

IEEE P802.19

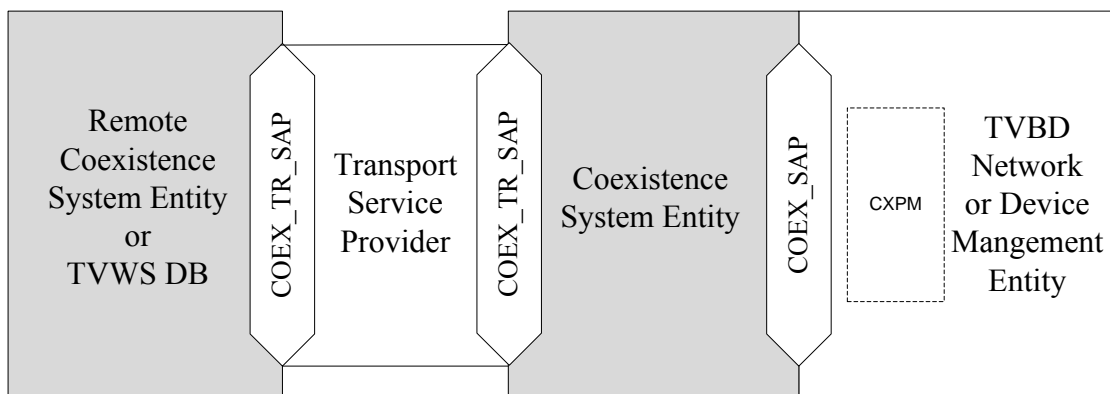
Wireless Coexistence Working Group

Project	IEEE 802.19 Wireless Coexistence Working Group (WG)
Title	Proposal for Reference Model
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Re:	
Abstract	Proposal for Reference Model
Purpose	
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1 **5 Reference model**

2 **5.1 General description**

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Figure 5-1 — Reference model of coexistence system

7

8 Figure 5-1 illustrates reference model of P802.19.1 coexistence system. P802.19.1 coexistence system
9 entities are located on the application layer. Each 802.19.1 entity has one or more the following service
10 access point (SAP):

11

—COEX_SAP (Coexistence SAP): The SAP between the coexistence system entities, e.g.,
12 CE/CM/CDIS, and the TVBD network or device management entities, e.g., 802.11 SME, 802.22
13 NCMS.

14

—CX_TR_SAP (Coexistence Transport SAP): The SAP between coexistence system entities, e.g.,
15 CE/CM/CDIS, or between coexistence system entity and TVWS DB.

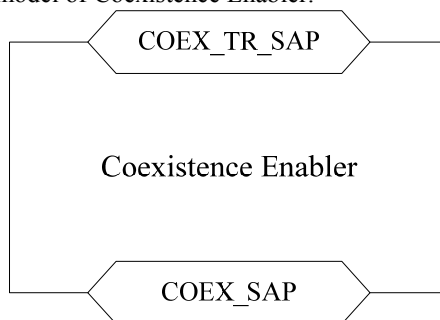
16

TVBD network or device management entity shall provide CXPM (coexistence primitive mapping) service.
17 CXPM converts CX_DME_SAP primitives into TVBD-specific management/control primitives. 1-to-1
18 mapping might be highly desirable to fully support 802.19.1 standard, but it might depend upon the degree
19 of modification of each TVDB standard. How to implement CXPM is out of scope of this standard.

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Figure 5-2 illustrates reference model of Coexistence Enabler.



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Figure 5-2 Reference model of Coexistence Enabler

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Coexistence Enabler has two service access points:

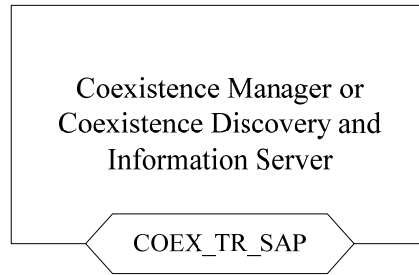
26

— Coexistence SAP (COEX_SAP)

27

— Coexistence Transport SAP (COEX_TR_SAP).

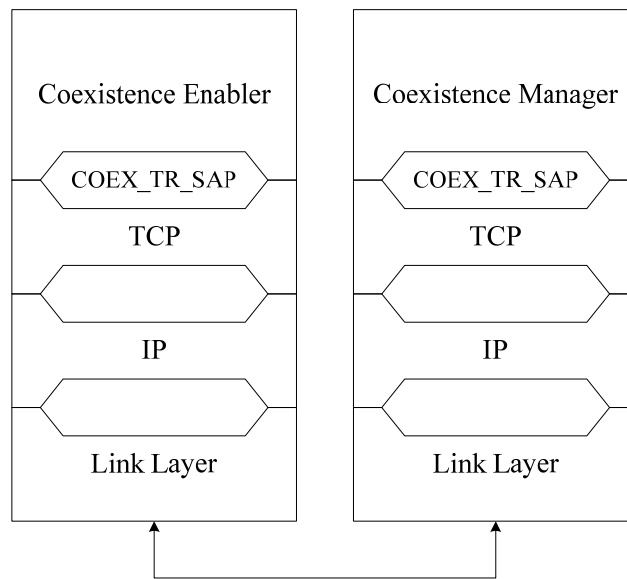
1
 2 Figure 5-3 illustrates reference model of Coexistence Manager and Coexistence Discovery and Information
 3 Server.



4
 5 Figure 5-3 Reference model of Coexistence Manager and Coexistence Discovery and Information Server

6
 7 Coexistence Manager and Coexistence Discovery and Information Server have one service access point:
 8 — Coexistence Transport SAP (COEX_TR_SAP).

9
 10 COEX_TR_SAP provides means for Coexistence Enabler, Coexistence Manager, and Coexistence
 11 Discovery and Information Server to communicate with each other and with external entities by using
 12 transport services provided by underlying layers. The underlying layers could be application layer,
 13 transport layer, network layer, and link layer. Example reference model of CE and CM describing example
 14 of using COEX_TR_SAP for interface B1 is shown in Figure 5-4.



15
 16 Figure 5-4 Example of using COEX_TR_SAP for interface B1

17
 18 Information required for coexistence and reconfiguration commands that are exchanged between CE and
 19 CM over interface B1 are forwarded to transport layer, for example, to TCP, for transmission. This is done
 20 using COEX_TR_SAP service access point of CE and CM.

21
 22 COEX_SAP defines the interface A between CE and TVBD network/device. Example reference model of
 23 interface A for an IEEE 802.16h compliant device is shown in Figure 5-5.

