IEEE P802.19  
Wireless Coexistence

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| --- | --- | --- | --- | --- |
| Comment Resolutions regarding i-15, i-25 and i-60 | | | | |
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Abstract

This document provides propose resolutions for annex A (normative) Data types related to i-15, i-25 and i-60

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# (normative) Data types

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**-----------------------------------------------------------**

--Exported data types

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MeasurementResult,

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MobilityInformation,

--Entity profile

EntityProfile;

--List of recommended operation Frequency

ListOfRecommendedOperationFrequency,

--List of master CM candidate

ListOfMasterCMCandidate,

--List of neighbor CMs

ListOfNeighborCMs;

**-----------------------------------------------------------**

**--Coexistence protocol entity ID**

**-----------------------------------------------------------**

--Coexistence protocol entity type

CxType ::= ENUMERATED {

--Coexistence enabler

ce,

--Coexistence manager

cm,

--Coexistence discovery and information server

cdis}

--Coexistence protocol entity ID

CxID ::= SEQUENCE {

--Entity type

type CxType,

--Entity ID

id OCTET STRING}

**-----------------------------------------------------------**

**--Status**

**-----------------------------------------------------------**

--Status

Status ::= ENUMERATED {

--Primitive/message is successfully processed

noError,

--Primitive/message is rejected due to security reasons

rejected,

--Primitive/message cannot be successfully processed because according to the current entity status different primitive/message is expected

invalidEntityStatus,

--Primitive/message cannot be successfully processed because of invalid values of parameters

invalidArgument,

--Primitive/message cannot be successfully processed because of the process error in the receiving entity

processFailure,

--Primitive/message cannot be successfully processed because of the connection error

