGER,

transmissionStartTime REAL, /\* GeneralizedTime \*/

transmissionDuration REAL /\* unit [s] \*/

}

CoexSetNetworks ::= SEQUENCE OF SEQUENCE {

-- CE identifier of the related WSO

ceID CxID,

-- CM identifier for CE

cMID CxID,

-- CM IP address

cMIPAddress OCTET STRING,

-- CM port number

cMPortNum OCTET STRING,

-- Network identifier, e.g., BSS ID

networkID OCTET STRING,

-- Network technology, e.g., 802.11af, 802.22

networkTechnology NetworkTechnology,

operResources listOfOperatingResourceValues

}

OtherNetworks ::= SEQUENCE OF SEQUENCE {

-- Network identifier, e.g., BSS ID

networkID OCTET STRING OPTIONAL,

-- Network technology, e.g., 802.11af, 802.22

networkTechnology NetworkTechnology OPTIONAL,

CHOICE {

-- Operating channel number

operChNumber INTEGER, /\* channel number of incumbent system \*/

-- Operating frequency location

operFreq FrequencyRange },

occupancy REAL OPTIONAL /\* absolute value \*/

}

UnusedFrequencies ::= SEQUENCE OF SEQUENCE {

CHOICE {

-- Operating channel number

operChNumber INTEGER,

-- Operating frequency location

operFreq FrequencyRange }

}

UnknownFrequencyUsage ::= SEQUENCE OF SEQUENCE {

CHOICE {

-- Operating channel number

operChNumber INTEGER,

-- Operating frequency location

operFreq FrequencyRange }

}

ReqInfoDescr ::= SEQUENCE OF ENUMERATED{

sinr,

desiredBandwidth,

desiredOccupancy,

desiredCoverage,

channelNumber,

subscribedService,

interferenceLevel,

coexistenceValue,

threshold,

mobilityInformation,

…

}

ReqInfoValue ::= SEQUENCE OF SEQUENCE{

reqInfoDescr ReqInfoDescr,

reqInfoValue CHOICE {

sinrValue REAL, /\* absolute value \*/

desiredBandwidthValue INTEGER, /\* unit [Hz], resolution 1 Hz \*/

desiredOccupancyValue REAL, /\* absolute value \*/

desiredCoverageValue REAL, /\* unit [m] \*/  
 channelNumberValue INTEGER,

subscribedService SubscribedService

interferenceLevelValue REAL, /\* unit [dBm] \*/

coexistenceValue REAL, /\* absolute value \*/

thresholdValue REAL, /\* ? \*/

mobilityInformation MobilityInformation

}

}

MeasurementDescription ::= SEQUENCE {

measType MeasurementType,

measSchedule MeasurementSchedule,

measFreq MeasurementFreq

}

MeasurementType ::= ENUMERATED {

sinr,

fer,

ipnf,

signalDistribution,

spectrum,

ownNetworkChannelLoad,

totalChannelLoad,

otherUsers

}

MeasurementSchedule ::= SEQUENCE {

measStartTime REAL, /\* GeneralizedTime \*/

numberOfMeasurements INTEGER,

timeBetweenMeasurements REAL /\* unit [s] \*/

}

MeasurementFreq ::= CHOICE {

startStopFreq FrequencyIndication,

channelNumber ChannelIndication

}

FrequencyIndication ::= SEQUENCE OF FrequencyRange

ChannelIndication ::= SEQUENCE OF INTEGER

MeasurementReport ::= CHOICE {

sinrReport SinrReport,

ferReport FerReport,

ipnfReport IpnfReport,

signalDistributionReport SignalDistributionReport,

spectrumReport SpectrumReport,

ownNetworkChannelLoadReport ChannelLoadReport,

totalChannelLoadReport ChannelLoadReport,

otherUsersReport OtherUsersReport

}

SinrReport ::= SEQUENCE {

measBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

sinr REAL /\* absolute value \*/

}

FerReport ::= SEQUENCE {

fer REAL /\* absolute value \*/

}

IpnfReport ::= SEQUENCE {

measBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

ipnf REAL

}

SignalDistributionReport ::= SEQUENCE {

measBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

lowEndOfSignalLevelRange INTEGER, /\* unit [dBm] \*/

numberOfSignalLevelRange INTEGER,

widthOfSignalLevelRange INTEGER, /\* unit [dB] \*/

signalProportionPerRange SEQUENCE OF REAL

}

SpectrumReport ::= SEQUENCE {

measBW INTEGER, /\* unit [Hz], resolution 1 Hz \*/

lowEndOfReportedBandwidth INTEGER, /\* unit [Hz], resolution 1 Hz \*/

numberOfSubchannels INTEGER,

widthOfSubchannel INTEGER, /\* unit [Hz], resolution 1 Hz \*/

signalStrengthPerSubchannel SEQUENCE OF REAL

}

ChannelLoadReport ::= SEQUENCE {

load REAL

}

OtherUsersReport ::= SEQUENCE {

technologyType NetworkTechnology

}

ReconfigurationParameters ::= SEQUENCE OF SEQUENCE {

operResources ListOfOperatingResourceValue

}

FailedParameter ::= SEQUENCE {

failedParameterID FailedParameterID,

failedParameterValue FailedParameterValue

}

FailedParameters ::= SEQUENCE OF FailedParameter

FailedParameterID ::= ENUMERATED {

operatingFrequency,

listOfoperatingChNumber,

txPowerLimit,

channelIsShared,

txSchedule

}

FailedParameterValue ::= CHOICE {

operatingFrequency SEQUENCE {startFreq REAL, stopFreq REAL},

listOfoperatingChNumber SEQUENCE OF INTEGER,

txPowerLimit REAL, /\* unit [W] \*/

channelIsShared BOOLEAN,

txSchedule SEQUENCE OF TxSchedule OPTIONAL

}

EventParams ::= SEQUENCE {

eventDescr EventDescr,

addInfo AddInfo OPTIONAL

}

EventDescr ::= ENUMERATED {

sinrThresholdReached,

qosDegradation,

temporaryResourceRelease,

temporaryResourceReclaim,

…

}

AddInfo ::= CHOICE {

operatingParameters ListOfOperatingResourceValues,

…

}

EntityStatus ::= ENUMERATED {

alive,

terminating,

outOfService

}

END