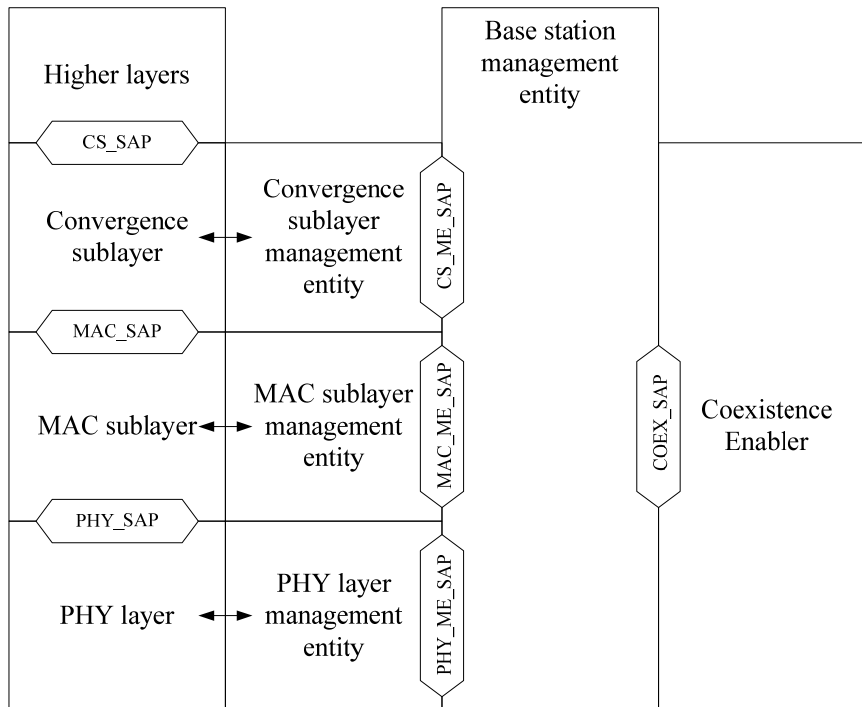
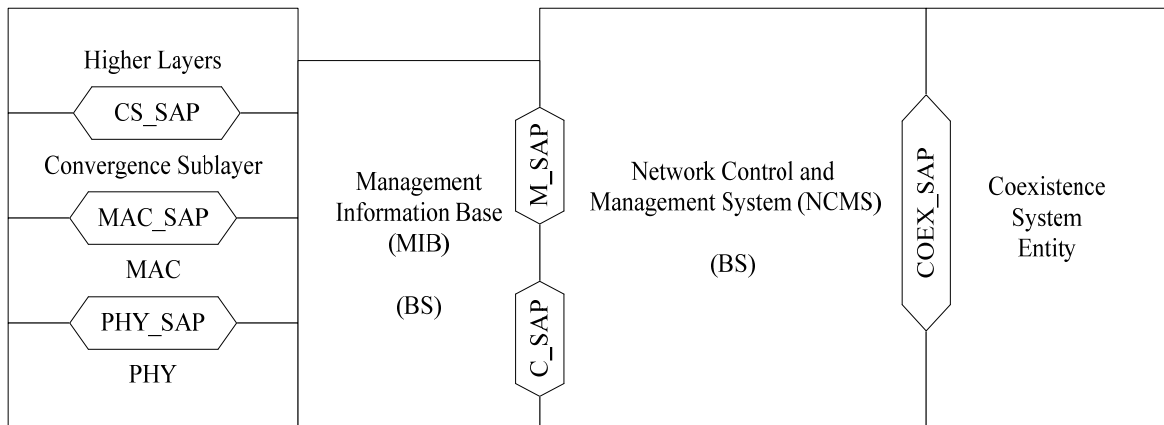


Figure 5-5 Example reference model of interface A for an IEEE 802.16h compliant device

The left side of Figure 5-5 shows typical reference model of radio interface including data, control and management planes for physical layer, MAC sublayer, and convergence sublayer. The middle part of Figure 5-5 shows base station management entity. The right part of Figure 5-5 shows CE.

Typically, radio interface is implemented in such a way that it provides management interface for base station management entity. In Figure 5-5, such interface is represented by three service access points PHY_ME_SAP, MAC_ME_SAP, and CS_ME_SAP, corresponding to physical layer, MAC sublayer, and convergence sublayer. This service access points can be used to obtain information from radio interface and to request reconfiguration of radio interface. Correspondingly, CE can use these service access points to implement interface A. Interface A is defined by service access point COEX_SAP. Communication between radio interface management service access points PHY_ME_SAP, MAC_ME_SAP, and CS_ME_SAP and CE service access point COEX_MEDIA_SAP is done via base station management entity.

Figure 5-6 illustrate an example reference model for interface A for an 802.22 compliant device. The left side of Figure 5-6 shows the reference model for 802.22 including control and management planes for conversion sublayer, MAC layer and PHY layer. The middle part of Figure 5-6 shows the network control and management system (NCMS) which allows the PHY/MAC layers specified in 802.22 standards to be independent of network architecture, the transport network, and the protocols used at the backend. Then, the 802.19.1 system in the right part of Figure 4 employs NCMS to obtain information and request reconfiguration of the 802.22 system.

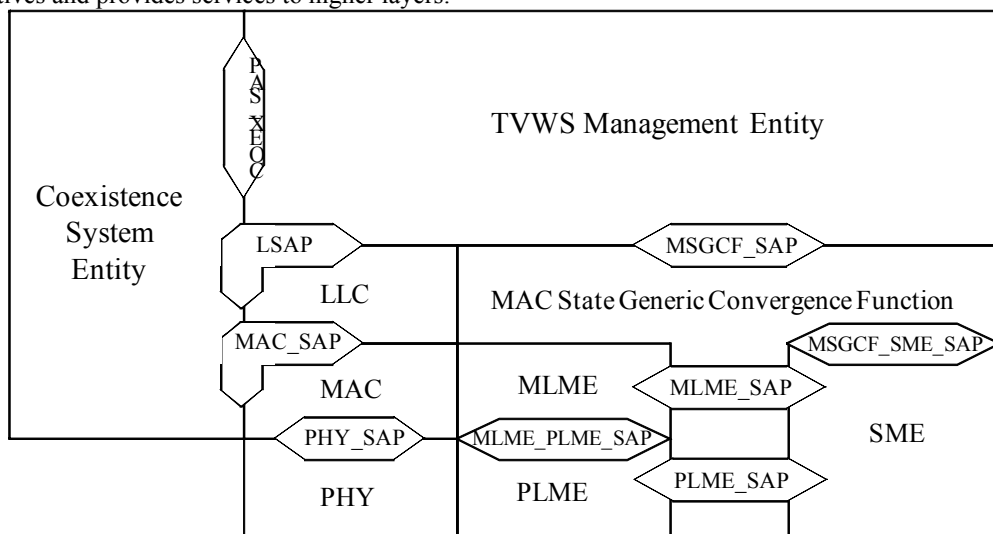


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Figure 5-6 Example reference model of interface A for a 802.22 compliant device

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Figure 5-7 shows an example reference model of interface A for an 802.11 compliant device. The coexistence services over IEEE 802.11 is carried either in the data frames by using existing primitives defined by the LSAP or by using primitives defined by the MAC State Generic Convergence Function (MSGCF) service access point (SAP) (MSGCF_SAP). The MSGCF has access to all management primitives and provides services to higher layers.