networkFailure}

--CxMedia status

CxMediaStatus ::= ENUMERATED {

noErrorAccepted,

noErrorRejected,

errorInvalidEntityStatus,

errorInvalidArgument,

errorProcessFailure,

errorNetworkFailure,

errorUnknown

}

**-----------------------------------------------------------**

**--Coexistence service**

**-----------------------------------------------------------**

--Coexistence service

CoexistenceService ::= ENUMERATED {

--Information service

information,

--Management service

management,

--No service

noService}

SubscribedService::= ENUMERATED {

information,

management,

interCMCoexistenceSetElementsNeighbors,

allCoexistenceSetElementsNeighbors

}

**-----------------------------------------------------------**

**--Network technology**

**-----------------------------------------------------------**

NetworkTechnology ::= ENUMERATED {

--IEEE 802.11af

ieee802dot11af,

--IEEE 802.22

ieee802dot22,

--Radio microphone

radioMic,

--Area broadcast

areaBroadcast,

--ECMA 392

ecma392}

**-----------------------------------------------------------**

**--Network type**

**-----------------------------------------------------------**

NetworkType ::= ENUMERATED {

fixed,

mode1,

mode2,

…

}

**-----------------------------------------------------------**

**--Discovery information**

**-----------------------------------------------------------**

DiscoveryInformation ::= SEQUENCE {

coordinateX REAL, /\* unit none \*/

coordinateY REAL, /\* unit none \*/

coordinateZ REAL, /\* unit none \*/

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

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

antennaGain REAL, /\* unit [dB] \*/

minReqSNR REAL, /\* unit [dB] \*/

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

…

}

**-----------------------------------------------------------**

**--Location**

**-----------------------------------------------------------**

--Location

Geolocation ::= CHOICE {

--Place name or ID

placeID OCTET STRING,

--Coordinates of the master station

coordinates SEQUENCE {

--Latitude

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

--Longitude

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

--Altitude

altitude REAL /\* unit [m] \*/ OPTIONAL}}

**-----------------------------------------------------------**

**--Coverage area**

**-----------------------------------------------------------**

--Coverage area

CoverageArea ::= SEQUENCE {

--Coverage radius

radius REAL, /\* unit none \*/

--Reference central frequency

refFrequency REAL, /\* unit [MHz] \*/

--Reference height of master station

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

--Reference height of slave station

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

--Reference transmission power

refTxPower REAL /\* unit [dBm] \*/}

**-----------------------------------------------------------**

**--Installation parameters**

**-----------------------------------------------------------**

--Installation parameters

InstallationParameters ::= SEQUENCE {

--Operating height of master station

opMasterHeight REAL OPTIONAL, /\* unit [m] \*/

--Operating height of slave station

opSlaveHeight REAL OPTIONAL, /\* unit [m] \*/

--Operating transmission power

opTxPower REAL OPTIONAL, /\* unit [dBm] \*/

--Adjacent channel selectivity of the WSO

aCS REAL OPTIONAL, /\* unit [dB] \*/

--Adjacent channel leakage ratio of the WSO

aCLR REAL OPTIONAL, /\* unit [dB] \*/

--Guaranteed QoS of backhaul connection of the WSO

guaranteedQoSOfBackhaulConnection GuaranteedQoSOfBackhaulConnection OPTIONAL}

**-----------------------------------------------------------**

**--Guaranteed QoS of backhaul connection related data types**

**----------------------------------------------------------**

GuaranteedQoSOfWiredConnection ::= SEQUENCE{

--Backhaul type ID

backhaulTypeID ENUMERATED{

xDSL,

opticalFibre,

…},

--Guaranteed minimum bit rates of backhaul connection

GuaranteedMinimumBitRates REAL OPTIONAL, /\* unit [bit/sec] \*/

…}

**-----------------------------------------------------------**

**--Frequency range related data types**

**-----------------------------------------------------------**

--Frequency range

FrequencyRange ::= SEQUENCE {

--Start frequency

startFreq REAL, /\* unit [MHz] \*/

--Stop frequency

stopFreq REAL}/\* unit [MHz] \*/

--List of available frequencies

ListOfAvailableFrequencies ::= SEQUENCE OF SEQUENCE {

--Frequency range

frequencyRange FrequencyRange,

--Transmission power limit

txPowerLimit REAL OPTIONAL, /\* unit [dBm] \*/

--Start time when this frequency range is available

availableStartTime GeneralizedTime OPTIONAL,

--Duration during which this frequency range is available

availableDuration REAL OPTIONAL, /\* unit [sec] \*/

--Aggregated interference control parameters

aggInterfCtrolParam   
AggregatedInterferenceControlParameters OPTIONAL}

--Aggregated interference control parameters

AggregatedInterferferenceControlParameters ::= SEQUENCE{

--Reference point ID to be protected in controlling

--aggregated interference from the other WSO(s)

referencePointID INTEGER,

--Geolocation information of the reference point ID

geolocation Geolocation,

--Adjacent channel selectivity of the WSO

aCS REAL, /\* unit [dB] \*/

--Adjacent channel leakage ratio of the WSO

aCLR REAL, /\* unit [dB] \*/

--Potential antenna height of the reception to be protected

--in the reference point

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

--Potential antenna gain of the reception to be protected

--in the reference point

antennaGain REAL, /\* unit [dB] \*/

--Protection ratio of the reception to be protected

--at the reference point for the frequency

protectionRatio REAL, /\* unit [dB] \*/

…}

--List of supported frequencies

ListOfSupportedFrequencies ::= SEQUENCE OF SEQUENCE {

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

supportedFrequency FrequencyRange,

-- Extra channel configuration

-- (subchannelization or channel aggregation) supported or not

extrachannelizationIsSupported BOOLEAN,

-- Extra channel configuration description

extrachannelizationDescription   
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

minChRaster REAL OPTIONAL, /\* unit [kHz] \*/

--Maximum supported bandwidth per channel

maxCHBW REAL, /\* unit [MHz] \*/

--Minimum supported bandwidth per channel

minCHBW REAL, /\* unit [MHz] \*/

--Resolution for additional channel bandwidth

--between minCHBW and maxCHBW

resolutionSBW REAL, /\* unit [MHz] \*/

--Minimum bandwidth within either maxCHBW or minCHBW.

