IEEE P802.19  
Wireless Coexistence

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| --- | --- | --- | --- | --- |
| Proposal to modify message definitions (section 6.4) and data type definitions (section 6.5) | | | | |
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Abstract

This document contains proposed modifications to message and data type definitions in sections 6.4 and 6.5 of the IEEE 802.19.1 draft DF3.02. Changes are highlighted with yellow. Rationale for the changes is given as comments.

**Notice:** This document has been prepared to assist IEEE 802.19. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

**SECTION 6.4**

IEEE802191ProtocolMessage DEFINITIONS AUTOMATIC TAGS ::= BEGIN

IMPORTS

SubscribedService,

OperationCode,

NetworkTechnology,

NetworkType,

DiscoveryInformation,

AvailableChannelsInformation,

ListOfAvailableFrequencies,

ListOfSupportedFrequencies,

ListOfSupportedChNumber,

ListOfOperatingFrequencies,

InterferenceDirection,

RadioEnvironmentInformation,

NetworkGeometryClass,

DeviceClass,

RequiredResource,

ListOfAllowedTVWSChNumber,

ConstOfChUses,

ChClassInfo,

FrequencyRange,

ReqInfoDescr,

ReqInfoValue,

MeasurementDescription,

MeasurementResult,

NegotiationInformation,

ListOfWinnerCMID,

ListOfSlotTimePosition,

ReconfigurationParameters,

FailedParameters,

EventParams,

ListOfGeolocation,

DatabaseInformation,

CoexistenceSetRadioEnvironmentInformation

FROM IEEE802191ProtocolDataType;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Message structure definitions

-- \* a) The overall message structure with header and payload

-- \* b) Message header structure with respective fields and their types

-- \* c) Message payload options, i.e. coexistence system messages

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* a) The overall message structure with header and payload

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- The overall message structure

CxMessage ::= SEQUENCE {

-- Message header

messageHeader MessageHeader,

-- Message payload

payload CxPayload

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* b) Message header structure with respective fields and their types

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- Message header

MessageHeader ::= {

-- Source indetifier

sourceIdentifier CxID,

-- Destination identifier

destinationIdentifier CxID,

-- Indicates whether ack service is required

ackPolicy BOOLEAN,

-- Message identifier

messageIdentification MessageIdentification,

}

-- Source and destination identifiers within the message header or within data type

CxID ::= SEQUENCE {

-- Entity type

type CxType,

-- Entity identifier

id OCTET STRING

}

-- Entity type identifier

CxType ::= ENUMERATED {

ce,

cm,

cdis,

tvwsdb

}

-- Message identifier

MessageIdentification ::= CHOICE {

None NULL,

-- Request identifier

requestID INTEGER (0..2147483647),

-- Multiple response identifier

multipleResponse SEQUENCE {

requestID INTEGER (0..2147483647),

sequenceNumber INTEGER (0..2147483647),

isLastResponse BOOLEAN

}

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* c) Message payload options, i.e. all the different coexistence

-- \* system messages

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CxPayload ::= CHOICE {

authenticationReq AuthenticationRequest,

authenticationRsp AuthenticationResponse,

deauthenticationReq DeauthenticationRequest,

deauthenticationRsp DeauthenticationResponse,

stopOperationAnn StopOperationAnnouncement,

subscriptionReq SubscriptionRequest,

subscriptionRsp SubscriptionResponse,

subscriptionChangeReq SubscriptionChangeRequest,

subscriptionChangeRsp SubscriptionChangeResponse,

ceRegistrationReq CERegistrationRequest,

registrationRsp RegistrationResponse,

cmRegistrationReq CMRegistrationRequest,

coexSetInformationAnn CoexistenceSetInformationAnnouncement,

coexSetInformationReq CoexistenceSetInformationRequest,

coexSetInformationRsp CoexistenceSetInformationResponse,

coexReportAnn CoexistenceReportAnnouncement,

coexReportReq CoexistenceReportRequest,

coexReportRsp CoexistenceReportResponse,

availableChannelsReq AvailableChannelsRequest,

cmAvailableChannelsReq CMAvailableChannelsRequest,

availableChannelsRsp AvailableChannelsResponse,

availableChannelsAnn AvailableChannelsAnnouncement,

cmChannelClassReq CMChannelClassificationRequest,

cmChannelClassRsp CMChannelClassificationResponse,

channelClassReq ChannelClassificationRequest,

channelClassRsp ChannelClassificationResponse,

channelClassAnn ChannelClassificationAnnouncement,

infoAquiringReq InfoAquiringRequest,

infoAquiringRsp InfoAquiringResponse,

coexSetElementInfoAnn CoexistenceSetElementInformationAnnouncement,

coexSetElementInfoConf CoexistenceSetElementInformationConfirm,

measurementReq MeasurementRequest,

measurementRsp MeasurementResponse,

measurementCnf MeasurementConfirm,

negotiationReq NegotiationRequest,

negotiationAnn NegotiationAnnouncement,

cmMasterCMReq CMMasterCMRequest,

cmMasterCMCnf CMMasterCMConfirm,

cdisMasterCMReq CDISMasterCMRequest,

cdisMasterCMCnf CDISMasterCMConfirm,

masterCMReq MasterCMRequest,

masterCMCnf MasterCMConfirm,

masterCMInd MasterCMIndication,

masterSlaveCMConfReq MasterSlaveCMConfigurationRequest,

masterSlaveCMConfAnn MasterSlaveCMConfigurationAnnouncement,

cmMasterSlaveCMConfReq CMMasterSlaveCMConfigurationRequest,

cmMasterSlaveCMConfRsp CMMasterSlaveCMConfigurationResponse,

cmMasterSlaveCMConfCnf CMMasterSlaveCMConfigurationConfirm,

reconfigurationRequest ReconfigurationRequest,

reconfigurationRsp ReconfigurationResponse,

cmReconfigurationReq CMReconfigurationRequest,

cmReconfigurationRsp CMReconfigurationResponse,

resourceReconfReq CMReconfigurationRequest,

resourceReconfRsp CMReconfigurationResponse,

coexSetElementReconfReq CoexistenceSetElementReconfigurationRequest,

coexSetElementReconfRsp CoexistenceSetElementReconfigurationResponse,

eventIndication EventIndication,

eventConfirm EventConfirm,

keepAliveReq KeepAliveRequest,

keepAliveRsp KeepAliveResponse

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Definitions of individual coexistence system messages

-- \* Messages defined per procedures as follows

-- \* 1) Authentication and deauthentication

-- \* 2) Coexistence service subscription

-- \* 3) Providing registration information

-- \* 4) Obtaining coexistence set information

-- \* 5) Obtaining available channel list

-- \* 6) Obtaining channel classification

-- \* 7) Obtaining information

-- \* 8) Requesting and obtaining measurements

-- \* 9) Negotiation between CMs

-- \* 10) Master CM selection

-- \* 11) Reconfiguration

-- \* 12) Event

-- \* 13) Coexistence set element reconfiguration

-- \* 14) Keep alive

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 1) Authentication and deauthentication

