IEEE 802.19.1a
Wireless Coexistence

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| Text proposal of information exchange related to interface B4 and B5 |
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Abstract

This document provides text proposal of information exchange related to interface B4 and B5 that are included in the system architecture approved in January F2F meeting (802.19-16/0013r2). This proposal focuses on addition to Section 5 and 6 of the standard.

**5.2.xx Inter-CM association procedure**

A CM (CM1) shall initiate this procedure to start communicating with the other CM communicating with the different CDIS from that CM1 is communicating with. Prior to start communication, CM1 shall obtain the association information of the CM2 to be communicated with in some way (implementation dependent). After obtaining the association information, CM1 shall initiate association procedure. An illustrative example of this procedure is shown in Figure X.



**Figure X —Inter-CM association procedure**

In order to start the procedure, CM1 shall generate a ***InterCMAssociationRequest*** message and send this message to CM2. After CM2has received a ***InterCMAssociationRequest*** message from CM1, CM2 shall generate a ***InterCMAssociationResponse*** message, and shall send this ***InterCMAssociationResponse*** message to CM1. CM operations related to generating and sending these messagesare specified in 6.3.

**5.2.xx.x Inter-CM association procedure over coordination enabler**

A CM (CM1) shall initiate this procedure to start communicating with CM within different coexistence system (CM2) when the CM1 needs to exchange information with the CM2. Prior to start communication, CM1 shall obtain the association information of the COE2 to be communicated with in some way (implementation dependent). After obtaining the association information, CM1 shall initiate association procedure. An illustrative example of this procedure is shown in Figure X.



**Figure X —Inter-CM association procedure over coordination enabler**

In order to start the procedure, CM1 shall generate a ***InterCMAssociationRequest*** message and send this message to COE1. After COE1 has received a ***InterCMAssociationRequest*** message from CM1, COE1 shall generate a ***InterCOEAssociationRequest*** message, and shall send this ***InterCOEAssociationRequest*** message to COE2. After COE2 has received a ***InterCOEAssociationRequest*** messagefrom COE1, COE2 shall generate a ***COEAssociationCheckRequest*** message, and send this ***InterCMAssociationRequest*** message to CM2. After CM2 has received a ***InterCMAssociationRequest*** message from COE2, CM2 shall make a decision whether the association request is acceptable. After that, CM2 shall generate a ***InterCMAssociationResponse*** message, and send this ***InterCMAssociationResponse*** message to COE2. After COE2 has received a ***InterCMAssociationResponse*** messagefrom CM2, COE2 shall generate a ***InterCOEAssociationResponse*** message, and send this ***InterCOEAssociationResponse*** message to COE1. After COE1 has received a ***InterCOEAssociationResponse*** messagefrom COE2, COE1 shall generate a ***InterCMAssociationResponse*** message, and send this ***InterCMAssociationResponse*** message to CM1. CM operations related to generating and sending these messagesare specified in 6.3.

**5.2.yy Obtaining operating frequency information procedure**

A CM (CM1) shall initiate this procedure to obtain operating frequency information from CM connecting with different CDIS from CM1 connecting (CM2). An illustrative example of this procedure is shown in Figure X.



**Figure X —** **Obtaining operating frequency information procedure over coordination enabler**

CM1 shall generate a ***OperatingFreqInformationRequest*** message and send this message to CM2. After CM2 has received a ***OperatingFreqInformationRequest*** message from CM1, CM2 shall process this ***OperatingFreqInformationRequest***. After that CM2 shall generate a ***OperatingFreqInformationResponse*** message, and shall send this ***OperatingFreqInformationResponse*** message to CM1. After CM1 has received a ***OperatingFreqInformationResponse*** messagefrom CM2, CM1 shall process this ***OperatingFreqInformationResponse*** message. CM operations related to generating and sending these messagesare specified in 6.3.

**5.2.yy.zz Obtaining operating frequency information procedure over coordination enabler**

A CM (CM1) shall initiate this procedure to obtain operating frequency information from CM within different coexistence system (CM2). An illustrative example of this procedure is shown in Figure X.