10
11

Figure 5-7 Example reference model of interface A for a 802.11 compliant device

12 5.2 Service access points

13 The SAPs are defined as a set of SAP primitives. Each primitive definition has the table of allowable
14 parameters. Each parameter is defined using abstract data types. These types indicate the semantic value of
15 that parameter. The parameters defined within the subclause for a particular primitive are produced or
16 consumed by that primitive. Several of the abstract data types are used in multiple primitive definitions.
17

1 **5.2.1 COEX_TR_SAP**

2 Coexistence Transport SAP (COEX_TR_SAP) supports interface B1, B2, B3 and C providing means for
 3 Coexistence Enabler, Coexistence Manager, and Coexistence Discovery and Information Server to
 4 communicate with each other and with external entities by using transport services provided by underlying
 5 layers. COEX_TR_SAP is defined as a set of primitives that provides the following service:

- 6 — Transport service:
 7 — Used by CE, CM, CDIS or external entity to send coexistence protocol data unit to each other and
 8 to external entities and to receive acknowledgement of such operation
 9 — Used by CE, CM, and CDIS or external entity to receive coexistence protocol data unit from each
 10 other and from external entities.
 11

12 Primitives described in Table 5-1 are used to define the Coexistence Transport SAP.
 13
 14

Table 5-1 – Coexistencere Transport SAP primitives

Primitive	Service	Description
COEX_TR_PACKET	Transport	Used by CE, CM, CDIS or external entity to send a coexistence protocol data unit using a transport service provider. Also used by a transport service provider to deliver a coexistence protocol data unit to CE, CM, CDIS or external entity.

15

16 **5.2.1.1 Transport service**

17 **5.2.1.1.1 COEX_TR_PACKET**

18 **5.2.1.1.1.1 COEX_TR_PACKET.request**

19 **Function:**

20 This primitive is used by CE, CM, CDIS or external entity to request the transport service provider to
 21 transport a coexistence protocol data unit.
 22

23 **Semantics:**

24 COEX_TR_PACKET.request(
 25 TransportPref,
 26 SourceAddress,
 27 DestinationAddress,
 28 ReliableDeliveryFlag,
 29 CXProtocolPDU
 30)
 31

Name	Data Type	Description
TransportPref	TRANSPORT_PREF	Transport protocol preference.
SourceAddress	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity sending coexistence protocol data unit.
DestinationAddress	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity to receive coexistence protocol data unit.
CXProtocolPDU	OCTET STRING	Coexistence protocol data unit to be transported.

32

1 **When generated:**
 2 This primitive is generated by CE, CM, CDIS or external entity to request the transport service provider to
 3 transport a coexistence protocol data unit.

4
 5 **Effect on receipt:**
 6 Upon receipt of this primitive, the specific transport service provider attempts to transport the coexistence
 7 protocol data unit.

8 **5.2.1.1.1.2 COEX_TR_PACKET.indication**

9 **Function:**
 10 This primitive is used by transport service provider to acknowledge transportation of the coexistence
 11 protocol data unit if such acknowledgment is supported by the transport service provider.

12
 13 **Semantics:**
 14 COEX_TR_PACKET.indication(
 15 TransportPref,
 16 SourceID,
 17 DestinationID,
 18 TransportStatus
 19)
 20

Name	Data Type	Description
TransportPref	TRANSPORT_PREF	Transport protocol preference.
SourceAddress	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity sending coexistence protocol data unit.
DestinationAddress	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity to receive coexistence protocol data unit.
TransportStatus	BOOLEAN	Indicates whether the transfer of coexistence protocol data unit is successful or not.

21
 22 **When generated:**
 23 This primitive is generated by the transport service provider to confirm delivery of coexistence protocol
 24 data with coexistence system entity if such acknowledgement is supported by the transport service provider.

25
 26 **Effect on receipt:**
 27 Upon receipt of this primitive, CE, CM, CDIS or external entity receives learns about the staus of the
 28 requested delivery of coexistence protocol data.

29 **5.2.1.1.1.3 COEX_TR_PACKET.confirm**

30 **Function:**
 31 This primitive is used by transport service provider to notify a deliver of a coexistence protocol data unit to
 32 CE, CM, CDIS or external entity.

33
 34 **Semantics:**
 35 CX_TP_Data.confirm(
 36 TransportPref,
 37 SourceAddress,
 38 DestinationAddress,
 39 CXProtocolPDU
 40)
 41
 42
 43

Name	Data Type	Description
TransportPref	TRANSPORT_PREF	Transport protocol preference.
SourceID	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity sending coexistence protocol data unit.
DestinationID	TRANSPORT_ADDR	Protocol layer specific Transport Address of the entity to receive coexistence protocol data unit.
CoexProtocolPDU	OCTET_STRING	Coexistence protocol data unit to be delivered.

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When generated:

This primitive is generated by the transport service provider when it has coexistence protocol data unit for CE, CM, CDIS or external entity

Effect on receipt:

Upon receipt of this primitive, the CE, CM, CDIS or external entity gets coexistence protocol data unit.

9 **5.2.2 COEX_SAP**

10 Coexistence SAP (COEX_SAP) defines the interface A between CE and TVBD network/device. The
11 Coexistence SAP is defined as a set of primitives that provides the following services:

- 12 — Registration service
 - 13 — Used by TVBD network/device to set up a connection with CE
 - 14 — Used by CE to obtain subscription information from TVBD network/device
 - 15 — Used by CE to obtain authentication information from TVBD network/device
 - 16 — Used by CE to obtain registration information from TVBD network/devices
- 17 — Information service:
 - 18 — Used by CE to obtain information required for coexistence from TVBD network/device
 - 19 — Used by TVBD network/device to obtain information required for coexistence from CE
 - 20 — Used by TVBD network/device to share information required for coexistence with other TVBD
 - 21 network/devices via the IEEE 802.19.1 system
- 22 — Measurement service:
 - 23 — Used by CE to request TVBD network/device to perform measurements required for coexistence
 - 24 — Used by CE to obtain measurement results required for coexistence from TVBD network/device
- 25 — Reconfiguration service:
 - 26 — Used by CE to request TVBD network/device to perform reconfiguration required for coexistence
- 27 — Event service:
 - 28 — Used by TVBD network/device to receive information about observed or predicted events related to
 - 29 coexistence from CE
 - 30 — Used by CE to receive information about observed or predicted events related to coexistence from
 - 31 TVBD network/device.

32 Primitives described in Table 1 are used to define the Coexistence SAP.

33 **Table 5-2 – COEX_SAP primitives**

Primitives	Services	Description
COEX_Connection	Registration	Used by TVBD to request connection with CE network/device.