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

AuthenticationRequest ::= SEQUENCE {

-- Client identifier

clientID IA5String,

-- Client password

clientPW IA5String

}

AuthenticationResponse ::= SEQUENCE {

-- Server identifier

serverID IA5String,

-- Server password

serverPassword IA5String, -- Authentication status

status BOOLEAN

}

DeauthenticationRequest ::= SEQUENCE {

-- Client identifier

clientID IA5String,

-- Client password

clientPW IA5String

}

DeauthenticationResponse ::= SEQUENCE {

-- Server identifier

serverID IA5String,

-- Server password

serverPassword IA5String,

-- Deauthentication status

status BOOLEAN

}

StopOperationAnnouncement ::= SEQUENCE {

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 2) Coexistence service subscription

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

SubscriptionRequest ::= SEQUENCE {

-- Subscribed coexistence service

subscrivedService SubscribedService

}

SubscriptionResponse ::= SEQUENCE {

-- Subscription status

status BOOLEAN

}

SubscriptionChangeRequest ::= SEQUENCE {

-- Proposed new subscribed coexistence service

newSubscribedService SubscribedService

}

SubscriptionChangeResponse ::= SEQUENCE {

-- Subscription change status

status BOOLEAN

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 3) Providing registration information

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- From CE to CM

CERegistrationRequest ::= SEQUENCE {

-- Indicates whether this is new registration or registration update

operationCode OperationCode,

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

networkID OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Network type, e.g., fixed, mode 2

networkType NetworkType,

-- Regulatory ID of the WSO, e.g. FCC ID

deviceRegulatoryID OCTET STRING,

-- Serial number of the WSO

deviceSN OCTET STRING,

-- Information about available white space resources

availableChannelsInfo AvailableChannelsInfo,

-- Information for discovery

discoveryInformation DiscoveryInformation,

-- List of supported resources: channel numbers or frequencies

-- List of operating resources: channel numbers or frequencies

listOfOperatingResources CHOICE {

-- List of operating channel numbers

listOfOperChNumber ListOfOperatingChNumber,

-- List of operating frequencies

-- Includes occupancy information

listOfOperFrequencies ListOfOperatingFrequencies },

Measurement results (RadioEnvironmentInformation) sent in another message

~~-- Information on radio environment as observed by this WSO~~

~~radioEnvInformation RadioEnvironmentInformation OPTIONAL,~~

-- Resource required for operation of this WSO

requiredResource RequiredResource,

-- WSO capabilities that have an effect on coexistence decisions

wsoCapabilities NetworkCapabilities,

-- Adjacent channel leakage ratio of the TVBD device

aCLR REAL,

-- Adjacent channel selectivity of the receiver

aCS REAL,

-- Guaranteed QoS of backhaul connection in the TVBD device

guaranteedQoSOfBackhaulConn GuaranteedQoSOfBackhaulConnection,

--Coexistence value of the network

coexistenceValue REAL

--Fairness indicator

fairness REAL

}

-- From CM to CE

RegistrationResponse ::= SEQUENCE {

}

-- From CM to CDIS

CMRegistrationRequest ::= SEQUENCE {

-- Maximum number of controllable WSOs

maximumNumberOfControlableWSO INTEGER,

***Irrelevant information? Where is this needed?***

~~-- The geo-location of the CM~~

~~geolocationCM Geolocation,~~

~~-- The coverage radius of the CM in meters~~

~~coverageRadiusCM REAL,~~

-- Indicates whether this is new registration, registration update,

-- or deletion of WSO

operationCode OperationCode,

-- CE identifier to which this message applies

ceID CxID,

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

networkID OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Network type, e.g., fixed, mode 2

networkType NetworkType,

***This change proposal is tightly coupled with proposal to change the coexistence discovery model as presented in 19-12/0200r0.***

*-- Impact area which includes communication and interference areas*

impactArea WSOImpactArea,

~~-- Information for discovery~~

~~discoveryInformation DiscoveryInformation,~~

***The next 3 ones belong to CM analysis?***

-- Adjacent channel leakage ratio of the WSO device

aCLR REAL,

-- Adjacent channel selectivity of the receiver

aCS REAL,

-- Guaranteed QoS of backhaul connection in the WSO device

guarQoSOfBackhaulConnection GuaranteedQoSOfBackhaulConnection,

-- List of supported resources: channel numbers or frequencies

listOfSupportedResources CHOICE {

-- List of supported channel numbers

listOfSuppChNumber ListOfSupportedChNumber,

-- List of supported frequencies

listOfSuppFrequencies ListOfSupportedFrequencies },

***CDIS does not need to know this***

~~-- Measurement capability of the WSO~~

~~measurementCapability MeasurementCapability~~

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 4) Obtaining coexistence set information

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- From CM to CDIS

CoexistenceSetInformationRequest ::= SEQUENCE {

-- List of WSO for which coexistence set information is requested

listofWSO SEQUENCE OF SEQUENCE {

-- Indication of a particular WSO for which coexistence set

-- information is requested

networkID OCTET STRING,

-- CE identifier of the related WSO

ceID CxID

}

}

-- From CDIS to CM

CoexistenceSetInformationResponse ::= SEQUENCE {

-- List of CE~~WSO~~s for which coexistence set information is reported

listOf~~WSO~~CE SEQUENCE OF SEQUENCE {

-- Indication of a particular CE~~WSO~~ for which coexistence set

-- information is reported in this response

~~networkID OCTET STRING,~~

ceID CxID,

~~-- List of neighbor CMs~~

~~listOfNeighborCM SEQUENCE OF SEQUENCE {~~

~~-- Neighbor CM identifier~~

~~neighborCMID CxID,~~

~~-- Neighbor CM IP address~~

~~neighborCMIPAddress OCTET STRING,~~

~~-- Neighbor CM port number~~

~~neighborCMPortNum OCTET STRING,~~

-- List of coexistence set elements served by this CM

listOfCoexSetElement SEQUENCE OF SEQUENCE {

-- CE identifier of the related WSO

ceID CxID

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

networkID OCTET STRING,

-- CM identifier serving CE

cMID CxID,

-- CM IP address

cMIPAddress OCTET STRING,

-- CM port number

cMPortNum OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Interference direction: mutual, source or victim

interfDirection InterferenceDirection,

-- Estimated interference level caused by the

-- coexistence set element

interfLevelFromCoexSetElem REAL,

-- Estimated interference level caused to the

-- coexistence set element

interfLevelToCoexSetElem REAL,

-- Network geometry class between this WSO and this

-- coexistence set element

networkGeometryClass NetworkGeometryClass

}

~~}~~

}

}

-- From CDIS to CM

CoexistenceSetInformationAnnouncement ::= SEQUENCE {

listOf~~WSO~~CE SEQUENCE OF SEQUENCE {

-- Indication of a particular CE~~WSO~~ for which coexistence set

-- information is reported in this response

~~networkID OCTET STRING,~~

ceID CxID,

~~-- List of neighbor CMs~~

~~listOfNeighborCM SEQUENCE OF SEQUENCE {~~

~~-- Neighbor CM identifier~~

~~neighborCMID CxID,~~

~~-- Neighbor CM IP address~~

~~neighborCMIPAddress OCTET STRING,~~

~~-- Neighbor CM port number~~

~~neighborCMPortNum OCTET STRING,~~

-- List of coexistence set elements served by this CM

listOfCoexSetElement SEQUENCE OF SEQUENCE {

-- CE identifier of the related WSO

ceID CxID

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

networkID OCTET STRING,

-- CM identifier serving CE

cMID CxID,

-- CM IP address

cMIPAddress OCTET STRING,

-- CM port number

cMPortNum OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Interference direction: mutual, source or victim

