

**IEEE Standard for
Information technology—
Telecommunications and information
exchange between systems—
Local and metropolitan area networks—
Specific requirements—
Part 19: TV White Space Coexistence Methods**

**Amendment 1: Coexistence Methods for
Geo-location Capable Devices Operating under
General Authorization**

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

IEEE Std 802.19.1a™-2017
(Amendment to
IEEE Std 802.19.1™-2014)

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Approved 28 September 2017

IEEE-SA Standards Board

Abstract: The network-based coexistence information exchange among networks and devices to enable network-based coexistence management is defined in this amendment to IEEE 802.19.1-2014. This amendment specifies procedures and protocols for collection and exchange of coexistence information of heterogeneous networks, spectrum resource measurements and network performance metrics, such as packet error ratio, delay, etc., and information elements and data structures to capture coexistence information.

Keywords: 5 GHz license-exempt bands, database, general authorized access in 3.5 GHz bands, geolocation, IEEE 802[®], IEEE 802.19.1[™], IEEE 802.19.1a[™], network-based coexistence, spectrum management, TV band white spaces

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Introduction

This introduction is not part of IEEE Std 802.19.1a-2017, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 19: TV White Space Coexistence Methods—Amendment 1: Coexistence methods for geo-location capable devices operating under general authorization.

This amendment to IEEE 802.19.1-2014 defines the network-based coexistence information exchange among networks and devices to enable network-based coexistence management. It specifies procedures and protocols for collection and exchanging coexistence information of heterogeneous networks, spectrum resource measurements and network performance metrics, such as packet error ratio and delay, etc., and information elements and data structures to capture coexistence information.

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IEEE Standard for Information technology— Telecommunications and information exchange between systems— Local and metropolitan area networks— Specific requirements— Part 19: TV White Space Coexistence Methods

Amendment 1: Coexistence Methods for Geo-location Capable Devices Operating under General Authorization

(This amendment is based on IEEE Std 802.19.1™-2014.)

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strike through~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.¹

¹ Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

2. Normative references

Insert the following reference in alphanumeric order:

ECC Report 186, Technical and operational requirements for the operation of white space devices under geo-location approach, Jan. 2013.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

Insert the following definitions in alphabetical order:

coexistence system: A set of one or more coexistence enablers (CEs), coexistence managers (CMs), coordination enablers (COEs) and a coexistence discovery and information server (CDIS).

coordination enabler (COE): An entity that can communicate with coexistence manager (CM) within the same coexistence system and with the COE within the other coexistence system.

general authorization: Frequency authorization that a device would be entitled to use the spectrum with no individual frequency planning/coordination (not be entitled to interference protection from the others).

geo-location capability: The ability of a device to identify its geographical coordinate with certain accuracy.

geo-location capable object (GCO): An entity that represents a device or network of devices operating under general authorization with geo-location capability. The entity is connected to a coexistence enabler (CE) to consume coexistence services.

priority-based channel assignment: Assignment of a channel by the coexistence manager (CM) to a geo-location capable object (GCO) in such a way that the GCO can operate alone in such channel for a specific reservation period and in a specific area based on particular minimum protection requirements of the GCO operating under general authorization in same frequency band.

sensing: To measure the radio signal emitted by the incumbent system.

spectrum management database (SMDB): A database system approved by the relevant national regulatory authority that can communicate with geo-location capable objects (GCOs) and provide information on spectrum availability, taking into account any operational changes from the protected incumbents. SMDB includes TV white space (TVWS) database, geo-location database, Spectrum Access System (SAS) database, and such kind of database system.

Change the following definitions as shown:

coexistence: The ability of two or more spectrum-dependent devices or networks to operate without harmful interference under the same frequency authorization in the same frequency band each other.

coexistence discovery: Procedure executed inside the coexistence system in order to find a coexistence set for a coexistence enabler (CE) and its white space/geo-location capable object (WSO/GCO).

coexistence discovery and information server (CDIS): An entity that is responsible for determining for coexistence managers (CMs) those white space/geo-location capable objects (WSOs/GCOs) that may affect performance of the WSOs/GCOs that the CMs serve.

coexistence enabler (CE): An entity that represents a white space/geo-location capable object (WSO/GCO) in the coexistence system and serves one WSO/GCO at a time.

coexistence manager (CM): An entity that is responsible for making coexistence decisions related to reconfiguration of white space/geo-location capable objects (WSOs/GCOs) to solve coexistence problems among them.

coexistence services: Services provided by the coexistence system to dissimilar or independently operated white space/geo-location capable objects (WSOs/GCOs) as well as services provided by the entities of the coexistence system to other entities of the coexistence system.

coexistence set: A set of white space/geo-location capable objects (WSOs/GCOs) associated to a WSO/GCO containing those WSOs/GCOs that may affect performance of the WSO/GCO.

coexistence set element: One white space/geo-location capable object (WSO/GCO) of a coexistence set.

neighbor coexistence managers: At least two coexistence managers that serve white space/geo-location capable-objects (WSOs/GCOs) that may affect performance of each other.

profile: A statement of the procedures, messages, and parameters that are mandatory and that are optional for the implementation of an IEEE 802.19.1a compliant coexistence system entity.

registered location secure server (RLSS): An entity that accesses and manages a database that organizes storage of information by ~~geographic~~geo-location and securely holds the location and some operating parameters of one or more basic service sets (adapted from IEEE Std 802.11af™).

3.2 Acronyms and abbreviations

Insert the following acronyms and abbreviations in alphabetical order:

COE coordination enabler

EIRP equivalent isotropically radiated power

GCO geo-location capable object

SMDB spectrum management database

4. System description

4.1 System architecture

Change 4.1 as follows:

The A coexistence system defined in this draft standard has ~~three~~four logical entities (CE, COE, CM, CDIS) and ~~five~~seven logical interfaces (Interfaces A, B1, B2, B3, B4, B5 and C). Two independent coexistence

systems use one logical interface for information exchange, as shown in Figure 1. Each logical entity is defined by its functional roles and interfaces with other logical entities. System architecture is used to describe functional components of the coexistence system. The architectural descriptions are not intended to represent any specific physical implementation of the coexistence system.

The *coexistence discovery and information server* (CDIS) provides coexistence discovery service to the *coexistence managers* (CMs) it serves. Within this service the CDIS informs the CMs about potential neighbors of the *white space/geo-location capable objects* (WSOs/GCOs) served by these CMs. WSO is under an umbrella of GCO. Also, the CDIS supports the discovery of CMs by other CMs in order to open interfaces between them. In order to provide the coexistence discovery service, the CDIS obtains all necessary information and performs coexistence discovery. There can be a plural of CMs in one coexistence system.

The CM provides either information or management service to the WSO/GCOs it serves. Communication between the CM and the WSO/GCOs is performed via their *coexistence enablers* (CEs). Within the information service the CM provides the WSO/GCO information about its potential neighbors including their operating frequencies, potential interference levels, etc. Within the management service the CM provides the WSO/GCO reconfiguration requests that create such configuration of this WSO/GCO that its operation is improved according to some criteria. In order to provide these information and management coexistence services, the CM obtains all necessary information and makes coexistence decisions.