34
35
36

COEX_Auth		Used by TVBD network/device to request authentication with CE
COEX_Reg		Used by TVBD network/device to request CE to do registration in coexistence system
COEX_CE_DREG		Used by TVBD is transmitted to CE to request de-registration of the corresponding TVBD.
COEX_TVBD_DREG		Used by CE to request de-registration of the corresponding TVBD.
COEX_DeAuth		Used by TVBD network/device to request de-authentication with CE
COEX_NeighbourList	Information	Used by CE to update the neighbour list for TVBD network/device.
COEX_AvailableChannel List		Used by CE to obtain available channel list from TVBD network/device Also used by TVBD network/device to update the list of available channels it can operate to CE.
COEX_ChannelClassification		Used by TVBD network/device to request the channel classification of the corresponding TVBD network/device.
COEX_Information		Used by CE to obtain the context information of the corresponding TVBD for coexistence. Also used by TVBD is transmitted to CE to indicate the context information change of the corresponding TVBD for coexistence.
COEX_ResourceConfigure	Reconfiguration	Used by CE to request reconfiguration of TVBD network/device required for coexistence.
COEX_Measurement	Measurement	Used by CE to request TVBD network/device to perform measurement required for coexistence and to obtain measurement results.
COEX_Event	Event	Used by TVBD network/device to inform CE about events related to coexistence observed or predicted by TVBD network/device. Also, used by CE to inform TVBD network/device about events related to coexistence observed or predicted by IEEE 802.19.1 system.

1 **5.2.2.1 Registration service**

2 **5.2.2.1.1 COEX_Connection**

3 **5.2.2.1.1.1 COEX_Connection.request**

4 **Function**

5 Used by TVBD network/device to request connection with CE.

6 **Semantics**

7 COEX_Connection.request(
8 sourceID
9 destinationID
10)
11

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request

12

13 **When generated**

14 Generated by TVBD network/device to request connection with CE.

15

16 **Effect on receipt**

17 When CE receives this primitive, the CE shall send COEX_Connection.response back to the TVBD
18 network/device.
19

20 **5.2.2.1.1.2 COEX_Connection.response**

21 **Function**

22 Used by TVBD network/device to confirm the connection with CE.

23 **Semantics**

24 COEX_Connection.confirm(
25 sourceID
26 destinationID
27)
28

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request

29

30 **When generated**

31 Generated by CE in response to COEX_Connection.request from TVBD network/device.

32 **Effect on receipt**

33 When TVBD network/device receives this primitive, it confirms the connection with CE.

1 **5.2.2.1.2 COEX_Auth**

2 **5.2.2.1.2.1 COEX_Auth.request**

3 **Function**

4 Used by TVBD network/device to request authentication with CE.

5 **Semantics**

6 COEX_Auth.request (
7 sourceID
8 destinationID
9 User ID
10 User Password
11)
12

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
User ID	IA5String (ITU-T X.208)	This parameter contains User ID to be used by CE to authenticate with coexistence system.
User Password	IA5String	This parameter contains User Password to be used by CE to authenticate with coexistence system.

13

14

15 **When generated**

16 Generated by TVBD network/device to request authentication with CE.

17 **Effect on receipt**

18 When CE receives this primitive, it shall send COEX_Authentication.response back to the CE.

19 **5.2.2.1.2.2 COEX_Auth.response**

20 **Function**

21 Used by CE to inform TVBD network/device that the authentication is valid or not.

22 **Semantics**

23 COEX_Auth.response (
24 sourceID
25 destinationID
26 status
27)
28

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
status	Status	This parameter shows that the authentication information in GetAuthInfo.response is valid or invalid status.

29

30 **When generated**

31 Generated by CE to TVBD network/device to indicate that the authentication information is valid or not.

32 **Effect on receipt**

1 When TVBD networks/devices receive this primitive, it shall examine authStatus.

2 **5.2.2.1.3 COEX_Reg**

3 **5.2.2.1.3.1 COEX_Reg.request**

4 **Function**

5 Used by TVBD network/device to request CE to do registration in coexistence system.

6 **Semantics**

7 COEX_Reg.request(
8 sourceID
9 destinationID
10 networkID
11 serviceType
12)
13

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
networkID	NetworkID	E.g., FCC ID of TVBD network or device
serviceType	ServiceType	Discovery/Management

14

15 **When generated**

16 Generated by TVBD network/device to request CE to do registration in coexistence system.

17 **Effect on receipt**

18 When CE receives this primitive, it shall send COEX_Reg.response back to TVBD network/device.

19 **5.2.2.1.3.2 COEX_Reg.response**

20 **Function**

21 Used by CE to confirm registration status with TVBD network/device.

22 **Semantics**

23 COEX_Reg.response (
24 sourceID
25 destinationID
26 status
27)
28

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
status	STATUS	Returns the outcome of a request

29

30 **When generated**

31 Generated by CE in response to COEX_Reg.request from TVBD network/device.

32 **Effect on receipt**

33 When TVBD network/device receives this primitive, it examines the registration status.

1 **5.2.2.1.4 COEX_DeReg**

2 **5.2.2.1.4.1 COEX_DeReg.request**

3 **Function:**

4 Used by TVBD to request de-registration of the corresponding TVBD with CE.

6 **Semantics:**

7 COEX_DeReg.request(
8 sourceID
9 destinationID
10)
11
12
13

Name	Type	Description
SourceID	COEX_ID	This identifies a TVBD that is source of this request
DestinationID	COEX_ID	This identifies a CE that is destination of this request

15 **When generated:**

16 This primitive is generated by TVBD when it needs to request de-registration of the corresponding TVBD.

18 **Effect on receipt:**

19 When receiving this primitive from TVBD, the CE shall send the de-registration request message to CM
20 and give the response from CM the corresponding TVBD, which indicates “Success” or “Failure” for the
21 de-registration request of the TVBD.

22 **5.2.2.1.4.2 COEX_DeReg.response**

23 **Function:**

24 Used by CE to response the de-registration request of the corresponding TVBD.

26 **Semantics:**

27 COEX_DeReg.response(
28 sourceID
29 destinationID
30 status
31)
32

Name	Data Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
status	Status	Status of de-registration <ul style="list-style-type: none"> • Success: De-registration of the corresponding TVBD is succeed. • Failure:De-registration of the corresponding TVBD is failed.

34 **When generated:**

35 This primitive is generated in response to a COEX_CE_DREG.request primitive.

37 **Effect on receipt:**

1 When receiving this primitive, TVBD examines the received information about the status of the de-
2 registration request of the corresponding TVBD.

3 **5.2.2.1.5 COEX_TVBD_DeReg**

4 **5.2.2.1.5.1 COEX_TVBD_DeReg.request**

5 **Function:**

6 Used by CE to request de-registration of the corresponding TVBD.

7
8 **Semantics:**

9 COEX_TVBD_DeReg.request(
10 sourceID
11 destinationID
12)
13

14 Parameters:

Name	Type	Description
SourceID	COEX_ID	This identifies a CE that is source of this request
DestinationID	COEX_ID	This identifies a TVBD that is destination of this request

15

16 **When generated:**

17 This primitive is generated by CE when it needs to request de-registration of the corresponding TVBD.

18

19 **Effect on receipt:**

20 When receiving this primitive from CE, the TVBD shall send the response to CE, which indicates
21 "Success" or "Failure" for de-registration of the corresponding TVBD.

22 **5.2.2.1.5.2 COEX_TVBD_DeReg.response**

23 **Function:**

24 This primitive used by TVBD is transmitted to CE to give the response of de-registration of the
25 corresponding TVBD.