**Figure X —** **Obtaining operating frequency information procedure over coordination enabler**

CM1 shall generate a ***OperatingFreqInformationRequest*** message and send this message to COE1. After COE1 has received a ***OperatingFreqInformationRequest*** message from CM1, COE1 shall process this ***OperatingFreqInformationRequest***. After that COE1shall generate a ***InterCOEOperatingFreqInformationRequest*** message, and shall send this ***InterCOEOperatingFreqInformationRequest*** message to COE2. After COE2 has received a ***InterCOEOperatingFreqInformationRequest*** messagefrom COE1, COE2 shall process this ***InterCOEOperatingFreqInformationRequest*** message. After that, COE2 shall generate a ***OperatingFreqInformationRequest*** message, and send this ***OperatingFreqInformationRequest*** message to CM2. After CM2 has received a ***OperatingFreqInformationRequest*** message from COE2, CM2 shall process ***OperatingFreqInformationRequest*** message. After processing ***OperatingFreqInformationRequest*** message, CM2 shall generate a ***OperatingFreqInformationResponse*** message, and send this ***OperatingFreqInformationResponse*** message to COE2. After COE2 has received a ***OperatingFreqInformationResponse*** messagefrom CM2, COE2 shall generate a ***InterCOEOperatingFreqInformationResponse*** message, and send this ***InterCOEOperatingFreqInformationResponse*** message to COE1. After COE1 has received a ***InterCOEOperatingFreqInformationResponse*** messagefrom COE2, COE1 shall generate a ***OperatingFreqInformationResponse*** message, and send this ***OperatingFreqInformationResponse*** message to CM1. CM operations related to generating and sending these messagesare specified in 6.3.

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**6.3 CM operation**

**6.3.4 Profile 3**

**6.3.4.x COE association procedure**

When a CM requires to communicate with the other CM within different coexistence system, the CM shall perform the COE association procedure described in 5.2.xx. The CM shall generate and send the ***InterCMAssociationRequest*** message to the COE.

The following table shows ***CxMessage*** fields in ***InterCMAssociationRequest*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***interCMAssociationRequest*** |

The following table shows ***InterCMAssociationRequest*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***cmID*** | ***CxID*** | CM ID |
| ***managementRegion*** | ***Region*** | Shall be set to indicate the geographical region that CM manages, if available. |

After the CM has received a ***InterCMAssociationRequest*** message from the other CM, the CM shall process this ***InterCMAssociationRequest*** message. The CM shall generate and send the ***InterCMAssociationResponse*** message to the source CM.

The following table shows ***CxMessage*** fields in ***InterCMAssociationResponse*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***interCMAssociationResponse*** |

The following table shows ***InterCMAssociationResponse*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***status*** | ***Status*** | status |
| ***listOfAccessibleCM*** | ***ListOfAccessibleCM*** | Optionally present to indicate list of the accessible CM. If the CM cannot accept the request, accessible CM information may be included in this message. |

The following table shows ***ListOfAccessibleCM*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***cmID*** | ***CxID*** | CM ID |
| ***ipAddress*** | ***OCTET STRING*** | IP address |
| ***portNumber*** | ***Integer*** | Port number |
| ***serverPassword*** | ***IA5String*** | May be set to indicate the server password if needed. |

**6.3.4.y Obtaining operating frequency information procedure**

When a CM requires to obtain operating frequency information of GCOs that are served by the other CM within different coexistence system, the CM shall perform the obtaining operating frequency information procedure described in 5.2.xx. The CM shall generate and send the ***OperatingFreqInformationRequest*** message to the other CM.

The following table shows ***CxMessage*** fields in ***OperatingFreqInformationRequest*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***operatingFreqInformationRequest*** |

The following table shows ***OperatingFreqInformationRequest*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***cmID*** | ***CxID*** | CM ID |
| ***region*** | ***Region*** | Shall be set to indicate the geographical region where CM would like to obtain operating frequency information of GCOs. |

After the CM has received a ***OperatingFreqInformationRequest*** message from the other CM, the CM shall process this ***OperatingFreqInformationRequest*** message. The CM shall generate and send the ***OperatingFreqInformationResponse*** message to the source CM.