The CE is an interface element that represents one or several WSO/GCOs of the same type in the coexistence system.

The coordination enabler (COE) is an interface element that represents one or more CMs to communicate with the other COE in another independent coexistence system.

~~Interface B1 between a CE and a CM, interface B2 between a CM and a CDIS, and interface B3 between two CMs are specified in this standard.~~

Interface A between a CE and its WSO/GCO is defined in a generic format.

Interface B1 is between a CE and a CM. Interface B2 is between a CM and a CDIS. Interface B3 is between two CMs. Interface B4 is between a CM and a COE within the same coexistence system. Interface B5 is between two COEs in independent coexistence systems.

Interface C between a CM and a spectrum management database (SMDB)~~TVWS database~~ is not ~~defined~~specified in this standard and is implementation dependent. Thus the interface C is optional and is not utilized in the frequency band in which SMDB is not required. One of the implementation examples of the interface C is Protocol to Access ~~WS~~White Space database (PAWS) specification for TVWS operation.²

4.2 Reference model

Change the second, fourth, and sixth paragraphs as shown:

The COEX_TR_SAP provides means for a CE, a CM, a COE and a CDIS to communicate with each other and with external entities by using transport services provided by underlying layers.

The COEX_MEDIA_SAP defines the interface A between a CE and a WSO/GCO.

² For information on PAWS, go to <http://tools.ietf.org/wg/paws/>.

Typically, the radio interface is implemented in such a way that it provides a management interface for the WSO/GCO management entity. In Figure 3, such interface is represented by the PHY_ME_SAP, MAC_ME_SAP, and CS_ME_SAP, corresponding to the physical layer, the Media Access Control (MAC) sublayer, and the convergence sublayer. These SAPs can be used to obtain information from the radio interface and to request reconfiguration of the radio interface. Correspondingly, the CE can use these SAPs to implement interface A using the COEX_MEDIA_SAP. Communication between the radio interface management SAPs PHY_ME_SAP, MAC_ME_SAP, and CS_ME_SAP and the COEX_MEDIA_SAP is done via the WSO/GCO management entity. The WSO/GCO management entity provides the coexistence primitive mapping (CXPM) service. The CXPM converts COEX_MEDIA_SAP primitives into WSO/GCO-specific management/control primitives. A one-to-one mapping is highly desirable to fully support this standard, but feasibility of such an implementation depends on the standard the WSO/GCO complies with and the WSO/GCO implementation. The CXPM implementation is out of scope of this standard.

Change the title of Figure 5 as shown:

Figure 5—CM, COE and CDIS reference model

4.3 System profiles and interoperability

Change the first paragraph and insert a new item in the dashed list in 4.3 as shown:

The coexistence system has ~~three~~four logical entities: CDIS, CM, COE and CE. This standard defines several profiles determining operation of these entities.

However, profiles are designed in such way that the required level of interoperability is verified among entities operating according to different profiles. The defined profiles follow the following principles:

- Any CDIS shall be able to provide coexistence discovery service to any type of CM.
- Any CM shall be able to exchange information with any other type of CM.
- Any CM shall support at least one of the profiles specified in this specification.
- Any CM shall support both management service and information service.
- Any COE shall support at least one of the profiles specified in this specification.
- Any CE shall support at least one of the profiles specified in this specification.
- Any CE shall support at least management service or information service and may support both.

4.4 Coexistence services

Change 4.4 as shown:

4.4.1 Introduction

Coexistence services are services provided by the coexistence system to WSOs/GCOs as well as services provided by the CDIS to the CMs. Correspondingly, the categories of the coexistence services are services provided to WSOs/GCOs and services provided to CMs.

4.4.2 Services for WSOs/GCOs

The coexistence system provides coexistence services to a WSO/GCO via interface A. To obtain services from the coexistence system, a WSO/GCO needs to subscribe to the coexistence services and register to the coexistence system.

After the registration, the WSO/GCO may get information services and/or management services.

A WSO/GCO may be subscribed to only one service at a time.

Within the information service, the WSO/GCO gets a coexistence report from the coexistence system. Such coexistence report provides enough information to the WSO/GCO to make autonomous coexistence decisions on its operating parameters.

Within the management service, the WSO/GCO gets reconfiguration requests generated by the coexistence system. The WSO/GCO needs to provide information to the coexistence system while using this service. Also, the WSO/GCO needs to perform measurements according to requests from the coexistence system. Both the information and measurement reports are used by the coexistence system to make coexistence decisions.

4.4.3 Services for CM

The coexistence discovery service provides coexistence set information to the CM for WSO/GCOs served by this CM. Two types of coexistence discovery service are provided by the CDIS to the CM. With one type of service, the CM gets coexistence set information only for those WSO/GCOs that are served by other CMs. This is called *inter-CM coexistence discovery*. In this case, the CM performs intra-CM coexistence discovery by itself. With the other type of coexistence discovery service, the CM gets coexistence set information regardless of which CM serves the WSO/GCOs in the coexistence set. In this case the CDIS performs both inter-CM coexistence discovery and intra-CM coexistence discovery.

4.5 Coexistence algorithms

4.5.1 Introduction

Change the second and third paragraphs in 4.5.1 as shown:

Coexistence discovery algorithms are used by CDIS and CM to discover WSO/GCOs that may affect each other performance.

Coexistence decision algorithms are used by a CM to make coexistence decisions related to WSO/GCO reconfiguration.

4.5.3 Coexistence decision algorithms

Change 4.5.3.8 to 4.5.3.10 as follows:

4.5.3.8 Algorithm based on load balancing

The processing load balancing algorithm uses the distributed processing power of the CMs effectively and maximizes the number of the registered ~~WSOs~~GCOs in accordance with the conditions of the coexistence system operation. The key component is to adapt different channel selection policies, which are centralized coordination by the master CM, cooperative coordination between CM and ~~WSOGCO~~ itself and autonomous/distributed coordination by different CMs, to the conditions of the coexistence system operation.

In the centralized coordination method, the master CM makes final decisions on channel selections for its ~~WSOGCOs~~ and for all ~~WSOs~~GCOs of its slave CMs. With the cooperative coordination method the CM has capability to ask ~~WSOs~~GCOs to make final decisions required for coexistence. In the autonomous/distributed coordination method the CM individually makes final decisions on channel selections for its ~~WSOs~~GCOs.

4.5.3.9 Algorithm based on output power control

The output power level control algorithm addresses the aggregated interference problem in the target protection service contour due to the multiple simultaneous transmission of coexistence set elements. The calculation basis may be applicable in conducting an information service on a potential aggregated interference power level, or a management service on power control of ~~WSOs~~GCOs.