interfDirection InterferenceDirection,

-- Estimated interference level caused by the

-- coexistence set element

interfLevelFromCoexSetElem REAL,

-- Estimated interference level caused to the

-- coexistence set element

interfLevelToCoexSetElem REAL,

-- Network geometry class between this WSO and this

-- coexistence set element

networkGeometryClass NetworkGeometryClass

}

~~}~~

}

}

OLD CoexistenceSetElementInformationAnnouncement section 6.3.7.3 CM to CM to new 6.3.4.2

-- From CM to CM

CoexistenceSetElementInformationAnnouncement ::= SEQUENCE OF SEQUENCE {

--Identifier of the CE for which information is given

ceID CX\_ID,

--frequency usage alternatives

frequencyUsageStatus CHOICE {

--802.19.1 type networks

coexNets CoexSystemNetworks,

--Other networks outside 802.19.1

otherNets OtherNetworks,

--unused frequency locations

unusedFreqs UnusedFrequencies,

--Unknown frequency usage

unknownUsage UnknownFrequencyUsage

}

}

-- From CM to CM

CoexistenceSetElementInformationConfirm ::= SEQUENCE {

}

-- From CM to CM

CoexistenceSetElementInformationRequest ::= SEQUENCE {

--Identifier of the CE for which information is requested

ceID CX\_ID

}

-- From CM to CM

CoexistenceSetElementInformationResponse ::= SEQUENCE OF SEQUENCE {

--Identifier of the CE for which information is given

ceID CX\_ID,

--frequency usage alternatives

frequencyUsageStatus CHOICE {

--802.19.1 type networks

coexNets CoexSystemNetworks,

--Other networks outside 802.19.1

otherNets OtherNetworks,

--unused frequency locations

unusedFreqs UnusedFrequencies,

--Unknown frequency usage

unknownUsage UnknownFrequencyUsage

}

}

-- From CE to CM

CoexistenceReportRequest ::= SEQUENCE {

}

-- From CM to CE

CoexistenceReportResponse ::= SEQUENCE {

-- List of coexistence set elements reported in this response

listOfCoexistenceSetElement SEQUENCE OF SEQUENCE {

-- CE identifier of the related WSO

ceID CxID

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

networkID OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Interference direction, i.e., mutual, source or victim

interferenceDirection InterferenceDirection,

-- Estimated interference level caused by the coexistence set

-- element

interfLevelFromCoexSetElem REAL,

-- Estimated interference level caused to the coexistence set

-- element

interfToCoexSetElem REAL,

~~-- List of operating resources: channel numbers or frequencies~~ MORE ACCURATE OPERATING PARAMETER INFORMATION TOLD SEPARATELY INCLUDING NON COEX SYSTEM DATA

~~listOfOperatingResources CHOICE {~~

~~-- List of operating channel numbers~~

~~listOfOperChNumber ListOfOperatingChNumber,~~

~~-- List of operating frequencies including occupancy~~

~~-- information~~

~~listOfOperFrequencies ListOfOperatingFrequencies },~~

remove: not relevant here

~~-- Radio environment information~~

~~radioEnvInformation RadioEnvironmentInformation OPTIONAL,~~

-- Network geometry class between the WSO and this coexistence

-- set element

networkGeometryClass NetworkGeometryClass

},

-- Channel priority allocation proposal

channelPriority SEQUENCE OF ChannelProrityElement OPTIONAL,

--WSO’s coexistence set element allocation and this coexistence set

-- element’s surrounding frequency and time domain usage

radioEnvironment SEQUENCE OF SEQUENCE {

--frequency usage alternatives

frequencyUsageStatus CHOICE {

--802.19.1 type networks

CoexNets CoexSystemNetworks,

--Other networks outside 802.19.1

otherNets OtherNetworks,

--unused frequency locations

unusedFreqs UnusedFrequencies,

--Unknown frequency usage

unknownUsage UnknownFrequencyUsage

}

}

}

-- From CM to CE

CoexistenceReportAnnouncement ::= SEQUENCE {

-- List of coexistence set elements reported in this response

listOfCoexistenceSetElement SEQUENCE OF SEQUENCE {

-- CE identifier of the related WSO

ceID CxID

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

networkID OCTET STRING,

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

networkTechnology NetworkTechnology,

-- Interference direction, i.e., mutual, source or victim

interferenceDirection InterferenceDirection,

-- Estimated interference level caused by the coexistence set

-- element

interfLevelFromCoexSetElem REAL,

-- Estimated interference level caused to the coexistence set

-- element

interfToCoexSetElem REAL,

~~-- List of operating resources: channel numbers or frequencies~~ MORE ACCURATE OPERATING PARAMETER INFORMATION TOLD SEPARATELY INCLUDING NON COEX SYSTEM DATA

~~listOfOperatingResources CHOICE {~~

~~-- List of operating channel numbers~~

~~listOfOperChNumber ListOfOperatingChNumber,~~

~~-- List of operating frequencies including occupancy~~

~~-- information~~

~~listOfOperFrequencies ListOfOperatingFrequencies },~~

remove: not relevant here

~~-- Radio environment information~~

~~radioEnvInformation RadioEnvironmentInformation OPTIONAL,~~

-- Network geometry class between the WSO and this coexistence

-- set element

networkGeometryClass NetworkGeometryClass

},

-- Channel priority allocation proposal

channelPriority SEQUENCE OF ChannelProrityElement OPTIONAL,

--WSO’s coexistence set element allocation and this coexistence set

-- element’s surrounding frequency and time domain usage

radioEnvironment SEQUENCE OF SEQUENCE {

--frequency usage alternatives

frequencyUsageStatus CHOICE {

--802.19.1 type networks

CoexNets CoexSystemNetworks,

--Other networks outside 802.19.1

otherNets OtherNetworks,

--unused frequency locations

unusedFreqs UnusedFrequencies,

--Unknown frequency usage

unknownUsage UnknownFrequencyUsage

}

}

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 5) Obtaining available channel list

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

AvailableChannelsRequest ::= SEQUENCE {

}

THIS SHOULD NOT BE DEFINED! OUTSIDE THE SCOPE OF SPEC!!!!