The following table shows ***CxMessage*** fields in ***OperatingFreqInformationResponse*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***operatingFreqInformationResponse*** |

The following table shows ***OperatingFreqInformationResponse*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***status*** | ***Status*** | status |
| ***listOfCoexistenceReports*** | ***ListOfCoexistenceReports*** | Shall be set to indicate the operating frequency information corresponding to the region information included in the *OperatingFreqInformationRequest*. No need to be included when “status” shows error or rejected. |

The following table shows ***ListOfCoexistenceReports*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***region*** | ***Region*** | Shall be set to indicate the region that GCOs are operating within. |
| ***listOfOperatingFrequencies*** | ***ListOfOperatingFrequencies*** | Shall be set to indicate the operating frequencies of the GCOs as specified in the below table. |

The following table shows ***ListOfOperatingFrequencies*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***frequencyRange*** | ***FrequenyRange*** | Shall be set to indicate the frequency range in which the GCO currently operates.  |

**6.5 COE operation**

**6.5.1 COE association procedure**

After the COE has received a ***InterCMAssociationRequest*** message from the CM, the COE shall process this ***InterCMAssociationRequest*** message. The COE shall generate and send the ***InterCOEAssociationRequest*** message to the COE that connects with the target CM.

The following table shows ***CxMessage*** fields in ***InterCOEAssociationRequest*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***interCOEAssociationRequest*** |

The following table shows ***InterCOEAssociationRequest*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***coeID*** | ***CxID*** | COE ID |
| ***interCMAssociationRequest*** | ***InterCMAssociationRequest*** | ***interCMAssociationRequest*** |

The following table shows ***InterCMAssociationRequest*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***cmID*** | ***CxID*** | CM ID |
| ***managementRegion*** | ***Region*** | Shall be set to indicate the geographical region that CM manages, if available. |

**6.5.2 Obtaining operating frequency information procedure**

After a COE receives ***OperatingFreqInformationRequest*** message from a CM, the COE shall perform the obtaining operating frequency information procedure described in 5.2.xx. The COE shall generate and send the ***InterCOEOperatingFreqInformationRequest*** message to the other COE.

The following table shows ***CxMessage*** fields in ***InterCOEOperatingFreqInformationRequest*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***interCOEOperatingFreqInformationRequest*** |

The following table shows ***InterCOEOperatingFreqInformationRequest*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***coeID*** | ***CxID*** | COE ID |
| ***operatingFreqInformationRequest*** | ***OperatingFreqInformationRequest*** | ***operatingFreqInformationRequest*** |

After the COE has received a ***InterCOEOperatingFreqInformationRequest*** message from the other COE, the COE shall process this ***InterCOEOperatingFreqInformationRequest*** message. The COE shall generate and send the ***OperatingFreqInformationRequest*** message to the target CM.

The following table shows ***CxMessage*** fields in ***OperatingFreqInformationRequest*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***operatingFreqInformationRequest*** |

The following table shows ***OperatingFreqInformationRequest*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***cmID*** | ***CxID*** | CM ID |
| ***region*** | ***Region*** | Shall be set to indicate the geographical region. |

After the COE has received a ***OperatingFreqInformationResponse*** message from the CM, the COE shall process this ***OperatingFreqInformationResponse*** message. The COE shall generate and send the ***InterCOEOperatingFreqInformationResponse*** message to the target CM.

The following table shows ***CxMessage*** fields in ***InterCOEOperatingFreqInformationResponse*** message.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***header*** | ***CxHeader*** | ***requestID*** |
| ***payload*** | ***CxPayload*** | ***interCOEOperatingFreqInformationResponse*** |

The following table shows ***InterCOEOperatingFreqInformationResponse*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***coeID*** | ***CxID*** | COE ID |
| ***operatingFreqInformationResponse*** | ***OperatingFreqInformationResponse*** | ***operatingFreqInformationResponse*** |

The following table shows ***OperatingFreqInformationResponse*** payload element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***status*** | ***Status*** | status |
| ***listOfCoexistenceReports*** | ***ListOfCoexistenceReports*** | Shall be set to indicate the operating frequency information corresponding to the region information included in the *OperatingFreqInformationRequest*. No need to be included when “status” shows error or rejected. |

The following table shows ***ListOfCoexistenceReports*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***region*** | ***Region*** | Shall be set to indicate the region that GCOs are operating within. |
| ***listOfOperatingFrequencies*** | ***ListOfOperatingFrequencies*** | Shall be set to indicate the operating frequencies of the GCOs as specified in the below table. |

The following table shows ***ListOfOperatingFrequencies*** information element.