4.5.3.10 Algorithm based on co-channel sharing via ~~WSOGCO~~ network geometry classification

The co-channel sharing via ~~WSOGCO~~ network geometry classification algorithm optimizes the efficiency of the frequency utilization as much as possible in managing ~~TVWS operation~~GCOs operating under general authorization, in a case where the system cannot assign different channel among ~~WSOs~~GCOs in a coexistence set. The key processing parts, which are conducted in CDIS or CM, are as follows:

- Coexistence discovery process based on network geometry classification
- Network coexistence protocol check process
- Interference power level check process
- Backhaul connection check process

Insert the following new subclauses, 4.5.3.11 to 4.5.3.22, after 4.5.3.10:

4.5.3.11 Algorithm for centralized control of energy detection

There are GCOs that employ energy detection, i.e., the measurement of signal energy to check the availability of spectrum before utilizing the spectrum for transmission. Through such listen-before-talk procedure, the interference among GCOs can be avoided to a certain extent. A higher detection threshold leads to less protection to other coexisting GCOs but gives a higher probability of obtaining the spectrum. The centralized control of the energy detection algorithm adjusts the threshold of different GCOs to control the spectrum utilization and interference condition of coexisting GCOs.

4.5.3.12 Algorithm for interference alignment based coexistence management

The interference alignment based coexistence management algorithm optimizes the spectrum utilization of multiple GCOs by considering the interference leakage from each GCO to the others. By adjusting the weight factor on the interference leakage, the algorithm can provide a better performance for a high-priority GCO than that of a low-priority GCO.

4.5.3.13 Algorithm for successive interference cancellation coordination

Utilizing the receiver's information and the geolocation information, the algorithm can decide the order of interference cancellation at each individual GCO to improve the demodulation performance in the presence of coexisting GCOs. For those GCO receivers close to the interferer, the interference signal is demodulated first. And for those GCO receivers far from the interferer, the desired signal is demodulated directly.

4.5.3.14 Coexistence management considering spectrum release

When one of the low-priority GCO finishes the spectrum utilization before the validity time of the available spectrum, this spectrum resource can be released. In such situations, the aggregate interference at the reference point of the high-priority GCOs is reduced. The algorithm controls the spectrum reallocation by considering the relationship of the spectrum utilization and the contribution to the total interference at the reference point.

4.5.3.15 Algorithm for coexistence management over region by controlling number of co-channel GCOs

The algorithm controls the maximum number of GCOs over a given region. Given the expected QoS from the GCOs, the CM can determine the maximum number of GCOs and the minimum number of assigned channels to GCOs while achieving a satisfactory QoS of individual GCO and sum capacities of GCOs.

4.5.3.16 Algorithm for coexistence management with spectrum request modification

When aggregate interference based calculation method is used, the available channels would be different when different GCOs request the available spectrum. The algorithm can optimize the grouping of GCOs in order to obtain the maximum available spectrum and suggest the spectrum request of GCOs.

4.5.3.17 Algorithm for low-complexity resource reassignment for coexistence management

The algorithm reassigns the spectrum utilization of GCOs in order to achieve the maximum spectrum efficiency. The GCOs exchange their spectrum following instruction by the algorithm in a manner that the number of changes is minimized.

4.5.3.18 Algorithm for spectrum allocation of system spectrum with different priority levels

This algorithm allocates spectrum of high-priority GCO while considering the interference relationship between the high- and low-priority systems, thus increasing the spectrum of the low-priority system.

4.5.3.19 Algorithm for spectrum allocation based on graph information

The algorithm makes spectrum allocation of GCOs that have different QoS requirements. Graph is used to describe the interference relationship among GCOs. The weight of the graph edge takes into account the desired QoS of different GCOs.

4.5.3.20 Algorithm for GCOs operating over overlapped service coverage area

This algorithm provides a method for avoiding interference among GCOs operating over overlapped service coverage area according to a distribution state of master GCOs (i.e., APs) and slave GCOs (i.e., STAs) in a master GCO constituting an overlapping service coverage area [i.e., overlapping basic service set (OBSS)].

4.5.3.21 Algorithm for spectrum allocation considering interference aggregation effect at reference points

This algorithm considers the interference aggregation effect at a common reference point of multiple GCOs. Using the spectrum allocation coefficient parameter to describe such effect, the algorithm avoids allocating the same spectrum for any pair of the GCOs that have a relatively high spectrum allocation coefficient value.

4.5.3.22 Algorithm for coexistence service based on frequency utilization pattern

This algorithm presents a coexistence service scheme that ranks frequencies based on frequency utilization pattern of GCOs. The frequency utilization pattern captures the behavioral pattern on the frequency usage of GCOs. The following subclauses describe the definition of the frequency utilization pattern, followed by estimation and utilization of such information to do resource allocation. At the last subclause, procedure of associated resource allocation algorithm is introduced.

4.5.4 Other algorithms related to coexistence

4.5.4.2 Temporarily released resource

Insert the following new subclauses, 4.5.4.3 to 4.5.4.5, after 4.5.4.2:

4.5.4.3 Proxy coexistence service

The proxy coexistence service algorithm provides coexistence service for moving GCO by establishing connection between the serving CM of moving GCO managing the GCO-located region and the CMs managing the adjacent region. In case of CM managing region by region, moving GCO has to change its serving CM, and the candidate serving CM might not be able to serve the GCO newly due to such as its capacity. In proxy coexistence service, the previous serving CM can provide information service to the moving GCO on behalf of the CM that should manage the GCO.

4.5.4.4 Algorithm for priority based coexistence management

This algorithm presents a fine-grained resource allocation solution that ranks frequencies to be used for a certain GCO according to prospective impact of their usage to higher priority GCOs. The metric of interest

in the algorithm is the interference incurred to higher priority GCOs when the frequency is used by the target GCO with a pre-assumed power level.

4.5.4.5 Algorithm for selection of candidate serving CMs for moving GCOs

This algorithm designs a way to select and provide the information of candidate serving CMs to moving GCOs. The information of candidate serving CMs can be updated at least as often as the mobility information update from the GCO to the CM.

5. Procedures and protocols

5.1 General

Change the following paragraph as shown:

This clause defines typical procedures and protocols among coexistence system entities (CE, CM, COE and CDIS) and with external entities (~~TVWS-database~~SMDB and WSO/GCO). Data types are defined in Annex A, primitives between a CE and a WSO/GCO are defined in Annex B, messages between coexistence system entities are defined in Annex C. The coexistence system entities shall use TCP/IP in all the exposed interfaces B1, B2 ~~and~~, B3, B4, and B5 to communicate with peer entities. The entities shall support both the Secure Shell (SSH) protocol and the Transport Layer Security (TLS) protocol in all the exposed interfaces.

5.2 Procedures

5.2.14 Inter-CM information exchange procedures

Insert the following new subclauses, 5.2.15 to 5.2.20, after 5.2.14:

5.2.15 CM association procedure

A CE shall perform this procedure to start communicating with CM when the CE is not associated with any of CMs or CE needs to change its serving CM. An illustrative example of this procedure is shown in Figure 46. **CMAssociationRequest** and **CMAssociationResponse** messages are defined in Annex C.

Prior to starting the procedure, CE needs to get association information such as the IP address of CM. Annex D provides examples of how to get the information.