--Any number or location, which fits within

--either maxCHBW or minCHBW is allowed.

minUnderlayBW REAL, /\* unit [MHz] \*/

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

offsetFreqMaxCHBW REAL, /\* unit [MHz] \*/

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

offsetFreqMinCHBW REAL, /\* unit [MHz] \*/

--Offset always based on the Primary Channelization or not

OffsetPerPrimaryChannelization BOOLEAN}

--List of operating frequencies

ListOfOperatingFrequencies ::= SEQUENCE OF SEQUENCE {

--Frequency range

frequencyRange FrequencyRange,

--Occupancy if known

occupancy REAL OPTIONAL} /\* unit none \*/

**-----------------------------------------------------------**

**--Available channel numbers**

**-----------------------------------------------------------**

ConstOfChUseID :: = ENUMERATED {

regulationMaxTxPower,

regulationMaxAntGain,

regulationMaxAntHeight,

regulationTVDBUpdateTime,

outOfBandEmissionLimit,

…

}

ConstOfChUseValue ::= CHOICE {

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

regulationMaxAntMaxGain REAL, /\* unit [dB] \*/

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

regulationTVDBUpdateTime REAL, /\* unit [sec] \*/

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

…

}

ConstOfChUses ::= SEQUENCE OF SEQUENCE {

constOfChUseID ConstOfChUseID,

constOfChUseValue ConstOfChUseValue

}

ListOfAvailableChNumbers ::= SEQUENCE OF SEQUENCE {

chNumber INTEGER,

availableStartTime GeneralizedTime,

availableDuration REAL, /\* unit [sec] \*/

constOfChUses ConstOfChUses

}

**-----------------------------------------------------------**

**--Operating channel numbers**

**-----------------------------------------------------------**

ListOfOperatingChNumbers ::= SEQUENCE OF SEQUENCE {

chNumber INTEGER,

occupancy REAL /\* unit none \*/

}

**-----------------------------------------------------------**

**--Required resource**

**-----------------------------------------------------------**

--Required resource

RequiredResource ::= SEQUENCE OF SEQUENCE {

--Required bandwidth

requiredBandwidth REAL, /\* unit [MHz] \*/

--Expected occupancy if known

occupancy REAL OPTIONAL} /\* unit none \*/

**-----------------------------------------------------------**

**--Operation code for registration**

**-----------------------------------------------------------**

--Operation code for registration

OperationCode ::= ENUMERATED {

--New registration

new,

--Update of registration information

update,

--Deregistration

delete}

**-----------------------------------------------------------**

**--Measurement capability**

**-----------------------------------------------------------**

MeasurementCapability ::= ENUMERATED {

energyDetection,

featureDetection,

…

}

**-----------------------------------------------------------**

**--Reconfiguration related data types**

**-----------------------------------------------------------**

--Transmission schedule

TxSchedule ::= SEQUENCE {

--Schedule start time

scheduleStartTime GeneralizedTime,

--Schedule frame duration

scheduleFrameDuration REAL, /\* unit [sec] \*/

--Number of schedule frames

numberOfFrames INTEGER,

--Transmission start time within a schedule frame

transmissionStartTime REAL, /\* unit [sec] \*/

--Transmission duration within a schedule frame

transmissionDuration REAL}/\* unit [sec] \*/

**-----------------------------------------------------------**

**--CM registration**

**-----------------------------------------------------------**

--CM registration

CMRegistration ::= SEQUENCE {

--CM IP address

ipAddress OCTET STRING,