CMAvailableChannelsRequest ::= SEQUENCE {

-- Time of the request

requestedTimeStamp GeneralizedTime,

-- Regulatory identifier of the WSO, e.g. FCC ID

deviceRegulatoryID OCTET STRING,

-- Serial number of the WSO

deviceSN OCTET STRING

REMOVE PARAMETERS BELOW: IRRELEVANT INFORMATION

~~-- Location of the WSO~~

~~deviceLocation DeviceLocation,~~

~~-- Antenna height of the WSO~~

~~antennaHeight REAL,~~

~~-- Network type, e.g., fixed, mode 2~~

~~networkType NetworkType~~

}

AvailableChannelsResponse ::= SEQUENCE {

-- Information about available white space resources

availableChannelsInfo AvailableChannelsInfo

~~-- List of available resources: allowed TVWS channel number list~~

~~-- with channel user constraint or list of available channels~~

~~listOfAvailableResources CHOICE {~~

~~-- Available resources indicated with TVWS channel notation~~

~~chNumbers SEQUENCE {~~

~~listOfAllowedTVWSChNum ListOfAllowedTVWSChNumber,~~

~~-- Start time of availability~~

~~listOfAvailStartTime SEQUENCE OF GeneralizedTime,~~

~~-- Duration of availability~~

~~listOfAvailableDuration SEQUENCE OF REAL,~~

~~-- Channel user constraint~~

~~listOfConstOfChUses SEQUENCE OF ConstOfChUses~~

~~},~~

~~-- List of available channels~~

~~listOfAvailableChannel SEQUENCE OF SEQUENCE {~~

~~-- Frequency range~~

~~frequencyRange FrequencyRange,~~

~~-- Transmission power limit~~

~~txPowerLimit REAL OPTIONAL,~~

~~-- Start time of availability~~

~~availableStartTime GeneralizedTime,~~

~~-- Duration of availability~~

~~availableDuration REAL,~~

~~-- Aggregated interference control parameters~~

~~aggInterfCtrolParam AggregatedInterferenceControlParameters~~

~~}~~

~~}~~

}

AvailableChannelsAnnouncement ::= SEQUENCE {

-- Information about available white space resources

availableChannelsInfo AvailableChannelsInfo

~~-- List of available resources: allowed TVWS channel number list~~

~~-- with channel user constraint or list of available channels~~

~~listOfAvailableResources CHOICE {~~

~~-- Available resources indicated with TVWS channel notation~~

~~chNumbers SEQUENCE {~~

~~listOfAllowedTVWSChNum ListOfAllowedTVWSChNumber,~~

~~-- Start time of availability~~

~~listOfAvailStartTime SEQUENCE OF GeneralizedTime,~~

~~-- Duration of availability~~

~~listOfAvailableDuration SEQUENCE OF REAL,~~

~~-- Channel user constraint~~

~~listOfConstOfChUses SEQUENCE OF ConstOfChUses~~

~~},~~

~~-- List of available channels~~

~~listOfAvailableChannel SEQUENCE OF SEQUENCE {~~

~~-- Frequency range~~

~~frequencyRange FrequencyRange,~~

~~-- Transmission power limit~~

~~txPowerLimit REAL OPTIONAL,~~

~~-- Start time of availability~~

~~availableStartTime GeneralizedTime,~~

~~-- Duration of availability~~

~~availableDuration REAL,~~

~~-- Aggregated interference control parameters~~

~~aggInterfCtrolParam AggregatedInterferenceControlParameters~~

~~}~~

~~}~~

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 6) Obtaining channel classification information

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CMChannelClassificationRequest ::= SEQUENCE {

-- Coexistence set element list

listOfNetworkID SEQUENCE OF OCTET STRING

}

CMChannelClassificationResponse ::= SEQUENCE OF SEQUENCE {

-- Network ID of the coexistence set element

networkID OCTET STRING,

-- Channel classification information of the coexistence set element

chClassInfo ChClassInfo

}

ChannelClassificationRequest ::= SEQUENCE {

-- Network ID list

listOfNetworkID SEQUENCE OF OCTET STRING

}

ChannelClassificationResponse ::= SEQUENCE OF SEQUENCE {

-- Network ID

networkID OCTET STRING,

-- Channel classification information

chClassInfo ChClassInfo

}

ChannelClassificationAnnouncement ::= SEQUENCE OF SEQUENCE {

-- Network ID

networkID OCTET STRING,

-- Channel classification information

chClassInfo ChClassInfo

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 7) Obtaining information

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

InfoAcquiringRequest ::= SEQUENCE {

-- Identifier of the CE to which the request relates to.

-- Available only when the request is transmitted from a CM to

-- another CM.

ceID Cx\_ID OPTIONAL,

-- ID of the requested information

listOfReqInfoDescr SEQUENCE OF ReqInfoDescr,

--Algorithm(s) supported by the CM serving the CE

listOfCMAlgos SEQUENCE OF CMSupportedAlgorithms OPTIONAL

}

InfoAcquiringResponse ::= SEQUENCE {

-- Identifier of the CE to which the response relates to.

-- Available only when the response is transmitted from a CM to

-- another CM.

ceID Cx\_ID OPTIONAL,

-- Requested information

reqInfoValue ReqInfoValue,

--Requested information of CM supported algorithms

CMAlgos CMSupportedAlgorithmsValue

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 8) Requesting and obtaining measurements

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

MeasurementRequest ::= SEQUENCE {

-- Indicates what type of measurement is requested

measurementDescription MeasurementDescription

}

MeasurementResponse ::= SEQUENCE OF SEQUENCE {

-- Measurement results in form of measurement reports

measurementDescription MeasurementDescription,

measurementReport MeasurementReport

}

MeasurementConfirm ::= SEQUENCE {

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 9) Negotiation between CMs

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NegotiationRequest ::= SEQUENCE {

-- Negotiation status

negotiationStatus NegotiationStatus,

-- Negotiation information

negotiationInformation NegotiationInformation

}

NegotiationAnnouncement ::= SEQUENCE {

-- Winner CM ID list

listOfWinnerCMID ListOfWinnerCMID,

-- Slot time position list

listOfSlotTimePosition ListOfSlotTimePosition

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 10) Master CM selection

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CMMasterCMRequest ::= SEQUENCE {