In order to start the procedure, CE shall generate a **CMAssociationRequest** message and send this message to CM. CE operations related to generating and sending a **CMAssociationRequest** message are specified in 6.4. After CM has received a **CMAssociationRequest** message from CE, CM shall make a decision, shall generate a **CMAssociationResponse** message, and shall send this **CMAssociationResponse** message to CE. CM operations related to generating and sending a **CMAssociationResponse** message are specified in 6.3. After CE has received a **CMAssociationResponse** message from CM, CE shall process the **CMAssociationResponse** message. CE operations related to processing a **CMAssociationResponse** message are specified in 6.4.

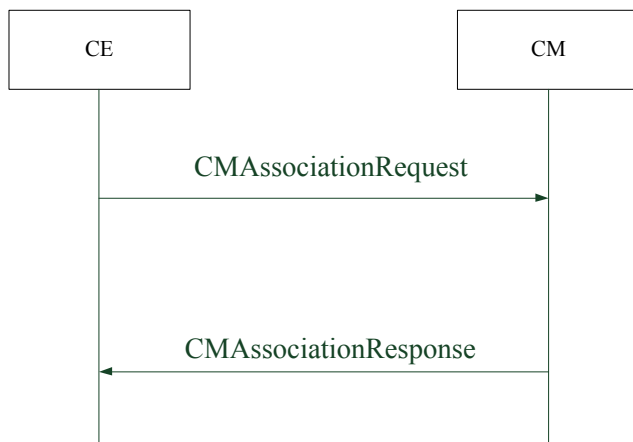


Figure 46—CM association procedure

5.2.16 Inter-CM association procedure

A CM (CM1) shall initiate this procedure to start communicating with the other CM (CM2) that is communicating with a CDIS that is different from the one that CM1 is communicating with. Prior to starting 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 47.

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

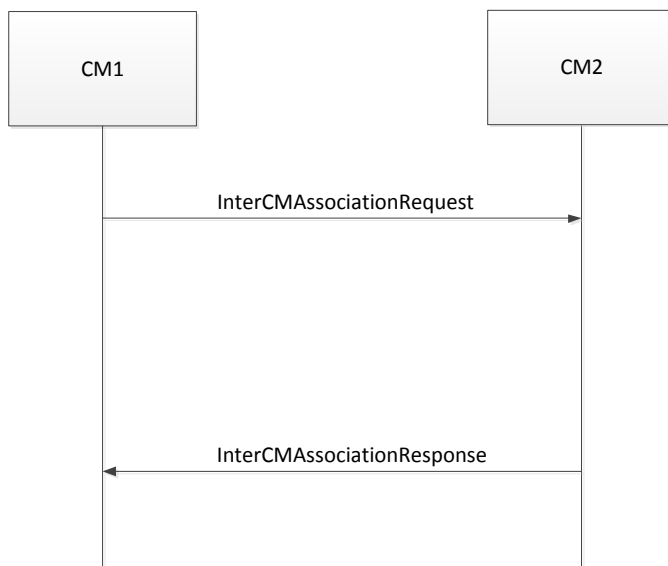


Figure 47—Inter-CM association procedure

5.2.17 Inter-CM association procedure over coordination enabler

A CM (CM1) shall initiate this procedure to start communicating with CM within a different coexistence system (CM2) when the CM1 needs to exchange information with the CM2. Prior to starting 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 48.

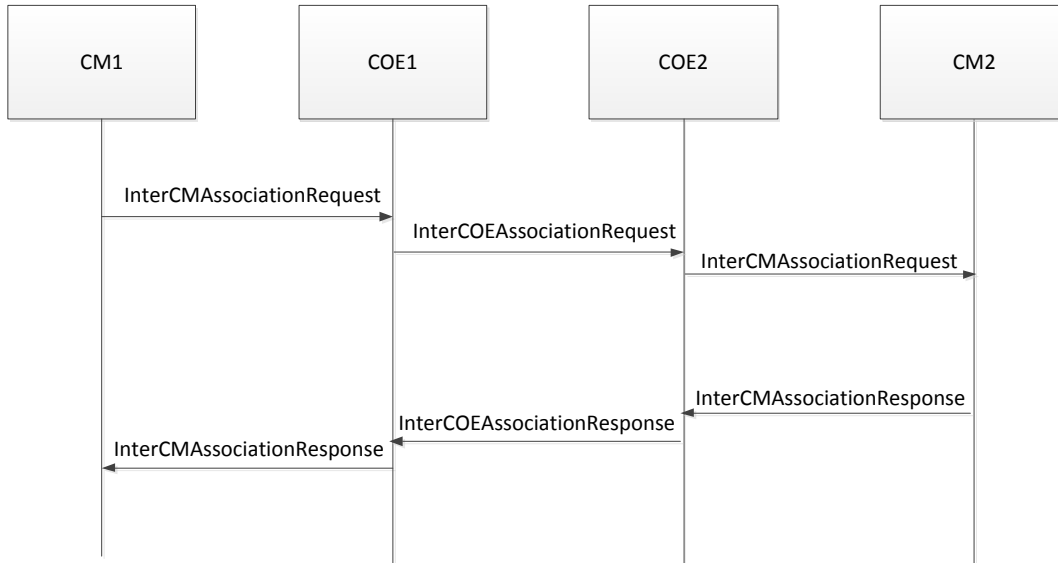


Figure 48—Inter-CM association procedure over coordination enabler

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

5.2.18 Obtaining operating frequency information procedure

A CM (CM1) shall initiate this procedure to start communicating with the other CM (CM2) that is communicating with a CDIS that is different from the one that CM1 is communicating with. An illustrative example of this procedure is shown in Figure 49.

CM1 shall generate an *OperatingFreqInformationRequest* message and send this message to CM2. After CM2 has received an *OperatingFreqInformationRequest* message from CM1, CM2 shall process this *OperatingFreqInformationRequest*. After that CM2 shall generate an *OperatingFreqInformationResponse* message and shall send this *OperatingFreqInformationResponse* message to CM1. After CM1 has received an *OperatingFreqInformationResponse* message from CM2,

CM1 shall process this *OperatingFreqInformationResponse* message. CM operations related to generating and sending these messages are specified in 6.3.

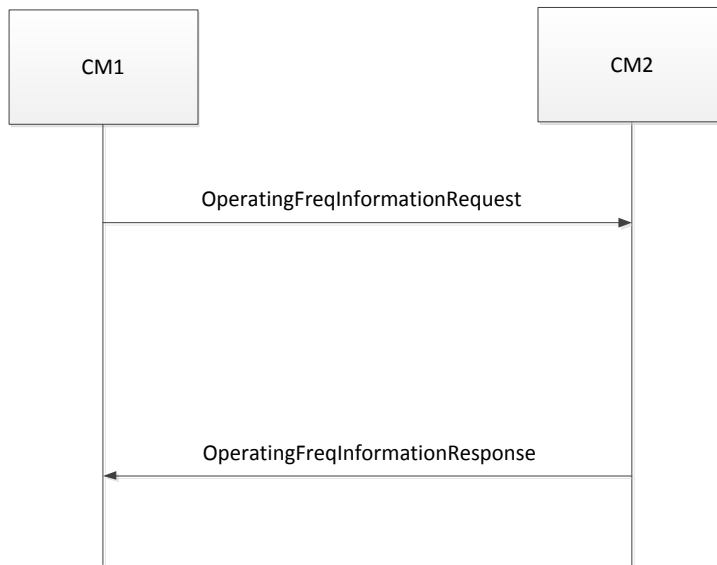


Figure 49—Obtaining operating frequency information procedure over coordination enabler

5.2.19 Obtaining operating frequency information procedure over coordination enabler (COE)

A CM (CM1) shall initiate this procedure to obtain operating frequency information from CM within a different coexistence system (CM2). An illustrative example of this procedure is shown in Figure 50.