--CM port number

portNumber INTEGER}

--List of WSO for registration

ListOfWSORegistrations ::= SEQUENCE OF SEQUENCE {

--New registration, registration update or deregistration

operationCode OperationCode,

--WSO ID

wsoID OCTET STRING,

--Network technology

networkTechnology NetworkTechnology OPTIONAL,

--Location

geolocation Geolocation OPTIONAL,

--Coverage area

coverageArea CoverageArea OPTIONAL,

-- Mobility information

mobilityInformation MobilityInformation OPTIONAL,

--Installation parameters

installationParameters InstallationParameters OPTIONAL,

--List of available frequencies

listOfAvailableFrequencies ListOfAvailableFrequencies OPTIONAL,

-- Operating frequency if available

operatingFrequency FrequencyRange OPTIONAL,

-- Upper limit of transmission power level of its operating frequency

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

--Maximum number of controllable WSO

maximumNumberOfControllableWSO INTEGER OPTIONAL}

--CE registration

CERegistration ::= SEQUENCE OF SEQUENCE{

--CE ID

ceID CxID,

-- List of WSO registration

listOfWSORegistration ListOfWSORegistrations}

**-----------------------------------------------------------**

**--Coexistence report**

**-----------------------------------------------------------**

CoexistenceReport ::= SEQUENCE OF SEQUENCE {

networkID OCTET STRING,

networkTechnology NetworkTechnology,

listOfOperatingChNumbers ListOfOperatingChNumbers

}

ChannelPriority ::= SEQUENCE OF SEQUENCE {

channelNumber INTEGER,

priority INTEGER

}

**-----------------------------------------------------------**

**--Coexistence set information related data types**

**-----------------------------------------------------------**

--Interference direction

InterferenceDirection ::= ENUMERATED {

--Subject WSO creates interference to neighbor WSO

source,

--Neighbor WSO creates interference to subject WSO

victim,

--Both subject WSO and neighbor WSO create interference to each other

mutual}

--Network geometry class

NetworkGeometryClass ::= ENUMERATED {

--Class#1 network geometry

class\_1,

--Class#2 network geometry

class\_2,

--Class#3 network geometry

class\_3,

--Class#4 network geometry

class\_4}

--List of neighbor WSOs

ListOfNeighborWSOs ::= SEQUENCE OF SEQUENCE {

--Neighbor WSO ID

wsoID OCTET STRING,

--Neighbor WSO network technology

networkTechnology NetworkTechnology,

--Interference direction

interferenceDirection InterferenceDirection,

--Network geometry classification

networkGeometryClass NetworkGeometryClass OPTIONAL,

--Distance to subject WSO

distance REAL/\* unit [m] \*/

--List of operating frequencies

--Not used in CoexistenceSetInformationAnnouncement

--Used in CoexistenceReportAnnouncement and CxMediaCoexistenceReportIndication

listOfOperatingFrequencies ListOfOperatingFrequencies OPTIONAL,

listOfAvailableFrequencies ListOfAvailableFrequencies}

--List of master CM candidate

ListOfMasterCMCandidate ::= SEQUENCE OF SEQUENCE {

cmID cxID,

ipAddress IPAddress,

portNumber PortNumber

}

--List of neighbor CEs

ListOfNeighborCEs ::= SEQUENCE OF SEQUENCE {

--Neihgbor CE ID

ceID CxID,

--List of neighbor WSOs

listOfNeighborWSOs ListOfNeighborWSOs}

--List of neighbor CMs

ListOfNeighborCMs ::= SEQUENCE OF SEQUENCE {

--Neighbor CM ID

cmID CxID,

--List of neighbor CEs

listOfNeighborCEs ListOfNeighborCEs}

--List of available frequencies of the subject WSO

ListOfSubjectWSOAvailableFrequencies ::= SEQUENCE OF SEQUENCE {

--Frequency range

frequencyRange FrequencyRange,

--List of neighbor CMs

listOfNeighborCMs ListOfNeighborCMs}