-- Number of WSOs managed by CM that intends to become slave CM

numberOfWSOs INTEGER

}

CMMasterCMConfirm ::= SEQUENCE {

-- ID of the CM accepting to be a master CM

masterCMID CxID,

-- Confirm status

status BOOLEAN

}

CDISMasterCMRequest ::= SEQUENCE {

-- ID of the CM that intends to become slave CM

slaveCMID CxID,

-- Number of WSOs managed by CM that intends to become slave CM

numberOfWSOs INTEGER

}

CDISMasterCMConfirm ::= SEQUENCE {

-- Confirm status

status BOOLEAN

}

MasterCMRequest ::= SEQUENCE {

-- Number of WSOs managed by CM that intends to become slave CM

numberOfWSOs INTEGER

}

MasterCMConfirm ::= SEQUENCE {

-- Confirm status

status BOOLEAN

}

MasterCMIndication ::= SEQUENCE {

-- ID of the slave CM

slaveCMID CxID

}

MasterSlaveCMConfigurationRequest ::= SEQUENCE {

}

MasterSlaveCMConfigurationAnnouncement ::= SEQUENCE {

-- Master CM ID

masterCMID CxID,

-- List of slave CM IDs

ListOfSlaveCMIDs SEQUENCE OF CxID

}

CMMasterSlaveCMConfigurationRequest ::= SEQUENCE {

-- Network type

networkType NetworkType,

-- Registered geolocation

geolocation ~~GEO\_LOC~~ Geolocation,

-- Channel number

channelNumber INTEGER,

-- Power limit

maximumPowerLevel REAL,

-- Expected throughput

desiredOccupancy REAL OPTIONAL,

-- CM ID

sourceCMID CxID,

-- CM ID

destinationCMID CxID

}

CMMasterSlaveCMConfigurationResponse ::= SEQUENCE {

-- Network type

networkType NetworkType,

-- Registered geolocation

geolocation ~~GEO\_LOC~~ Geolocation,

-- Channel number

channelNumber INTEGER,

-- Power limit

maximumPowerLevel REAL,

-- Expected throughput

desiredOccupancy REAL OPTIONAL,

-- CM ID

sourceCMID CxID,

-- CM ID

destinationCMID CxID

}

CMMasterSlaveCMConfigurationConfirm ::= SEQUENCE {

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 11) Reconfiguration

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ReconfigurationRequest ::= SEQUENCE {

-- Reconfiguration request description

reconfigParameters ReconfigurationParameters,

-- Channel classification information

chClassInfo ChClassInfo OPTIONAL,

-- Indicates whether the CE is allowed to release resources in

-- temporary manner

tempReleaseAllowed BOOLEAN OPTIONAL

}

ReconfigurationResponse ::= SEQUENCE {

-- Status: successful or not

status BOOLEAN,

-- Failed reconfiguration parameters with recommended values of

-- parameters if reconfiguration request from CM to WSO is failed

failedParameters FailedParameters OPTIONAL

}

CMReconfigurationRequest ::= SEQUENCE {

-- Indicates WSO to be reconfigured

reconfigTarget CxID,

-- Reconfiguration request description

reconfigParam ReconfigurationParameters,

-- Channel classification information

chClassInfo ChClassInfo OPTIONAL

}

CMReconfigurationResponse ::= SEQUENCE {

-- Indicates CE of the WSO to be reconfigured

reconfigTarget CxID,

-- Status: successful or not

status BOOLEAN,

-- Failed reconfiguration parameters with recommended values of

-- parameters if reconfiguration request from CM to WSO is failed

failedParameters FailedParameters OPTIONAL

}

ResourceReconfigurationRequest ::= SEQUENCE {

-- Indicates CE of the WSO wanting reconfiguration

reconfigTarget CxID,

~~-- WSO type~~

~~wsoType WSO\_TYPE,~~ WHAT IS WSO TYPE?

~~-- Registered geolocation~~ CM KNOWS THE LOCATION OF WSO! NOT NEEDED.

~~geolocation GEO\_LOCGeolocation,~~

-- New operating resource: channel number or frequency range

newOperatingResource CHOICE {

-- Channel number

channelNumber INTEGER,

--Resource target

resourceTarget RequiredResource

~~-- Frequency range~~

~~frequencyRange SEQUENCE {~~

~~-- Start frequency~~

~~startFreq REAL,~~

~~-- End frequency~~

~~endFreq REAL~~

~~}~~

},

-- Power limit

maximumPowerLevel REAL,

-- Expected throughput

channelLoad REAL OPTIONAL

}

ResourceReconfigurationResponse ::= SEQUENCE {

-- New operating resource: channel number or frequency range

~~newOperatingResource CHOICE {~~

~~-- Channel number~~

~~channelNumber SEQUENCE OF INTEGER,~~

~~-- Frequency range~~

~~freqRange~~

~~frequencyRange SEQUENCE {~~

~~-- Start frequency~~

~~startFreq REAL,~~

~~-- End frequency~~

~~endFreq REAL~~

~~}~~

~~},~~

~~-- Power limit~~

~~maximumPowerLevel REAL~~

reconfigParams ReconfigurationParameters

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 12) Event indication

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

EventIndication ::= SEQUENCE {

-- List of event parameters

eventParams EventParams

}

EventConfirm ::= SEQUENCE {

}

ADD EVENTS LIKE MEASUREMENTS; UPDATE OF CV AND FAIRNESS

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 13) Coexistence set element reconfiguration

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CoexistenceSetElementReconfigurationRequest ::= SEQUENCE {

-- Indicates WSO to be reconfigured

reconfigTarget CxID,

-- Reconfiguration request description

reconfigParam ReconfigurationParameters,

}

CoexistenceSetElementReconfigurationResponse ::= SEQUENCE {

-- Indicates WSO to be reconfigured

reconfigTarget CxID,

-- Status: successful or not

status BOOLEAN,

-- Failed reconfiguration parameters with recommended values of

-- parameters if reconfiguration request from CM to WSO is failed

failedParameters FailedParameters OPTIONAL

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 14) Keep alive

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

KeepAliveRequest ::= SEQUENCE {

-- Indicates KeepAliveExpiryTime parameter value in seconds

keepAliveExpiryTimeValue REAL,

-- Indicates status of the requesting entity

requestingEntityStatus EntityStatus

}

KeepAliveResponse ::= SEQUENCE {

-- Indicates status of the responding entity

respondingEntityStatus EntityStatus

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* Messages for the following procedures

-- \* 15) Conflict handling

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--Conflict handling inquiry to another CM

ConflictInquiryRequest ::= SEQUENCE {

--request source CM

cmID CxID,

-- request source CM IP address

sourceCMIPAddress OCTET STRING ,

-- request source CM port number

sourceCMPortNum OCTET STRING ,

--request destination CM of neighbor/extended neighbor WSO

cmID CxID,

-- CE identifier to which neighbor/extended neighbor WSO this message

-- applies

neighborCeID CxID,

-- Network identifier of the neighbor/extended neighbor WSO, e.g., BSS ID

neighborNetworkID OCTET STRING,

-- CE identifier of target WSO to which suggested operating parameters

-- apply

targetCeID CxID,

-- Network identifier of the target WSO, e.g., BSS ID to which suggested

-- operating parameters apply

targetNetworkID OCTET STRING,

--Proposed operating parameters to the target WSO

operParamsTarget ReconfigurationParameters

}

ConflictInquiryResponse ::= SEQUENCE {

--response source CM

cmID CxID,

-- response source CM IP address

sourceCMIPAddress OCTET STRING,

-- response source CM port number

sourceCMPortNum OCTET STRING,

-- CE identifier to which neighbor/extended neighbor WSO this message

-- applies

neighborCeID CxID,

-- Network identifier of the neighbor/extended neighbor WSO, e.g., BSS ID

neighborNetworkID OCTET STRING,

--request source CM

cmID CxID,

-- CE identifier to which target WSO this message applies

targetCeID CxID,

-- Network identifier of the target WSO, e.g., BSS ID

targetNetworkID OCTET STRING,

--allocation status is “yes” if calculating resources to the target WSO,

-- else “no”

allocationStatus BOOLEAN

}

ConflictResolutionRanking ::= SEQUENCE {

-- CE identifier to which target WSO this message applies

targetCeID CxID,

-- Network identifier of the target WSO, e.g., BSS ID

targetNetworkID OCTET STRING,

--Number of conflict responses to inquiry

conflictingResponses INTEGER,

--The ranking order of resource allocation proposals to target WSO as

-- networkIDs from the best to worst and optionally also the ranking

-- value included

rankOrder RankingOrder

}

END

**SECTION 6.5**

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, NegotiationInformation, ListOfWinnerCMID, ListOfSlotTimePosition, ReconfigurationParameters, FailedParameters, EventParams, ListOfGeolocation, DatabaseInformation;