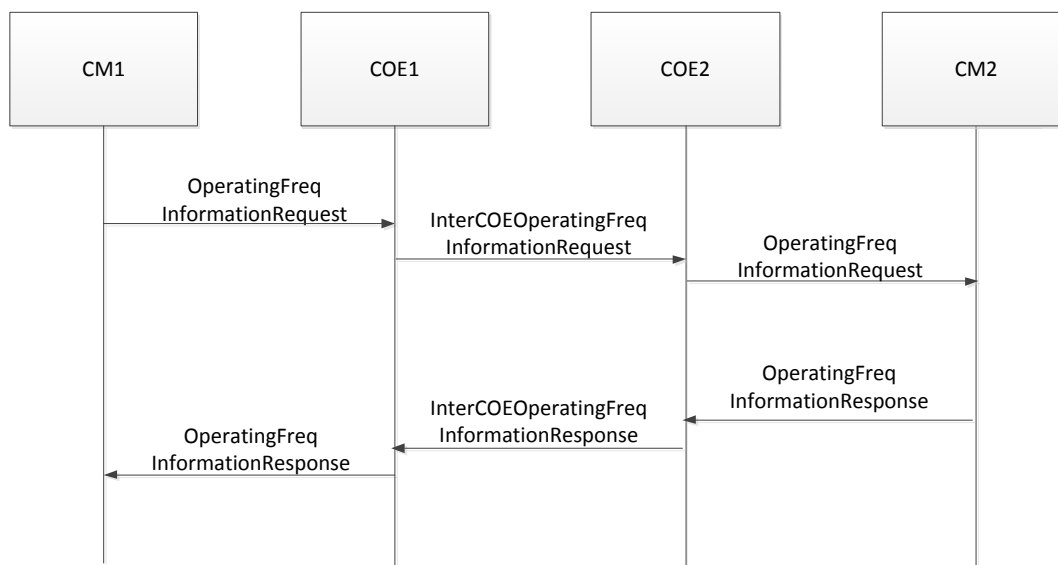


Figure 50—Obtaining operating frequency information procedure over coordination enabler

CM1 shall generate an *OperatingFreqInformationRequest* message and send this message to COE1. After COE1 has received an *OperatingFreqInformationRequest* message from CM1, COE1 shall process this *OperatingFreqInformationRequest*. After that COE1 shall generate an *InterCOEOperatingFreqInformationRequest* message and shall send this

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

5.2.20 Proxy coexistence service procedure

A CE shall perform the proxy coexistence procedure to start communicating with CM when the CE needs to obtain coexistence report information from the non-serving CM. An illustrative example of this procedure is shown in Figure 51. **CEProxyCoexistenceServiceRequest**, **CMProxyCoexistenceServiceRequest**, and **CoexistenceReportResponse** messages are defined in Annex C.

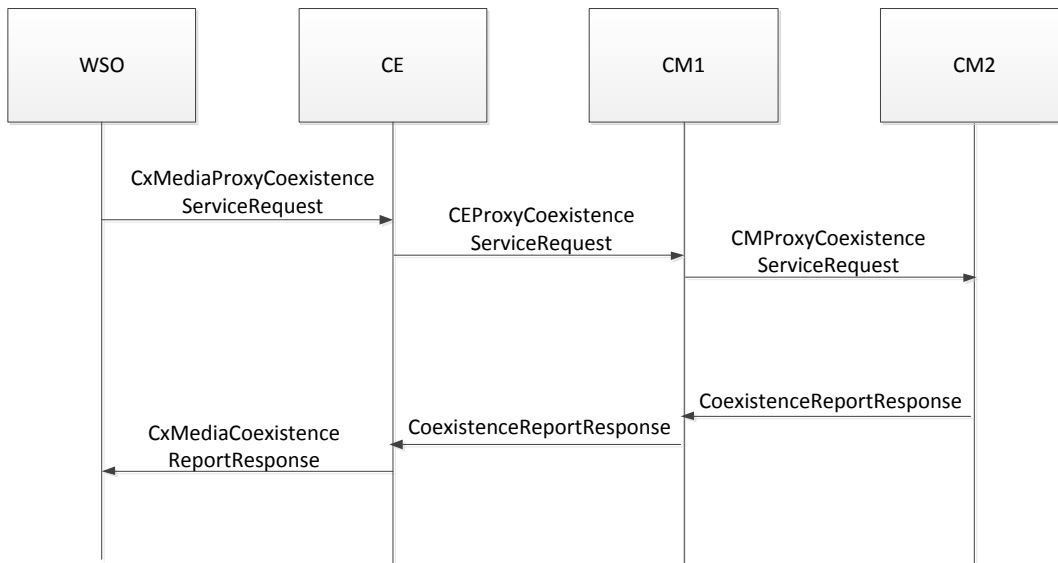


Figure 51—Proxy coexistence service procedure

After the CE receives a primitive request for a proxy coexistence service report from the GCO, the CE shall generate a **CEProxyCoexistenceServiceRequest** message and send this message to the CM1. The CE operations related to generating and sending a **CEProxyCoexistenceServiceRequest** message are specified in 6.4.

After the CM1 receives a **CEProxyCoexistenceServiceRequest** message from the CE, the CM1 shall generate a **CMProxyCoexistenceServiceRequest** message, and shall send this **CMProxyCoexistenceServiceRequest** message to the CM2. The CM operations related to generating and sending message **CMProxyCoexistenceServiceRequest** are specified in 6.3.

After the CM2 receives a **CMProxyCoexistenceServiceRequest** message from the CM1, the CM2 shall generate a **CoexistenceReportResponse** message and shall send this **CoexistenceReportResponse** message

to the CM1. After the CM1 has received a **CoexistenceReportResponse** message from the CM2, the CM1 shall generate a **CoexistenceReportResponse** message and shall send this **CoexistenceReportResponse** message to the CE. The CM operations related to generating and sending a **CoexistenceReportResponse** message are specified in 6.3.

After the CE receives a **CoexistenceReportResponse** message from the CM1, the CE shall send the received coexistence report to the GCO. The CE operations related to receiving the **CoexistenceReportResponse** message and sending the coexistence report to the GCO are specified in 6.4.