26 **Semantics:**

27 COEX_TVBD_DeReg.response(
28 sourceID
29 destinationID
30 Status
31)
32

33 Parameters:

34

Name	Data Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
status	Status	Status of de-registration <ul style="list-style-type: none">• Success:De-registration of the corresponding TVBD is succeed.• Failure:De-registration of the corresponding TVBD is failed.

35

1 **When generated:**
2 This primitive is generated in response to a COEX_TVBD_DREG.request primitive.
3

4 **Effect on receipt:**
5 When receiving this primitive from TVBD, the CE shall send the response from TVBD to CM, which
6 indicates “Success” or “Failure” for de-registration of the corresponding TVBD.
7

8 5.2.2.1.6 COEX_DeAuth

9 5.2.2.1.6.1 COEX_DeAuth.request

10 **Function**

11 Used by TVBD network/device to request de-authentication with CE.

12 **Semantics**

13 COEX_DeAuth.request (
14 sourceID
15 destinationID
16 User ID
17 User Password
18)
19

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
User ID	IA5String (ITU-T X.208)	This parameter contains User ID to be used by CE to authenticate with coexistence system.
User Password	IA5String	This parameter contains User Password to be used by CE to authenticate with coexistence system.

20

21 **When generated**

22 Generated by TVBD network/device to request de-authentication with CE.

23 **Effect on receipt**

24 When CE receives this primitive, it shall send COEX_DeAuth.response back to the CE.
25

26 5.2.2.1.6.2 COEX_DeAuth.response

27 **Function**

28 Used by CE to inform TVBD network/device that the de-authentication is valid or not.

29 **Semantics**

30 COEX_DeAuth.response (
31 sourceID
32 destinationID
33 status
34)
35

Name	Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request

status	Status	This parameter shows that the authentication information in GetAuthInfo.response is valid or invalid status.
--------	--------	--

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When generated

Generated by CE to TVBD network/device to indicate whether the de-authentication is successfully processed.

Effect on receipt

When TVBD network/device receives this primitive, it shall examine status.

8 **5.2.2.2 Information service**

9 **5.2.2.2.1 COEX_NeighbourList**

10 **5.2.2.2.1.1 COEX_NeighbourList.indication**

11 **Function**

Used by CE to update the neighbour list for TVBD network/device. This primitive is only used for TVBD network/device that is subscribed to discovery service.

14 **Semantics**

15 COEX_Neighbourlist.indication (
16 sourceID
17 destinationID
18 neighbourList
19)

Name	Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
neighbourList	NeighbourList	The list of TVBD neighbours

20
21
22
23
24
25

When generated

Generated by CE to update the neighbor information for TVBD network/device.

Effect on receipt

When TVBD network/device receives this primitive, it shall update the neighbour information with the new value provided in this primitive.

26 **5.2.2.2.2 COEX_AvailableChannelList**

27 **5.2.2.2.2.1 COEX_AvailableChannelList.request**

28 **Function**

Used by CE to obtain available channel list from TVBD network/device

30 **Semantics**

31 COEX_AvailableChannelList.request(
32 sourceID
33 destinationID
34)

Name	Type	Description
------	------	-------------

sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request

1

2 **When generated**

3 Generated by TVBD network/device to obtain available channel list from CE.

4

5 **Effect on receipt**

6 When TVBD network/device receives this primitive, the TVBD network/device shall send
7 COEX_AvailableChannelList.response back to the CE.

8 **5.2.2.2.2 COEX_AvailableChannelList.response**

9 **Function**

10 Used by TVBD network/device to provide the list of available channels it can operate to CE.

11 **Semantics**

12 COEX_AvailableChannelList.response (
13 sourceID
14 destinationID
15 regulatoryDomain
16 availableChannelList
17)
18

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
regulatoryDomain	RegulatoryDomain	The domain of regulatory of TVWS
availableChannelList	AvailableChannelList	Available channel list to operate in TVWS

19

20 **When generated**

21 Generated by TVBD network/device in response to COEX_AvailableChannelList.request from CE.

22 **Effect on receipt**

23 When CE receives this primitive, it examines the received information required for coexistence.

24 **5.2.2.2.3 COEX_AvailableChannelList.indication**

25 **Function**

26 Used by TVBD network/device to update the list of available channels it can operate to CE.

27 **Semantics**

28 COEX_AvailableChannelList.response (
29 sourceID
30 destinationID
31 regulatoryDomain
32 availableChannelList
33)
34

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request

regulatoryDomain	RegulatoryDomain	The domain of regulatory of TVWS
availableChannelList	AvailableChannelList	Available channel list to operate in TVWS

1

2 **When generated**

3 Generated by TVBD network/device if information in the last COEX_AvailableChannelList.response
4 changed.

5

6 **Effect on receipt**

7 When CE receives this primitive, it examines the received information required for coexistence.

8 **5.2.2.2.3 COEX_ChannelClassification**

9 **5.2.2.2.3.1 COEX_ChannelClassification.request**

10 **Function:**

11 This primitive is used by TVBD network/device to request the channel classification of the corresponding
12 TVBD network/device.

13

14 **Semantics:**

15 Ch_Classification.request(
16 SourceID,
17 DestinationID
18)
19

20

20 Parameters:

21

Name	Data Type	Description
SourceID	COEX_ID	Source identifier
DestinationID	COEX_ID	Destination identifier

22

23 **When generated:**

24 This primitive is generated by TVBD network/device when it needs to request the channel classification of
25 the corresponding TVBD network/device.

26

27 **Effect on receipt:**

28 When receiving this primitive from TVBD network/device, the CE shall request the channel classification
29 information of the corresponding TVBD network/device to CM.

30

31 **5.2.2.2.3.2 COEX_ChannelClassification.response**

32 **Function:**

33 This primitive used by CE is transmitted to TVBD network/device to give the channel classification
34 information of the corresponding TVBD network/device from CM

35

36 **Semantics:**

37 Ch_Classification.response(
38 SourceID,
39 DestinationID,
40 ChannelClassificationList,
41 TxMaxPower
42)
43

44

44 Parameters:

1

Name	Data Type	Description
SourceID	COEX_ID	Source identifier
DestinationID	COEX_ID	Destination identifier
ChannelClassificationList	COEX_CH_CLASSIFICATION	Channel classification list
TxMaxPower	REAL	Maximum transmit power

2

3

When generated:

This primitive is generated in response to a Ch_Classification.request primitive.

5

6

Effect on receipt:

When receiving this primitive from CE, TVBD network/device shall employ the information for selecting operating channel of the corresponding TVBD network/device.

9

10 **5.2.2.2.3.3 COEX_ChannelClassification.indication**

11 **Function:**

This primitive used by CE is transmitted to TVBD to update channel classification information of the corresponding TVBD from CM.