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Data type* | *Value* |
| ***frequencyRange*** | ***FrequenyRange*** | Shall be set to indicate the frequency range in which the GCO currently operates.  |

**Annex A** (normative) **Data types**

--Coexistence protocol entity type

CxType ::= ENUMERATED {

--Coexistence enabler

ce,

--Coexistence manager

cm,

--Coexistence discovery and information server

cdis,

--Coordination enabler

coe

}

--List of accessible CMs

ListOfAccessibleCM ::= SEQUENCE OF SEQUENCE {

 --CM ID

 cmID CxID OPTIONAL,

 ipAddress OCTET STRING OPTIONAL,

 portNumber Integer OPTIONAL,

 serverPassword IA5String OPTIONAL,

 ...

 }

--List of coexistence reports

ListOfCoexistenceReports ::= SEQUENCE OF SEQUENCE {

 --Region information

 region Region OPTIONAL,

--List of operating frequencies

listOfOperatingFrequencies ListOfOperatingFrequencies OPTIONAL

}

**Annex C** (normative) **Messages**

-- Payload types

CxPayload ::= CHOICE {

--WSO subscription request

subscriptionRequest SubscriptionRequest,

--WSO subscription response

subscriptionResponse SubscriptionResponse,

--WSO subscription change request

subscriptionChangeRequest SubscriptionChangeRequest,

--WSO subscription change response

subscriptionChangeResponse SubscriptionChangeResponse,

--CE registration request

ceRegistrationRequest CERegistrationRequest,

--Registration response

registrationResponse RegistrationResponse,

--Reconfiguration request

reconfigurationRequest ReconfigurationRequest,

--Reconfiguration response

reconfigurationResponse ReconfigurationResponse,

--Stop operation announcement

stopOperationAnnouncement StopOperationAnnouncement,

--Stop operation confirm

stopOperationConfirm StopOperationConfirm,

--Coexistence report announcement

coexistenceReportAnnouncement CoexistenceReportAnnouncement,

--Coexistence report confirm

coexistenceReportConfirm CoexistenceReportConfirm,

--Coexistence report request

coexistenceReportRequest CoexistenceReportRequest,

--Coexistence report response

coexistenceReportResponse CoexistenceReportResponse,

--CM registration request

cmRegistrationRequest CMRegistrationRequest,

--Coexistence set information announcement

coexistenceSetInformationAnnouncement CoexistenceSetInformationAnnouncement,

--Coexistence set information confirm

coexistenceSetInformationConfirm CoexistenceSetInformationAnnouncement,

--Coexistence set information request

coexistenceSetInformationRequest CoexistenceSetInformationRequest,

--Coexistence set information response

coexistenceSetInformationResponse CoexistenceSetInformationResponse,

--Coexistence set element information announcement

coexistenceSetElementInformationAnnouncement CoexistenceSetElementInformationAnnouncement,

--Coexistence set element information confirm

coexistenceSetElementInformationConfirm CoexistenceSetElementInformationConfirm,

--Coexistence set element information request

coexistenceSetElementInformationRequest CoexistenceSetElementInformationRequest,

--Coexistence set element information response

coexistenceSetElementInformationResponse CoexistenceSetElementInformationResponse,

--Coexistence set element reconfiguration request

coexistenceSetElementReconfigurationRequest CoexistenceSetElementReconfigurationRequest,

--Coexistence set element reconfiguration response

coexistenceSetElementReconfigurationResponse CoexistenceSetElementReconfigurationResponse,