6. Entity operation

6.1 Common operation

6.1.1 sport SAP operation

6.1.1.1 General operation

Change the first and third paragraphs, and renumber figure as shown:

The COEX_TR_SAP provides means for a CE, a COE, a CM, and a CDIS to communicate with each other and with external entities by using underlying transport service.

~~Figure 46~~ Figure 52 illustrates operation of the COEX_TR_SAP.

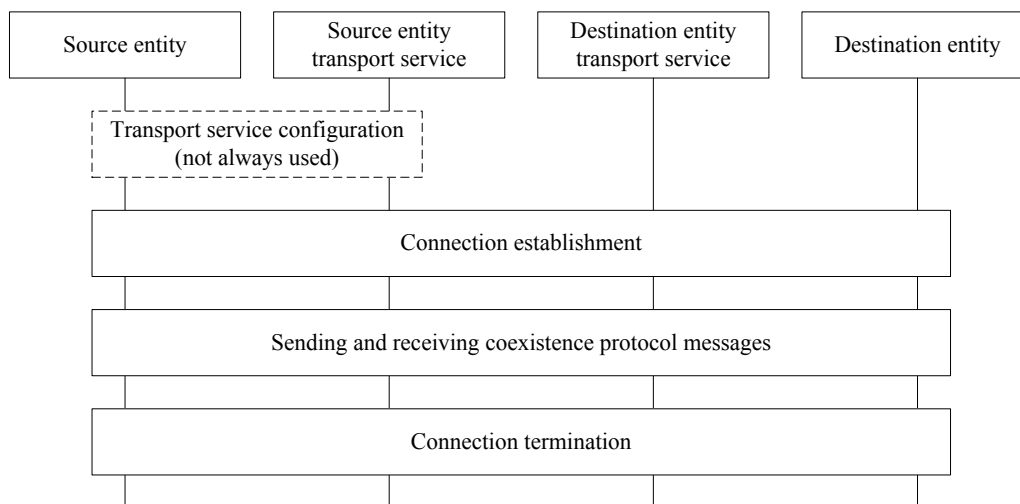


Figure 4652—COEX_TR_SAP operation

6.1.1.2 Transport service configuration

Change the third, sixth, and ninth paragraphs, figure caption, and table as shown:

This refers to the following connection establishment cases:

- From CE to CM
- From CM to CDIS

- From CM to ~~TVWS database (DB)~~ spectrum management database (SMDb)
- From CM to other CM
- From CM to COE
- From COE to COE
- From CDIS to other CDIS

~~Figure 47~~Figure 53 shows COEX_TR_SAP operation during transport service configuration.

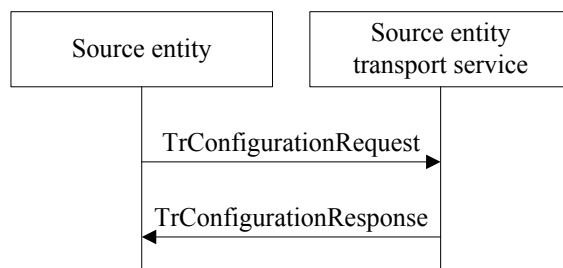


Figure 4753—COEX_TR_SAP operation during transport service configuration

The following table shows expected parameters of the *TrConfigurationResponse* primitive.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<i>destinationID</i>	<i>CxID</i>	Value of the <i>destinationID</i> parameter from the sent <i>TrConfigurationRequest</i> primitive.
<i>status</i>	<i>Status</i>	~~<i>noError</i>~~ <u><i>Status</i></u>

6.2 CDIS operation

6.2.2 Profile 1

6.2.2.1 General description

Change the second, fourth, seventh through ninth paragraphs, and figure title, as shown:

Each state represents the following:

- Inactive: the state where it is impossible to set up any interfaces with other ~~IEEE 802.19.1 entities in coexistence system~~. The inactive state goes to the active state when initialization process is finished.
- Active: the state where it is possible to set up interface with other ~~IEEE 802.19.1 entities in coexistence system~~. The Active state goes to the inactive state when shutdown process is finished.
- Engaged: the state where two entities are ready to communicate with each other by exchanging messages.
- Request sent: the state where the request has been sent from home entity to remote entity, and the home entity is waiting for response from the remote entity.
- Request received: the state where the request has been received from remote entity to home entity, and home entity is waiting for the completion of the request.

A flowchart of CDIS operation is shown in Figure 5458.

If the CDIS received a registration request from a CM, a CDIS shall perform GCO~~WSO~~ registration procedure and go back to the engaged state.

After GCO~~WSO~~ registration, if the CM is subscribed for discovery service of inter-CM coexistence discovery only, the CDIS shall execute a coexistence discovery for inter-CM domain only. Otherwise, the CDIS shall execute a coexistence discovery for both intra-CM and inter-CM domain.

If the CDIS received updated registration information from registered CMs, the CDIS shall perform GCO~~WSO~~ registration update procedure, and go back to the engaged state. After GCO~~WSO~~ registration update, the CDIS shall execute coexistence discovery based on the type of discovery service of the CM.

6.2.2.2 CM subscription

Change the sixth paragraph as shown:

The following table shows the parameters in the *subscriptionResponse* payload.

Parameter	Data type	Description
<i>status</i>	~~CxMediaStatus~~	Status

6.2.2.3 CM subscription update

Change the sixth paragraph as shown:

The following table shows the parameters in the *subscriptionResponse* payload.

Parameter	Data type	Description
<i>status</i>	~~CxMediaStatus~~	Status

Change title, first, and fourth paragraphs of 6.2.2.4 as shown:

6.2.2.4 GCO~~WSO~~ registration

To register GCO~~WSO~~ to CDIS, a CM shall perform the GCO~~WSO~~ registration procedure as shown in 5.2.2.1.

The following table shows the parameters in the *cmRegistrationRequest* payload.

Parameter	Data type	Description
<i>operationCode</i>	<i>OperationCode</i>	Operation code (new, modify, remove)
<i>ceID</i>	<i>CxID</i>	CE ID
<i>networkID</i>	<i>OCTET STRING</i>	Identifier of the network that the <u>GCO</u> ~~WSO~~ represents. As an example, in the case of IEEE 802.11™, this parameter contains the BSSID used by the <u>GCO</u> ~~WSO~~ .
<i>networkTechnology</i>	<i>NetworkTechnology</i>	Indicates the radio access technology that the <u>GCO</u> ~~WSO~~ uses.
<i>networkType</i>	<i>NetworkType</i>	Indicates network type as specified in regulations.
<i>discoveryInformation</i>	<i>DiscoveryInformation</i>	Discovery information of the <u>GCO</u> ~~WSO~~ .
<i>listOfSupportedChNumbers</i>	<i>SEQUENCE OF INTEGER</i>	List of supported channel number.