-- List of recommended operation frequencies

ListOfRecommendedOperationFrequency :: = SEQUENCE OF SEQUENCE {

frequencyRange FrequencyRange,

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

availableStartTime GeneralizedTime,

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

}

--List of subject WSOs

ListOfSubjectWSOs ::= SEQUENCE OF SEQUENCE {

--Subject WSO ID

wsoID OCTET STRING,

--List of available frequencies of the subject WSO

listOfSubjectWSOAvailableFrequencies ListOfSubjectWSOAvailableFrequencies}

--List of subject CEs

ListOfSubjectCEs ::= SEQUENCE OF SEQUENCE {

--Subject CE ID

ceID CxID,

--List of subject WSOs

listOfSubjectWSOs ListOfSubjectWSOs}

--List of neighbor CMs transport information

ListOfNeighborCMsTransport ::= SEQUENCE OF SEQUENCE {

--Neighbor CM ID

cmID CxID,

--Neighbor CM profile

cmProfile EntityProfile,

-- Neighbor CM IP address

ipAddress OCTET STRING,

-- Neighbor CM port number

portNumber INTEGER}

**-----------------------------------------------------------**

**--Coexistence set information**

**-----------------------------------------------------------**

ListOfCoexSetElement ::= SEQUENCE OF SEQUENCE {

networkID OCTET STRING,

networkTechnology NetworkTechnology

}

ListOfNeighborCM ::= SEQUENCE OF SEQUENCE {

neighborCMID CxID,

--Neighbor CM profile

cmProfile EntityProfile,

listOfCoexSetElement ListOfCoexSetElement

}

**-----------------------------------------------------------**

**--Coexistence set element information related data types**

**-----------------------------------------------------------**

--List of neighbor CM WSOs

ListOfNeighborCMWSOs ::= SEQUENCE OF SEQUENCE {

--WSO ID

wsoID OCTET STRING,

--List of available frequencies

listOfAvailableFrequencies ListOfAvailableFrequencies OPTIONAL,

--List of operating frequencies

listOfOperatingFrequencies ListOfOperatingFrequencies OPTIONAL,

--Network geometry classification

networkGeometryClass NetworkGeometryClass OPTIONAL

}

**-----------------------------------------------------------**

**--Coexistence set element reconfiguration related data types**

**-----------------------------------------------------------**

--List of WSOs

ReconfigListOfWSOs ::= SEQUENCE OF SEQUENCE {

--WSO ID

wsoID OCTET STRING,

--Potential new operating frequency

newOperatingFrequency FrequencyRange,

--Additionally operable network technology

addNetworkTechnology NetworkTechnology OPTIONAL

}

--List of CEs

ReconfigListOfCEs ::= SEQUENCE OF SEQUENCE {

--CE ID

ceID CxID,

--List of WSOs

reconfigListOfWSOs ReconfigListOfWSOs

}

**-----------------------------------------------------------**

**--Channel classification**

**-----------------------------------------------------------**

OperatingChannelInfo ::= SEQUENCE {

operatingChannelNumber INTEGER,

listOfNetworkID SEQUENCE OF OCTET STRING,

…

}

ChClassInfo ::= SEQUENCE {

availableChannelList SEQUENCE OF INTEGER,

restrictedChannelList SEQUENCE OF INTEGER,

protectedChannelList SEQUENCE OF INTEGER,

unclassifiedChannelList SEQUENCE OF INTEGER,

operatingChannelList SEQUENCE OF OperatingChannelInfo,

coexistenceChannelList SEQUENCE OF OperatingChannelInfo,

…

}

ChClassInfoList ::= SEQUENCE OF SEQUENCE {

networkID OCTET STRING,

chClassInfo ChClassInfo

}

**-----------------------------------------------------------**

**--Failed parameters**

**-----------------------------------------------------------**

FailedParameterID ::= ENUMERATED {

listOfoperatingChNumber,

txPowerLimit,

channelIsShared,

txSchedule

}

FailedParameterValue ::= CHOICE {

listOfoperatingChNumber SEQUENCE OF INTEGER,