14

15

Semantics:

16

Ch_Classification.response(
17

17

SourceID,
18

18

DestinationID,
19

19

ChannelClassificationList,
20

20

TxMaxPower
21

21

)
22

22

23

Parameters:
24

24

Name	Data Type	Description
SourceID	COEX_ID	Source identifier
DestinationID	COEX_ID	Destination identifier
ChannelClassificationList	COEX_CH_CLASSIFICATION	Channel classification list
TxMaxPower	REAL	Maximum transmit power

25

26

When generated:

This primitive is generated to update channel classification information of the corresponding TVBD network/device.

28

29

30

Effect on receipt:

When TVBD network/device receives this primitive, it shall update channel classification information of the corresponding TVBD network/device.

32

33

5.2.2.2.4 COEX_Information

34

5.2.2.2.4.1 COEX_Information.request

35

Function:

This primitive is used by CE to obtain the context information of the corresponding TVBD for coexistence.

37

1 **Semantics:**
 2 COEX_Information.request(
 3 sourceID
 4 destinationID
 5 coexInforIDs
 6)
 7
 8 Parameters:
 9

Name	Data Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
coexInforIDs	CoexInfoIDs	ID list of reported context information

10
 11 **When generated:**
 12 This primitive is generated by the CE when it needs to obtain the context information of the corresponding
 13 TVBD for coexistence.
 14
 15 **Effect on receipt:**
 16 When receiving this primitive from CE, the TVBD shall give its context information the CE, which is
 17 selected by information ID list from CE.

18 **5.2.2.2.4.2 COEX_Information.response**

19 **Function:**
 20 This primitive used by TVBD is transmitted to CE to give the context information of the corresponding
 21 TVBD for coexistence.

22 **Semantics**
 23 COEX_Information.response (
 24 sourceID
 25 destinationID
 26 coexInfoValues
 27)

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
coexInfoValues	CoexInfoValues	A set of information requests, each containing a information type and a information value

28
 29 **When generated:**
 30 This primitive is generated in response to a COEX_Information.request primitive.
 31
 32 **Effect on receipt:**
 33 When receiving this primitive from TVBD network/devices, the CE shall give the context information of
 34 the corresponding TVBD the CM, which is selected by information ID list from CM.
 35

36 **5.2.2.2.4.3 COEX_Information.indication**

37 **Function:**
 38 This primitive used by TVBD is transmitted to CE to indicate the context information change of the
 39 corresponding TVBD for coexistence.

1 **Semantics**
 2 COEX_Information.Indication (
 3 sourceID
 4 destinationID
 5 coexInfoValues
 6)

Name	Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
coexInfoValues	CoexInfoValues	A set of information requests, each containing a information type and a information value

7
 8 **When generated:**
 9 This primitive is generated to indicate the context information change of the corresponding TVBD for
 10 coexistence..
 11

12 **Effect on receipt:**
 13 When receiving this primitive from TVBD network/devices, the CE shall give the context information of
 14 the corresponding TVBD the CM, which is selected by information ID list from CM.
 15

16 5.2.2.3 Resource configuration service

17 5.2.2.3.1 COEX_ResourceConfigure

18 5.2.2.3.1.1 COEX_ResourceConfigure.request

19 **Function:**
 20 Used by CE to request reconfiguration of TVBD networks/devices required for coexistence.
 21

22 **Semantics:**
 23 COEX_Reconfigure.request(
 24 sourceID
 25 destinationID
 26 DialogToken
 27 CoexistenceMode,
 28 ChannelClassificationList,
 29 ServiceStartEndTime,
 30 ServiceCoverage,
 31 reconfigurationRequest
 32 CommandRequestSet
 33)
 34

35 Parameters:

Name	Data Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
DialogToken	Integer	The Dialog Token to identify the command transaction.

CoexistenceMode	COEX_MODE	Coexistence mode such as <ul style="list-style-type: none"> • Individual channel assignment mode • Co-channel sharing mode
ChannelClassificationList	COEX_CH_CLASSIFICATION	Channel classification list
ServiceStartEndTime	COEX_SER_TIME	Service time including <ul style="list-style-type: none"> • Start time • End time
ServiceCoverage	REAL	Service coverage for communications <ul style="list-style-type: none"> •
reconfigurationRequest	ReconfigurationRequest	Reconfiguration description.
CommandRequestSet	Set of command requests, each as defined in command request element	A set of command requests, each containing a command type and a command request

1

2

When generated:

3

This primitive is generated by the CE when it needs to request the reconfiguration of the corresponding TVBD network/device.

4

5

6

Effect on receipt:

7

When TVBD network/device receives this primitive from CE, it shall perform the reconfiguration based on

8

the parameter information in this primitive.

9

5.2.2.3.1.2 COEX_ResourceConfigure. response

10

Function:

11

This primitive used by TVBD network/device to report the results of the requested reconfiguration

12

Semantics:

13

COEX_Reconfigure.response(

14

sourceID

15

destinationID

16

DialogToken

17

ReconfigurationParameters

18

reconfigurationstatus

19

CommandResponseSet

20

)

21

Parameters:

22

23

Name	Data Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
DialogToken	Integer	The Dialog Token to identify the command transaction.
ReconfiguraitonParameters	COEX_RC_PARAMETERS	The status information of reconfiguration parameters is provided with <ul style="list-style-type: none"> • accepted values of parameters when reconfiguration is succeed • recommended values of parameters when reconfiguration is failed
reconfigurationstatus	Boolean	This parameter shows the status of reconfiguration.

CommandResponseSet	Set of command responses, each as defined in command response element	A set of command responses, each containing a command type and a command response
--------------------	---	---

1
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30

When generated:

This primitive is generated by TVBD network/device in response to a COEX_Reconfigure.request primitive.

Effect on receipt:

When CE receives this primitive from TVBD network/device, the CE shall examine the status of the reconfiguration.

5.2.2.4 Measurement service

5.2.2.4.1 COEX_Measurement

5.2.2.4.1.1 COEX_Measurement.request

Function:

This primitive is used by CE to request TVBD network/device to perform the measurement required for coexistence.

Semantics:

```
COEX_Measurement.request(
    sourceID
    destinationID
    DialogToken      MeasurementID,
    ChannelNumberList,
    MeasurementOptions
    measurementDescription
    MeasurementRequestSet
)
```

Parameters:

Name	Data Type	Description
sourceID	COEX_ID	This identifies a CE that is source of this request
destinationID	COEX_ID	This identifies a TVBD that is destination of this request
DialogToken	Interger	The Dialog Token to identify the command transaction.
MeasurementID	COEX_MES_ID	Measurement list such as <ul style="list-style-type: none"> • TVBD QoS • TVBD spectrum sensing
ChannelNumberList	SEQUENCE OF INTEGER	Measuring channel number list
MeasurementOptions	COEX_MES_OPTIONS	Measurement options such as <ul style="list-style-type: none"> • Measurement duration • Measurement frequency range
measurementDescription	MeasurementDescription	Measurement Description
MeasurementRequestSet	Set of measurement requests,	A set of measurement requests, each

	each as defined in measurement request element	containing a measurement type and a measurement request
--	--	---

1
2
3
4
5
6
7
8

When generated:

This primitive is generated by the CE to request TVBD network/device to perform measurement required for coexistence.