DEFINED ALREADY IN SECTION 6.4 IN A CORRECT WAY

~~CxID ::= ENUMERATED {~~

~~CE\_ID,~~

~~CM\_ID,~~

~~CDIS\_ID,~~

~~TVWSDB\_ID~~

~~}~~

OperationCode ::= ENUMERATED {

~~N~~new,

~~M~~modify,

~~R~~remove,

}

SubscribedService ::= ENUMERATED {

information,

management,

interCMCoexistenceSetElements,

allCoexistenceSetElements

}

NetworkID ::= ENUMERATED {

~~B~~bSSID,

…

}

NetworkTechnology ::= ENUMERATED {

~~I~~iEEE802.11af,

~~I~~iEEE802.22,

~~E~~eCMA392,

oneSeg,

…

}

NetworkType ::= ENUMERATED {

fixed,

mode1,

mode2,

…

}

~~ListOfCoexistenceSetElementCEID ::= SEQUENCE OF CxID~~ REMOVE: NOT USED IN 6.4 or 6.5

FrequencyRange ::= SEQUENCE {

startFreq INTEGER,

stopFreq INTEGER

}

ConstOfChUseID ::= ENUMERATED {

regulationMaxTxPower,

regulationMaxAntGain,

regulationMaxAntHeight,

regulationTVDBUpdateTime,

outOfBandEmissionLimit,

…

}

ConstOfChUseValue ::= CHOICE {

regulationMaxTxPower REAL,

regulationMaxAntGain REAL,

regulationAntMaxHeight REAL,

regulationTVDBUpdateTime REAL,

outOfBandEmissionLimit REAL,

…

}

ConstOfChUse ::= SEQUENCE {

constOfChUseID ConstOfChUseID,

constOfChUseValue ConstOfChUseValue

}

AggrIntCntrParams ::= SEQUENCE {

referencePointID INTEGER,

~~geolocation Geolocation,~~ Exists in DiscoveryInformation

~~acs REAL,~~ Exists in CERegistrationRequest

~~antennaHeight REAL,~~ Exists in DiscoveryInformation

~~antennaGain REAL,~~ Exists in DiscoveryInformation

protectionRatio REAL,

…

}

AvailableChannelElement ::= SEQUENCE {

freqRange FrequencyRange,

~~txPowerLimit REAL,~~ Included below

availableStartTime GeneralizedTime,

availableDuration REAL,

ConstOfChUse ConstOfChUse,

aggrIntCntrParams AggrIntCntrParams

}

AvailableChannelList ::= SEQUENCE OF AvailableChannelElement

ListOfAllowedTVWSChNumber ::= SEQUENCE OF INTEGER

ConstOfChUses ::= SEQUENCE OF ConstOfChUse

AvailableChNumberList ::= SEQUENCE {

listOfAllowedTVWSChNumber ListOfAllowedTVWSChNumber,

listOfAvailableStartTime SEQUENCE OF GeneralizedTime,

listOfAvailableDuration SEQUENCE OF REAL,

listOfConstOfChUses SEQUENCE OF ConstOfChUses

}

FccParam ::= SEQUENCE {

deviceFCCID OCTET STRING,

deviceSN OCTET STRING

}

OfcomParam ::= SEQUENCE {

deviceID OCTET STRING,

deviceSN OCTET STRING,

modulation Modulation,DEFINITION?

listOfAntenna ListOfAntenna, DEFINITION?

listOfSpectrumMask ListOfSpectrumMask DEFINITION?

}

ParametersForDBAccess ::= CHOICE {

fcc FccParam,

ofcom OfcomParam

}

DatabaseInformation ::= SEQUENCE {

dbIpAddress IA5String,

dbPortNumber INTEGER,

parameters ParametersForDBAccess

}

AvailableChannelsInformation ::= CHOICE {

listOfAvailableFrequencies AvailableChannelList,

listOfAvailableChNumber AvailableChNumberList,

databaseInformation DatabaseInformation

}

AltitudeType ::= ENUMERATED {

meters,

floors,

haat

}

Coordinate ::= SEQUENCE {

uncertainty REAL,

coordinate REAL

}

Altitude ::= SEQUENCE {

uncertainty REAL,

coordinate REAL,

type AltitudeType

}

Geolocation ::= SEQUENCE {

latitude Coordinate,

longitude Coordinate,

altitude Altitude

}

AntennaGain ::= SEQUENCE OF SEQUENCE {

--azimuth angle in radians towards the (max) antenna gain

theta REAL,

--elevation angle in radians towards the (max) antenna gain

phi REAL,

--(max) antenna gain (absolute value)

maxGain REAL,

--3 dB beam width in radians of antenna around the azimuth angle

-- in horizontal plane

hBeamWidth3dB REAL

--3 dB beam width in radians of antenna around the elevation

-- angle in vertical plane

vBeamWidth3dB REAL

}

DiscoveryInformation ::= SEQUENCE {

~~coordinateX REAL,~~

~~coordinateY REAL,~~

~~coordinateZ REAL,~~ Replaced by Geolocation

geolocation Geolocation,

maxTxPower REAL,

rxSensitivity REAL,

antennaGain ~~REAL~~ AntennaGain,

minReqSNR REAL,

TolerableInterferenceLevel REAL,

~~antennaHeight REAL,~~ In Geolocation

…

}

ListOfOperatingChNumber ::= SEQUENCE OF INTEGER

ListOfOperatingFrequencies ::= SEQUENCE OF SEQUENCE {

startFreq INTEGER,

stopFreq INTEGER,

occupancy REAL,

totalOccupancy REAL OPTIONAL

}

RequiredResource ::= SEQUENCE OF SEQUENCE {

requiredBandwidth ~~REAL~~INTEGER,

expectedLoad REAL

}

ListOfSupportedChNumber ::= SEQUENCE OF INTEGER

SAME AS FrequencyRange

~~FrequencyIndication ::= SEQUENCE {~~

~~startFreq INTEGER,~~

~~stopFreq INTEGER~~

~~}~~

WSODualBandwidths ::= SEQUENCE OF SEQUENCE {

--True signal bandwidth of the first part, frequency resolution 10 kHz?