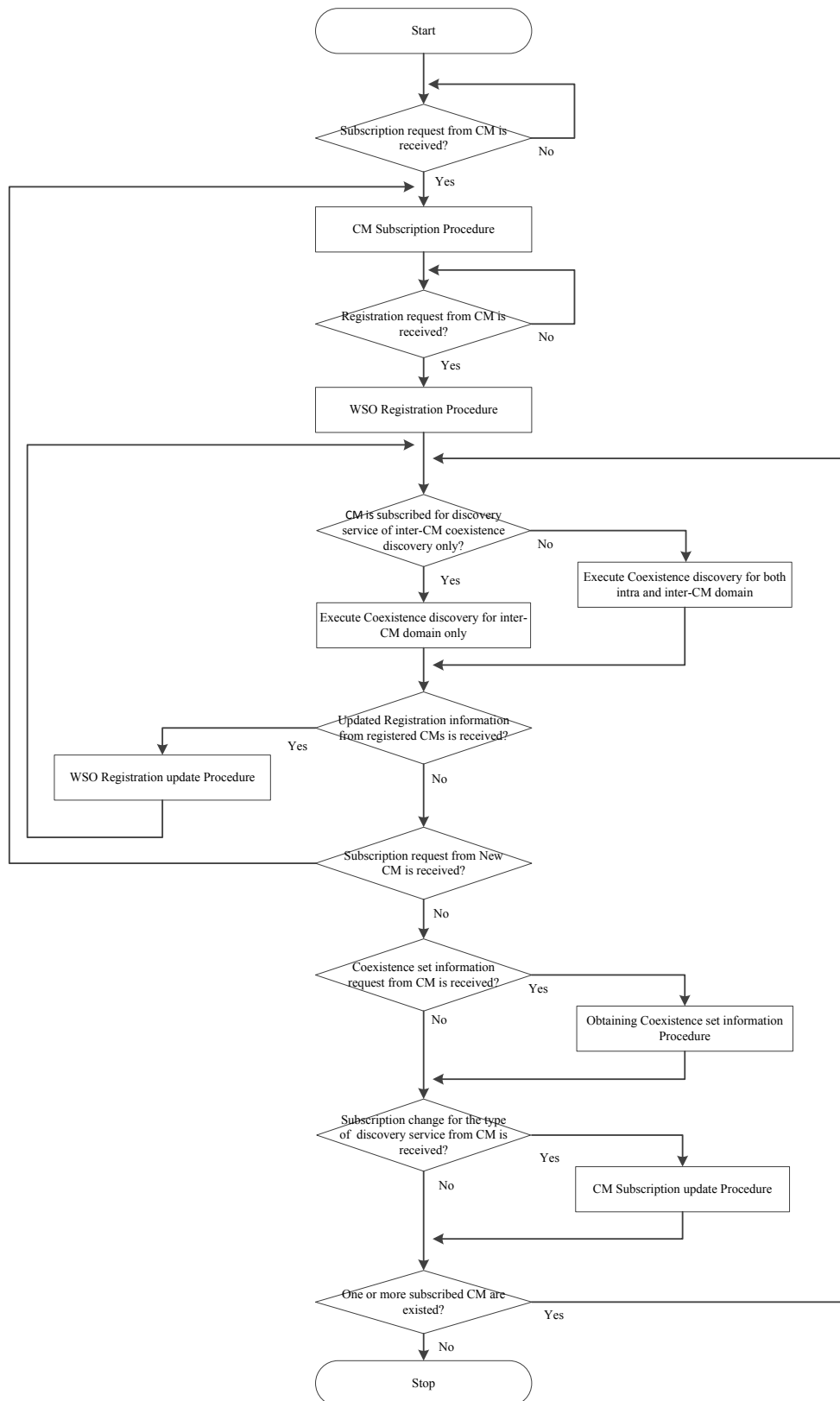


Figure 5258—CDIS operation

Change the title, first, and fourth paragraphs in 6.2.2.5 as shown:

6.2.2.5 **GCO~~WSO~~** registration update

To do the registration update, a CM shall perform the **GCO~~WSO~~ registration update procedure** as shown in 5.2.2.2.

The following table shows the parameters in the *cmRegistrationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
operationCode	OperationCode	Operation code (new, modify, remove)
ceID	CxID	CE ID
networkID	OCTET STRING	Identifier of the network that the GCO~~WSO~~ represents. As an example, in the case of IEEE 802.11, this parameter contains the BSSID used by the GCO~~WSO~~ .
networkTechnology	NetworkTechnology	Indicates the radio access technology that the GCO~~WSO~~ uses.
networkType	NetworkType	Indicates network type as specified in regulations.
discoveryInformation	DiscoveryInformation	Discovery information of the GCO~~WSO~~ .
listOfSupportedChNumbers	SEQUENCE OF INTEGER	List of supported channel number.

6.2.2.6 Coexistence set information

Change the fourth, and sixth through eighth paragraphs as shown:

The following table shows the parameters in the *coexistenceSetInformationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
listOfNetworkID	SEQUENCE OF OCTET STRING	Network ID list of GCO~~WSO~~ for which coexistence set information is requested

The following table shows the parameters of the each element of the sequence in the *coexistenceSetInformationResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
networkID	OCTET STRING	GCO~~WSO~~ for which coexistence set information is requested
listOfneighborCM	ListOfNeighborCM	Shall be set to indicate the list of neighbor CMs (see the following)

The following table shows the data type of the each element of the sequence in the *listOfneighborCM* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
neighborCMID	CxID	Neighbor CM ID
listOfCoexSetElement	ListOfCoexSetElement	Shall be set to indicate the list of neighbor GCO~~sWSO~~ (see the following)

The following table shows the data type of the each element of the sequence in the *listOfCoexSetElement* parameter.

<i>Parameter</i>	<i>Date type</i>	<i>Description</i>
networkID	OCTET STRING	Neighbor network ID.
networkTechnology	NetworkTechnology	Neighbor WSO network technology.

6.2.4 Profile 3

Change 6.2.4.1 through 6.2.4.4 and insert new text as follows:

6.2.4.1 General description

A CDIS that operates as per Profile 3 shall support the following procedures:

- ~~WSOGCO~~ registration
- ~~WSOGCO~~ registration update
- Obtaining coexistence set information

A high-level flowchart of the CDIS operation is provided in Figure ~~5460~~.

After receiving a CM registration/update request, a CDIS shall perform the ~~WSOGCO~~ registration (update) procedure and store/update the subject CM information. When a coexistence set information request is received from the subject CM and its operation code shows new or update, CDIS shall perform the obtaining coexistence set information procedure. When coexistence set information request is received from the subject CM and its operation code shows delete, CDIS shall check whether or not the number of registered CMs is larger than 1. If the number of registered CMs is none, the CDIS may stop the operation.