Effect on receipt:

When TVBD network/device receives this primitive from CE, it shall perform the measurements based on the measurement options/Description in this primitive..

9 **5.2.2.4.1.2 COEX_Measurement.response**

10 **Function:**

This primitive used by TVBD network/device to provide the results of the measurement to CE.

12

13 **Semantics:**

```
14 COEX_TVBD_MES.response(  
15     sourceID  
16     destinationID  
17     DialogToken  
18     MeasurementID,  
19     ChannelNumberList,  
20     MeasurementResults,  
21     MeasurementParameters  
22     measurementResult  
23     MeasurementReportSet  
24 )
```

25

Parameters:

26

Name	Data Type	Description
sourceID	COEX_ID	This identifies a TVBD that is source of this request
destinationID	COEX_ID	This identifies a CE that is destination of this request
DialogToken	Integer	The Dialog Token to identify the command transaction.
MeasurementID	COEX_MES_ID	Measurement ID
ChannelNumberList	SEQUENCE OF INTEGER	Measured channel number list
MeasurementResults	COEX_MES_RESULTS	Measurement results
MeasurementParameters	COEX_MES_OPTIONS	Actual measurement parameters such as <ul style="list-style-type: none"> • Actual measurement duration • Actual measurement frequency range
measurementResult	MeasurementResult	Measurement Result
MeasurementReportSet	Set of measurement reports, each as defined in measurement report element	A set of measurement reports, each containing a measurement type and a measurement report

27
28
29
30
31
32

When generated:

This primitive is generated by TVBD network/device in response to a COEX_Measurement.request primitive.

Effect on receipt:

1 When CE receives this primitive from TVBD network/device, the CE shall examine the measurement
 2 results required for coexistence.
 3

4 **5.2.2.4.1.3 COEX_Measurement.indication**

5 **Function**

6 Used by TVBD network/device to provide measurement results to CE.
 7

8 **Semantics**

9 GetAvailableChannelList.indication (
 10 measurementResult
 11)

Name	Type	Description
MeasurementResult	MeasurementResult	Measurement Result

12

13 **When generated**

14 Generated by TVBD network/device in response to GetMeasurement.request from CE.
 15

16 **Effect on receipt**

17 When CE receives this primitive, it examines the received measurement results required for coexistence.

18 **5.2.2.5 Event service**

19 **5.2.2.5.1 COEX_TVBD_EV**

20 **5.2.2.5.1.1 COEX_Evet.request**

21 **Function:**

22 This primitive, which is periodically generated, is used by CE is transmitted to TVBD to request the event
 23 detection of the corresponding TVBD.
 24

25 **Semantics:**

26 COEX_TVBD_EV.request(
 27 EventIDS
 28)
 29

30 Parameters:

31

32

Name	Data Type	Description
EventIDs	COEX_EV_IDS	Event list such as <ul style="list-style-type: none"> • TVBD QoS event, which is detected when QoS of TVBD is degraded under the required reliability. • TVBD geolocation change • TVBD coverage change

33

34 **When generated:**

35 This primitive is generated by the CE when it needs to request the event detection of the corresponding
 36 TVBD.
 37

1 **Effect on receipt:**
 2 When receiving this primitive from CE, the TVBD shall notify whether the event of the corresponding
 3 TVBD is occurred or not.

4 **5.2.2.5.1.2 COEX_Event.response**

5 **Function:**
 6 This primitive used by TVBD is transmitted to CE to notify whether the event of the corresponding TVBD
 7 is occurred or not.

8
 9 **Semantics:**
 10 COEX_TVBD_EV.response(
 11 EventStatus
 12)
 13

14 Parameters:

Name	Data Type	Description
EventStatus	COEX_EV_STATUS	Detected event such as <ul style="list-style-type: none"> • TVBD QoS change • TVBD geolocation change • TVBD coverage change

16 **When generated:**
 17 This primitive is generated in response to a COEX_TVBD_EV.request primitive.
 18

19 **Effect on receipt:**
 20 When receiving this primitive from TVBD, the CE shall send the response of the detected event of the
 21 corresponding TVBD to CM only if the event is occurred.

22 **5.2.2.5.2 COEX_Event**

23 **5.2.2.5.2.1 COEX_Event.indication**

24 **Function**
 25 Used by TVBD network/device to inform CE about events related to coexistence observed or predicted by
 26 TVBD network/device. Also, used by CE to inform TVBD network/device about events related to
 27 coexistence observed or predicted by IEEE 802.19.1 system
 28 .

29 **Semantics**
 30 EVENT.indication(
 31 eventParams
 32)
 33

Name	Type	Description
eventParams	EventParams	This parameter contains list of event parameters.

34
 35 **When generated**
 36 Generated by TVBD network/device to inform CE about events related to coexistence observed or
 37 predicted by TVBD network/device.
 38 Generated by CE to inform TVBD network/device about events related to coexistence observed or
 39 predicted by IEEE 802.19.1 system.
 40

41 **Effect on receipt**

1 When CE receives this primitive, it examines the received information about events related to coexistence
2 observed or predicted by TVBD network/device.
3 When TVBD network/device receives this primitive, it examines the received information about events
4 related to coexistence observed or predicted by IEEE 802.19.1 system.
5

6 **5.3 Data type definition**

7 **5.3.1 Coexistence Network SAP data types /Coexistence Transport SAP data types**

8 **5.3.1.1 Transport service**

9 The following data types are defined for Coexistence Transport SAP.

```
10 TRANSPORT_PREF ::= ENUMERATED {  
11     TCP,  
12     UDP,  
13     HTTP,  
14     SNMP,  
15     ...  
16 }  
17  
18 TRANSPORT_ADDR ::= OCTET_STRING  
19
```

20 **5.3.2 Coexistence Media/Link/DME SAP**

21 **5.3.2.1 Registration service**

```
22 COEX_ID ::= CHOICE {  
23     CE_ID INTEGER,  
24     TVBD_ID INTEGER  
25 }  
26  
27 Status ::= ENUMERATED {  
28     Success,  
29     Failure  
30 }  
31  
32 NetworkID ::= ENUMERATED {  
33     BSSID,  
34     ...  
35 }  
36  
37 ServiceType ::= ENUMERATED {  
38     Discovery,  
39     Management  
40 }  
41
```