cHBW1 INTEGER,

--True signal bandwidth of the second part

cHBW2 INTEGER,

--Frequency difference between these two channels

deltaFrequency SEQUENCE OF INTEGER

}

WSOSupportedBandwidths ::= SEQUENCE OF SEQUENCE {

*--True signal bandwidth*

bWSignal INTEGER,

--Nominal channel raster of signal

cHRaster INTEGER,

dualBWs WSODualBandwidths

}

ListOfSupportedFrequencies ::= SEQUENCE OF SEQUENCE {

--the frequency borders of each possible subband

supportedFreqSB FrequencyRange,

--bandwidth related information. Optional because in CM to CDIS link

--this is not sent

wSOSBWs WSOSupportedBandwidths OPTIONAL,

--Min frequency step for fine tuning of frequency

minFreqStep INTEGER OPTIONAL

}

MeasurementCapability ::= ENUMERATED {

sinr,

fer,

ipnf,

signalDistribution,

spectrum,

ownNetworkChannelLoad,

totalChannelLoad,

otherUsers,

energyDetection,

featureDetection

}

NetworkCapabilities ::= SEQUENCE {

listOfSupportedResources CHOICE {

-- List of supported channel numbers

listOfSuppChNumber ListOfSupportedChNumber,

-- List of supported frequencies

listOfSuppFrequencies ListOfSupportedFrequencies },

*-- Minimum transmission power*

minTxPower REAL,

*-- Additional supported network technologies*

addNetworkTechnology SEQUENCE OF Network Technology

*-- Additional supported network technologies*

measCapabs SEQUENCE OF MeasurementCapability,

-- Indicates whether scheduled transmission is supported

txScheduleSupported BOOLEAN,

-- Indicates whether network technology reconfiguration can be

-- requested by CM

reconfigurationSupported BOOLEAN

}

GuaranteedQoSOfWiredConnection ::= ENUMERATED {

CHOICE {xDSL, opticalFibre, others},

~~G~~guaranteedMinimumBitRates,

~~G~~guaranteedMaximumLatency OPTIONAL,

…

}

***The following three data type definitions are tightly coupled with the proposal 19-12/0200r0 to change coexistence discovery model***

CommunicationArea ::= SEQUENCE {

--coordinates of the upper right corner

latitudeUpRightCorner Coordinate,

longitudeUpRightCorner Coordinate,

--coordinates of the lower left corner

latitudeLowLeftCorner Coordinate,

longitudeLowLeftCorner Coordinate

}

InterferenceArea ::= SEQUENCE {

--the level (dBm) defining the constant interference power contour

constIntfPowContour REAL OPTIONAL,

--coordinates of the upper right corner

latitudeUpRightCorner Coordinate,

longitudeUpRightCorner Coordinate,

--coordinates of the lower left corner

latitudeLowLeftCorner Coordinate,

longitudeLowLeftCorner Coordinate }

WSOImpactArea ::= SEQUENCE {

commArea CommunicationArea,

interfArea SEQUENCE OF InterferenceArea

}

InterferenceDirection ::= ENUMERATED {

mutual,

source,

victim

}

NetworkGeometryClass ::= CHOICE {

class1,

class2,

class3,

class4

}

TxSchedule ::= SEQUENCE {

scheduleStartTime REAL,

scheduleDuration REAL,

numberOfScheduleRepetitions INTEGER,

transmissionStartTime REAL,

transmissionDuration REAL

}

CoexSystemNetworks ::= SEQUENCE OF SEQUENCE {

listOfCoexSetElement 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,

-- Coexistence service subscription

subscribedServ SubscribedService,

-- Indicates whether this WSO shall be managed by source CM or

-- destination CM

managingCM BOOLEAN OPTIONAL,

-- Channel classification information

chClassInfo ChClassInfo OPTIONAL,

-- Indicates whether this WSO finished scheduled time when

-- channel is shared

scheduledTimeEnd BOOLEAN OPTIONAL,

-- Indicates whether the coexistence set element releases resources

-- temporarily or reclaims them

temporaryResource ENUMERATED {release, reclaim} OPTIONAL

--Coexistence value of the network

cV REAL,

--Fairness value

Fairness REAL,

listOfOperatingResourceValues SEQUENCE OF SEQUENCE {

CHOICE {

-- Operating channel number

operChNumber INTEGER,

-- Operating frequency location

operFreq FrequencyRange },

occupancy REAL OPTIONAL,

txSch TxSchedule OPTIONAL,

totalOccupancy REAL OPTIONAL,

channelIsShared BOOLEAN OPTIONAL,

txPowerLimit REAL OPTIONAL

}

}

}

OtherNetworks ::= SEQUENCE OF SEQUENCE {

CHOICE {

-- Operating channel number

operChNumber INTEGER,

-- Operating frequency location

operFreq FrequencyRange },

occupancy REAL OPTIONAL

}

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 }

}

ChannelPriorityElement ::= SEQUENCE {

~~C~~channelNumber INTEGER,

~~P~~priority INTEGER

}

OperatingChannelInfo ::= SEQUENCE {

operatingChannelNumber INTEGER,

listOfNetworkID SEQUENCE OF NetworkID,

…

}

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,

…

}

~~FreqDescription ::= SEQUENCE {~~

~~networkID NetworkID OPTIONAL,~~

~~networkTechnology NetworkTechnology OPTIONAL,~~

~~coexType ENUMERATED {known, unknown},~~

~~interferenceDirection InterferenceDirection,~~

~~occupancy REAL OPTIONAL,~~

~~totalOccupancy REAL OPTIONAL~~

~~}~~

~~RadioEnvironmentInformation ::= SEQUENCE OF SEQUENCE {~~

~~startFreq REAL,~~

~~stopFreq REAL,~~

~~state ENUMERATED {free, occupiedKnown, occupiedUnknown, notMeasured},~~

~~freqDescription FreqDescription OPTIONAL~~

~~}~~

~~DeviceLocation ::= SEQUENCE {~~

~~coordinateX REAL,~~

~~coordinateY REAL,~~

~~coordinateZ REAL~~

~~}~~

ReqInfoDescr ::= SEQUENCE OF ENUMERATED{

sinr,

desiredBandwidth,

desiredOccupancy,

desiredQoS,

desiredCoverage,

channelNumber,

subscribedService,

interferenceLevel,

coexistenceValue,

fairness,

threshold,

…

}

CMSupportedAlgorithms ::= SEQUENCE OF ENUMERATED {

cMAlgo41,

cMAlgo42,

cMAlgo43,

cMAlgo44,

cMAlgo45,

cMAlgo46,

cMAlgo47,

cMAlgo48,

cMAlgo51,

cMAlgo52,

cMAlgo53,

cMAlgo54,

cMAlgo55,

cMAlgo56,

cMProprietary,

…

}

ReqInfoValue ::= SEQUENCE OF SEQUENCE{

reqInfoDescr ReqInfoDescr,

reqInfoValue CHOICE {sinrValue REAL, desiredBandwidthValue

REAL, desiredOccupancyValue REAL, desiredQoSValue REAL, desiredCoverageValue REAL,   
channelNumberValue REAL, interferenceLevelValue REAL, coexistenceValue REAL, fairnessValue REAL, thresholdValue REAL, otherValue ANY}