--CM Reconfiguration request

cmReconfigurationRequest CMReconfigurationRequest,

--CM Reconfiguration response

cmReconfigurationResponse CMReconfigurationResponse,

--WSO channel classification request

channelClassificationRequest ChannelClassificationRequest,

-- WSO channel classification response

channelClassificationResponse ChannelClassificationResponse,

--CM channel classification request

cmChannelClassificationRequest CMChannelClassificationRequest,

-- CM channel classification response

cmChannelClassificationResponse CMChannelClassificationResponse,

-- WSO channel classification update

channelClassificationAnnouncement ChannelClassificationAnnouncement,

--Available channel list request from WSO

availableChannelsRequest AvailableChannelsRequest,

-- Available channel list response from WSO

availableChannelsResponse AvailableChannelsResponse,

--Information acquiring request

infoAcquiringRequest InforAcquiringRequest,

--Information acquiring response

infoAcquiringResponse InforAcquiringResponse,

-- Event indication

eventIndication EventIndication,

-- Event confirm

eventConfirm EventConfirm,

--WSO measurement request

measurementRequest MeasurementRequest,

--WSO measurement response

measurementResponse MeasurementResponse,

--WSO measurement confirm

measurementConfirm MeasurementConfirm,

--Master/Slave CM request

masterCMRequest MasterCMRequest,

--Master/Slave CM response

masterCMResponse MasterCMResponse,

--Master/Slave CM configuration request

masterSlaveCMconfigurationRequest MasterSlaveCMconfigurationRequest,

--Master/Slave CM configuration response

masterSlaveCMconfigurationResponse MasterSlaveCMconfigurationResponse,

--Negotiation request

negotiationRequest NegotiationRequest,

--Negotiation announcement

negotiationAnnouncement NegotiationAnnouncement,

--Deregistration request

wsoDeregistrationRequest WsoDeregistrationRequest,

-- Deregistration response

wsoDeregistrationResponse WsoDeregistrationResponse,

--Inter-CM information announcement

interCMInformationAnnouncement InterCMInformationAnnouncement,

--Inter-CM information confirm

interCMInformationCOnfirm InterCMInformationConfirm,

--Inter-CM information request

interCMInformationRequest InterCMInformationRequest,

--Inter-CM information response

interCMInformationResponse InterCMInformationResponse,

--Inter-CM association request

interCMAssociationRequest InterCMAssociationRequest,

--Inter-CM association response

interCMAssociationResponse InterCMAssociationResponse,

--Inter-COE association request

interCOEAssociationRequest InterCOEAssociationRequest,

--Inter-COE association response

interCOEAssociationResponse InterCOEAssociationResponse,

--Operating frequency information request

operatingFreqInformationRequest OperatingFreqInformationRequest,

--Operating frequency information response

operatingFreqInformationResponse OperatingFreqInformationResponse,

-- Inter-COE operating frequency information request

interCOEOperatingFreqInformationRequest InterCOEOperatingFreqInformationRequest,

-- Inter-COE operating frequency information request

interCOEOperatingFreqInformationResponse InterCOEOperatingFreqInformationResponse,

...

}

--InterCMAssociationRequest

InterCMAssociationRequest ::= SEQUENCE {

 --CM ID

 cmID CxID,

 --Management region of the CM

 managementRegion Region OPTIONAL

 }

--InterCMAssociationResponse

InterCMAssociationResponse ::= SEQUENCE {

 --status of request processing

 status Status,

 --List of accessible CMs

 listOfAccessibleCMs ListOfAccessibleCMs OPTIONAL

 }

-- OperatingFreqInformationRequest

OperatingFreqInformationRequest ::= SEQUENCE {

 --CM ID

 cmID CxID,

 --region information

 region Region

 }

-- OperatingFreqInformationResponse

OperatingFreqInformationResponse ::= SEQUENCE {

 --Status of request processing

 status Status,

 --List of coexistence reports

 listOfCoexistenceReports ListOfCoexistenceReports OPTIONAL

 }

-- InterCOEAssociationRequest

InterCOEAssociationRequest ::= SEQUENCE {

 --COE ID

 coeID CxID,

 --InterCMAssociationRequest

 interCMAssociationRequest InterCMAssociationRequest

 }

-- InterCOEOperatingFreqInformationRequest

InterCOEOperatingFreqInformationRequest ::= SEQUENCE {

 --COE ID

 coeID CxID,

 --OperatingFreqInformationRequest

 operatingFreqInformationRequest OperatingFreqInformationRequest

 }

-- InterCOEOperatingFreqInformationResponse

InterCOEOperatingFreqInformationResponse ::= SEQUENCE {

 --COE ID

 coeID CxID,

 --OperatingFreqInformationResponse

 operatingFreqInformationResponse OperatingFreqInformationResponse

 }