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

channelIsShared BOOLEAN,

txSchedule TxSchedule

}

FailedParameters ::= SEQUENCE OF SEQUENCE {

failedParameterID FailedParameterID,

failedParameterValue FailedParameterValue

}

**-----------------------------------------------------------**

**--Event indication**

**-----------------------------------------------------------**

EventDescr ::= ENUMERATED{

sinrThresholdReached,

qosDegradation,

…

}

EventParams ::= SEQUENCE {

eventDescr EventDescr

}

**-----------------------------------------------------------**

**--Information Acquiring**

**-----------------------------------------------------------**

ReqInfoDescr ::= SEQUENCE OF ENUMERATED {

sinr,

desiredBandwidth,

desiredOccupancy,

desiredQoS,

desiredCoverage,

channelNumber,

subscribedService,

interferenceLevel,

fairness,

threshold,

mobilityInformation,

...

}

ReqInfoValue ::= SEQUENCE OF SEQUENCE {

reqInfoDescr ReqInfoDescr,

reqInfoValue CHOICE {

sinrValue REAL, /\* unit none \*/

desiredBandwidthValue REAL, /\* unit none \*/

desiredOccupancyValue REAL, /\* unit none \*/

desiredQoSValue REAL, /\* unit none \*/

desiredCoverageValue REAL, /\* unit none \*/

channelNumberValue REAL, /\* unit none \*/

subscribedServiceValue SubscribedService

interferenceLevelValue REAL, /\* unit none \*/

fairnessValue REAL, /\* unit none \*/

thresholdValue REAL, /\* unit none \*/

mobilityInformation MobilityInformation,

otherValue ANY

}

}

**-----------------------------------------------------------**

**--Negotiation**

**-----------------------------------------------------------**

NegotiationStatus :: = SEQUENCE {

negotiationSuccess BOOLEAN,

negotiationFailure BOOLEAN,

underNegotiation BOOLEAN,

…

}

StartEndTime :: = SEQUENCE {

startTime REAL, /\* unit [sec] \*/

endTime REAL /\* unit [sec] \*/

}

TimeSharingUnitInfo ::= SEQUENCE {

referenceTime REAL, /\* unit [sec] \*/

windowTime StartEndTime,

slotTime StartEndTime,

…

}

NegotiationInformation :: = SEQUENCE {

mode BOOLEAN,

listOfChNumber SEQUENCE OF INTEGER,

timeSharingUnitInfo TimeSharingUnitInfo,

slotTimePosition StartEndTime,

numberOfSlots INTEGER,

disallowedSlotTimePosition StartEndTime,

listOfContentionNumbers SEQUENCE OF REAL,

…

}

ListOfWinnerCMID ::= SEQUENCE OF CxID

ListOfSlotTimePosition ::= SEQUENCE OF REAL

**-----------------------------------------------------------**

**--Measurement**

**-----------------------------------------------------------**

MeasurementSchedule ::= SEQUENCE {

measStartTime REAL, /\* unit [sec] \*/

numberOfMeasurements INTEGER,

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

}

MeasurementFreq ::= SEQUENCE OF INTEGER

MeasurementType ::= ENUMERATED {

interferenceLevel

}

MeasurementDescription ::= SEQUENCE {

measType MeasurementType,

measSchedule MeasurementSchedule,

measFreq MeasurementFreq

}

MeasurementReport ::= CHOICE {

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

…

}

MeasurementResult ::= SEQUENCE OF SEQUENCE {

measurementDescription MeasurementDescription,

measurementReport MeasurementReport

}

-----------------------------------------------------------

--Mobility Information

-----------------------------------------------------------

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

}

**-----------------------------------------------------------**

**--Entity profile**

**-----------------------------------------------------------**

--Entity profile

EntityProfile ::= ENUMERATED {

--Profile 1

profile1,

--Profile 2

profile2,

--Profile 3

profile3}

END