subscribedService SubscribedService

}

CMSupportedAlgorithmsValue ::= SEQUENCE OF SEQUENCE {

cMAlgos CMSupportedAlgorithms

}

MeasurementSchedule ::= SEQUENCE {

measStartTime ~~REAL~~ GeneralizedTime,

numberOfMeasurements INTEGER,

timeBetweenMeasurements REAL

}

ChannelIndication ::= SEQUENCE OF INTEGER

MeasurementFreq ::= CHOICE {

startStopFreq SEQUENCE OF FrequencyRange,

channelNumber ChannelIndication

}

MeasurementType ::= ENUMERATED {

sinr,

fer,

ipnf,

signalDistribution,

spectrum,

ownNetworkChannelLoad,

totalChannelLoad,

otherUsers

}

MeasurementDescription ::= SEQUENCE {

measType MeasurementType,

measSchedule MeasurementSchedule,

measFreq MeasurementFreq

}

SinrReport ::= SEQUENCE {

measBW INTEGER,

sinr REAL

}

FerReport ::= SEQUENCE {

fer REAL

}

IpnfReport ::= SEQUENCE {

measBW INTEGER,

ipnf REAL

}

SignalDistributionReport ::= SEQUENCE {

measBW INTEGER,

lowEndOfSignalLevelRange INTEGER,

numberOfSignalLevelRange INTEGER,

widthOfSignalLevelRange INTEGER,

signalProportionPerRange SEQUENCE OF REAL

}

SpectrumReport ::= SEQUENCE {

measBW INTEGER,

lowEndOfReportedBandwidth INTEGER,

numberOfSubchannels INTEGER,

widthOfSubchannel INTEGER,

signalStrengthPerSubchannel SEQUENCE OF REAL

}

ChannelLoadReport ::= SEQUENCE {

load REAL

}

OtherUsersReport ::= SEQUENCE {

technologyType NetworkTechnology

}

MeasurementReport ::= CHOICE {

sinrReport SinrReport,

ferReport FerReport,

ipnfReport IpnfReport,

signalDistributionReport SignalDistributionReport,

spectrumReport SpectrumReport,

ownNetworkChLoadReport ChannelLoadReport,

totalChannelLoadReport ChannelLoadReport,

otherUsersReport OtherUsersReport

}

NegotiationStatus ::= SEQUENCE {

negotiationSuccess BOOLEAN,

negotiationFailure BOOLEAN,

underNegotiation BOOLEAN,

…

}

StartEndTime ::= SEQUENCE {

startTime REAL,

endTime REAL

}

TimeSharingUnitInfo ::= SEQUENCE {

referenceTime REAL,

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

ReconfigurationParameters ::= SEQUENCE OF SEQUENCE {

operatingResource CHOICE {

~~operatingFrequency SEQUENCE {~~

~~startFreq REAL,~~

~~stopFreq REAL~~

~~}~~ operatingFrequency FrequencyRange,

~~listOf~~operatingChNumber ~~SEQUENCE OF~~ INTEGER },

There is already SEQUENCE OF SEQUENCE ABOVE

txPowerLimit REAL OPTIONAL,

channelIsShared BOOLEAN OPTIONAL,

txSchedule ~~SEQUENCE OF~~ TxSchedule OPTIONAL,

networkTechnology NetworkTechnology OPTIONAL,

occupancy REAL OPTIONAL

}

FailedParameterID ::= ENUMERATED {

operatingFrequency,

~~listOf~~operatingChNumber,

txPowerLimit,

channelIsShared,

txSchedule,

networkTechnology,

occupancy

}

FailedParameterValue ::= CHOICE {

operatingFrequency ~~SEQUENCE {startFreq REAL, stopFreq REAL}~~ FrequencyRange,

~~listOf~~operatingChNumber ~~SEQUENCE OF~~ INTEGER,

txPowerLimit REAL,

channelIsShared BOOLEAN,

txSchedule ~~SEQUENCE OF~~ TxSchedule,

networkTechnology NetworkTechnology,

occupancy REAL

}

FailedParameter ::= SEQUENCE {

failedParameterID FailedParameterID,

failedParameterValue FailedParameterValue

}

FailedParameters ::= SEQUENCE OF FailedParameter

MisLocatedWSODetectedInfo ::= SEQUENCE {

networkID NetworkID,

frequencyInfo CHOICE {

operatingFrequency SEQUENCE {startFreq REAL, stopFreq REAL},

listOfoperatingChNumber SEQUENCE OF INTEGER

}

}

EventDescr ::= ENUMERATED {

sinrThresholdReached,

qosDegradation,

misLocatedWSODetected,

temporaryResourceRelease,

temporaryResourceReclaim,

measValue,

coexistenceValue,

fairness,

…

}

AddInfo ::= CHOICE {

misLocatedWSODetectedInfo MisLocatedWSODetectedInfo,

operatingParameters OperatingParameters,

measValue MeasurementReport,

coexistenceValue REAL,

fairness REAL,

…

}

EventParams ::= SEQUENCE {

eventDescr EventDescr,

addInfo AddInfo OPTIONAL

}

OperatingParameters ::= SEQUENCE OF SEQUENCE {

~~frequencyInfo CHOICE {~~

~~operatingFrequency SEQUENCE {startFreq REAL, stopFreq REAL},~~

~~listOfoperatingChNumber SEQUENCE OF INTEGER~~

~~}~~

~~txPowerLimit REAL,~~

~~channelIsShared BOOLEAN,~~

~~txSchedule SEQUENCE OF TxSchedule OPTIONAL,~~

frequencyInfo CHOICE {

operatingFrequency FrequencyRange,

operatingChNumber INTEGER },

txPowerLimit REAL OPTIONAL,

channelIsShared BOOLEAN OPTIONAL,

txSchedule TxSchedule OPTIONAL,

networkTechnology NetworkTechnology OPTIONAL,

occupancy REAL OPTIONAL

}

EXISTS ALREADY EARLIER!

~~AggregatedInterferferenceControlParameters ::= SEQUENCE {~~

~~referencePointID INTEGER,~~

~~geolocation GeolocationReferencePointGeolocation,~~

~~aCS REAL,~~

~~antennaHeight REAL,~~

~~antennaGain REAL,~~

~~protectionRatio REAL,~~

~~…~~

~~}~~

~~ReferencePointGeolocation ::= SEQUENCE {~~

~~latitude REAL,~~

~~longitude REAL,~~

~~altitude REAL,~~

~~…~~

~~}~~

EntityStatus ::= ENUMERATED {

alive,

terminating,

outOfService

}

RankingOrder ::= SEQUENCE {

rankingNeighborNetworkID SEQUENCE OF OCTET STRING,

rankingValue SEQUENCE OF INTEGER OPTIONAL

}

END