42 **5.3.2.2 Information service**

```
43 NetworkType ::= ENUMERATED {
```

```

1     IEEE802.11af,
2     IEEE802.22,
3     ECMA392,
4     ...
5 }
6
7 OperatingTVChannelList ::= SEQUENCE OF INTEGER
8
9 NeighbourList ::= SEQUENCE OF SEQUENCE {
10     networkID      NetworkID,
11     networkType    NetworkType,
12     operatingTVChannelList    OperatingTVChannelList
13 }
14
15 RegulatoryDomain ::= ENUMERATED {
16     USA,
17     UK,
18     Singapore,
19     ...
20 }
21
22 AvailableChannelList ::= SEQUENCE OF SEQUENCE {
23     TVChannelNumber    INTEGER,
24     txPowerLimit      REAL
25 }
26
27 ServiceArea ::= TBD
28
29 InterferenceArea ::= TBD
30
31 RequiredServiceCoverage ::= TBD
32
33
34 SeparateDistance ::= TBD
35
36 Coverage ::= TBD
37
38
39 TVBD_GEOLOCATION ::= SEQUENCE {
40     LatitudeResolution REAL,
41     Latitude          REAL,
42     LongitudeResolution REAL,
43     Longitude        REAL,
44     AltitudeResolution REAL
45     Altitude          REAL
46 }
47
48 ANT_POLAR ::= ENUMERATED{
49     HorizontalPolarization,
50     VerticalPolarization,
51     LeftHandCircularPolarization,
52     RightHandCircularPolarization,
53     ...
54 }
55
56 TVBD_RC_OPTION_ID ::= ENUMERATED {

```

```

1   TransmitPowerControlResolution,
2   TransmitPowerRange,
3   ReconfigurableAntenna PolarizationList,
4   AntennaHPBWControlResolution,
5   AntennaHPBWControlRange,
6   ...
7 }
8
9 TVBD_RC_OPTION_VALUE ::= CHOICE {
10  TransmitPowerControlResolution    REAL,
11  TransmitPowerRange                REAL,
12  ReconfigurableAntenna PolarizationList    SEQUENCE OF ANT_POLAR,
13  AntennaHPBWControlResolution      REAL,
14  AntennaHPBWControlRange           REAL,
15  ...
16 }
17
18 TVBD_RC_OPTION ::= SEQUENCE {
19  RCOptionsID            TVBD_RC_OPTION_ID,
20  RCOptionsValue        TVBD_RC_OPTION_VALUE
21 }
22
23 COEX_TVBD_RC_OPTIONS ::= SEQUENCE OF TVBD_RC_OPTION
24
25
26
27 CoexInfoID CHOICE {
28  serviceType,
29  networkID,
30  networkType,
31  operatingTVChannelList,
32  serviceArea,
33  interferenceArea,
34
35  requiredBandwidth,
36  requiredServiceDuration,
37  requiredServiceCoverage,
38  antennaGain,
39  antennaHeight,
40  geolocation,
41  reconfigurationOptions,
42
43  geolocation,
44  separateDistance,
45  coverage
46 }
47
48 CoexInfoIDs ::= SEQUENCE OF CoexInfoID
49
50 CoexInfoValue CHOICE {
51  serviceType        ServiceType,
52  networkID          NetworkID,
53  networkType        NetworkType,
54  operatingTVChannelList    OperatingTVChannelList,
55  serviceArea        ServiceArea,
56  interferenceArea   InterferenceArea,

```

```

1
2     requiredBandwidth      REAL,
3     requiredServiceDuration GeneralizedTime,
4     requiredServiceCoverage RequiredServiceCoverage,
5     antennaGain           REAL,
6     antennaHeight         REAL,
7     geolocation           TVBD_GEOLOCATION,
8     reconfigurationOptions COEX_TVBD_RC_OPTIONS,
9
10    geolocation           Geolocation,
11    separateDistance       SeparateDistance,
12    coverage               Coverage
13 }
14
15 CoexInfoValues ::= SEQUENCE OF CoexInfoValue
16

```

17 5.3.2.3 Reconfiguration service

```

18 COEX_MODE ::= ENUMERATED{
19     IndividualChannelAssignmentMode,
20     CoChannelSaringMode,
21     ...
22 }
23
24 COEX_CH_CLASSIFICATION ::= SEQUENCE {
25     AllowedChannelList      SEQUENCE OF INTEGER,
26     AvailableChannelList    SEQUENCE OF INTEGER,
27     RestrictedChannelList    SEQUENCE OF INTEGER
28 }
29
30 COEX_SER_TIME ::= SEQUENCE {
31     StartTime              INTEGER,
32     EndTime                INTEGER
33 }
34
35 ANT_POLAR ::= ENUMERATED{
36     HorizontalPolarization,
37     VerticalPolarization,
38     LeftHandCircularPolarization,
39     RightHandCircularPolarization,
40     ...
41 }
42
43 COEX_RC_OPTIONS ::= SEQUENCE {
44     TransmitPower          REAL,
45     AntennaPolarization    ANT_POLAR,
46     AntennaHPBW            REAL
47 }
48
49 RC_PARAMETER_ID ::= ENUMERATED{
50     CoexistenceMode,
51     OperatingChannelList,
52     ServiceStartEndTime,
53     ServiceCoverage,
54     ReconfigurationOptions,

```

```

1     ...
2 }
3
4 RC_PARAMETER_VALUE ::= CHOICE{
5     CoexistenceMode          COEX_MODE,
6     OperatingChannelList     SEQUENCE OF INTEGER,
7     ServiceStartEndTime      COEX_SER_TIME,
8     ServiceCoverage           REAL,
9     ReconfigurationOptions    COEX_RC_OPTIONS,
10    ...
11 }
12
13 RC_PARAMETER ::= SEQUENCE{
14     RCParametersID           RC_PARAMETER_ID,
15     RCParameterStatus        BOOLEAN,
16     RCParameterValue         RC_PARAMETER_VALUE
17 }
18
19 COEX_RC_PARAMETERS ::= SEQUENCE OF RC_PARAMETER
20
21
22 ReconfigurationRequest ::= SEQUENCE OF SEQUENCE {
23     operationChannel OperationChannel,
24     txPowerLimit REAL,
25     channelsShared BOOLEAN,
26     txSchedule SEQUENCE OF TxSchedule
27 }
28
29 TxSchedule ::= SEQUENCE {
30     scheduleStartTime REAL,
31     scheduleDuration REAL,
32     numberOfScheduleRepetitions INTEGER,
33     transmissionStartTime REAL,
34     transmissionDuration REAL
35 }
36
37 5.3.2.4 Measurement service
38
39 COEX_MES_ID ::= ENUMERATED{
40     TVBDQoS,
41     TVBDSpectrumSensing,
42     ...
43 }
44
45 COEX_MES_OPTIONS ::= ENUMERATED{
46     MeasureDuration          INTEGER,
47     MeasureFrequencyRange    REAL,
48     ...
49 }
50
51 COEX_MES_RESULTS ::= ENUMERATED{
52     TVBDQoSResult            REAL,
53     TVBDSpectrumSensingResults REAL,
54     ...
55 }

```

```
1 MeasurementDescription ::= TBD
2
3 MeasurementResult ::= TBD
4
5 5.3.2.5 Event service
6
7 EV_ID ::= ENUMERATED {
8     TVBDQoSChange,
9     TVBDGeolocationChange,
10    TVBDCoverageChange,
11    ...
12 }
13
14 COEX_EV_IDS ::= SEQUENCE OF EV_ID
15
16 COEX_EV_STATUS ::= SEQUENCE {
17     EventID          EV_ID,
18     EventStatus      BOOLEAN
19 }
20
21 EventParams ::= TBD
22
```