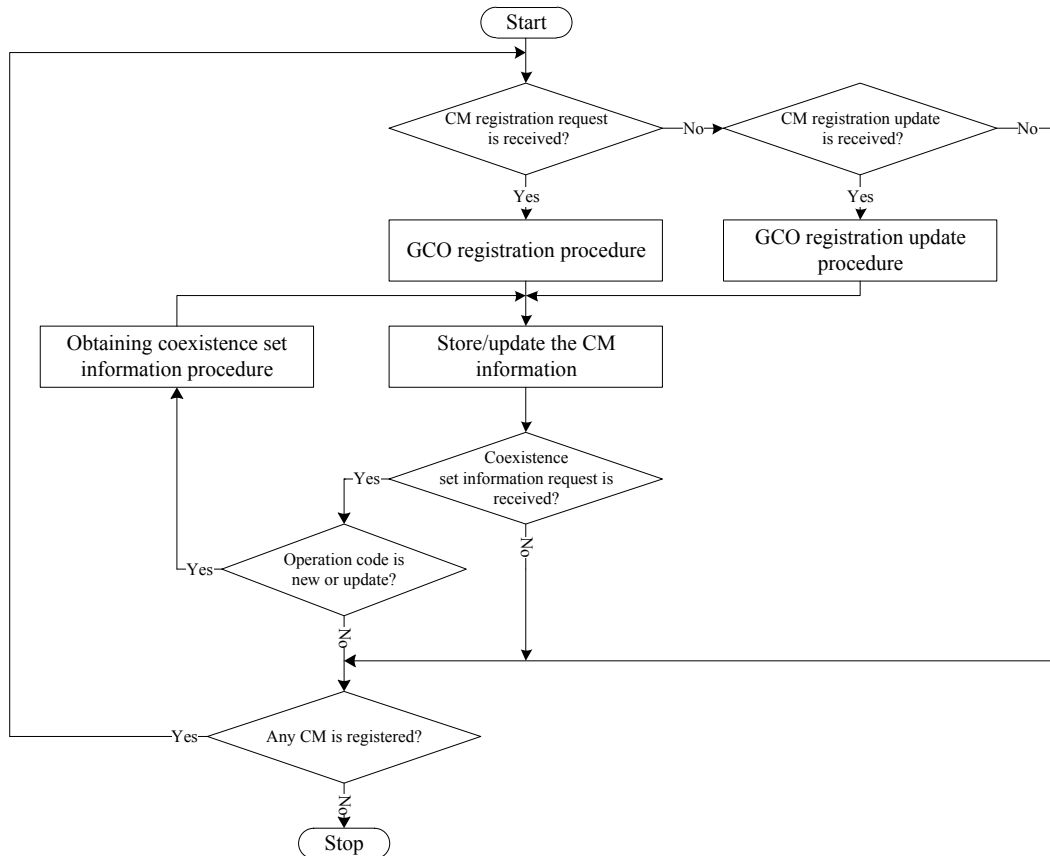


Figure ~~5460~~—High-level flowchart of the CDIS operation

6.2.4.2 **WSOGCO** registration

After the CDIS has received a **CMRegistrationRequest** message from a CM indicating new registration, the CDIS shall perform the **WSOGCO** registration procedure described in 5.2.2.1. The CDIS shall generate and send the **RegistrationResponse** message to the CM.

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

Parameter	Data type	Value
header	CxHeader	requestID
payload	CxPayload	registrationResponse

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

Parameter	Data type	Value
status	CxMediaStatus	statusStatus
registrationUpdateDuration	REAL	Optionally present. This value shall be set to indicate the registration update duration if the duration is needed to be changed.

6.2.4.3 **WSOGCO** registration update

After the CDIS has received a **CMRegistrationRequest** message from a CM indicating registration update, the CDIS shall perform the **WSOGCO** registration update procedure described in 5.2.2.1. The CDIS shall generate and send the **RegistrationResponse** message to the CM.

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

Parameter	Data type	Value
header	CxHeader	requestID
payload	CxPayload	registrationResponse

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

Parameter	Data type	Value
status	CxMediaStatus	status
registrationUpdateDuration	REAL	Optionally present. This value shall be set to indicate the registration update duration if the duration is needed to be changed.

6.2.4.4 Obtaining coexistence set information

After the CDIS has received a **CoexistenceSetInformationRequest** message from a CM, the CDIS shall perform the obtaining coexistence information procedure described in 5.2.2.2. The CDIS shall generate and send the **CoexistenceSetInformationResponse** message to the CM.

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

Parameter	Data type	Value
headerHeader	CxHeader	requestID
payloadPayload	CxPayload	coexistenceSetInformationResponse

The following table shows ~~CxMessage~~ fields in **CoexistenceSetInformationResponse** payload elements.

Parameter	Data type	Value
networkID	OCTET STRING	Subject network ID for coexistence set information
~~listOfNeighborCMs~~ listOfNeighborCMs	~~ListOfNeighborCMs~~ ListOfNeighborCMs	Shall be set to indicate the list of neighbor CMs as specified in following table.
listOfMasterCMCandidate	ListOfMasterCMCandidate	Shall be set to indicate the list of master CM candidates as specified in following table.

The following table shows ~~ListOfNeighborCMs~~**ListOfNeighborCMs** parameter element.

Parameter	Data type	Value
cmID	~~exIDCxID~~	Shall be set to indicate CM ID
listOfNeighborCEs	ListOfNeighborCEs	As shown in following table

The following table shows ~~ListOfNeighborCEs~~**ListOfNeighborCEs** parameter element.

Parameter	Data type	Value
~~emIDceID~~	~~exIDCxID~~	Shall be set to indicate CE ID
~~listOfNeighborWSOs~~ listOfNeighborGCOs	~~ListOfNeighborWSOs~~ ListOfNeighborGCOs	Shall be set to indicate the list of information of neighbor GCOs as shown in the following table.

The following table shows ~~ListOfNeighborWSOs~~**ListOfNeighborGCOs** parameter element.

Parameter	Data type	Value
~~wsIDgcoID~~	OCTET STRING	Shall be set to indicate ~~WSO~~ GCO ID
networkTechnology	NetworkTechnology	Shall be set to indicate network ~~Network~~ technology
networkGeometryClass	NetworkGeometryClass	As shown in following table Shall be set to indicate the network geometry class as described in 7.2.2.10.2.
listOfAvailableFrequencies	ListOfAvailableFrequencies	Shall be set to indicate the list of frequency information that is available at the location of the subject GCO as shown in following table.
listOfOperatingFrequencies	ListOfOperatingFrequencies	Shall be set to indicate the list of operating frequency information that the subject GCO uses as shown in following table.
spectrumTransitionCapability	BOOLEAN	Shall be set to indicate whether the spectrum transition is supported by the GCO or not.

The following table shows **ListOfAvailableFrequencies** parameter element.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u>timestamp</u>	<u>GeneralizedTime</u>	Shall be set to indicate the time of obtaining available frequency by GCO, if available.
<u>frequencyRange</u>	<u>FrequencyRange</u>	Shall be set to indicate the available frequency range.
<u>txPowerLimit</u>	<u>REAL</u>	Shall be set to indicate the power limit in the available frequency range.
<u>availableStartTime</u>	<u>GeneralizedTime</u>	Shall be set to indicate start time of the available frequency range if applicable.
<u>availableDuration</u>	<u>REAL</u>	Shall be set to indicate duration of the available frequency range if applicable.
<u>availableStopTime</u>	<u>GeneralizedTime</u>	Shall be set to indicate stop time of the available frequency range if applicable.
<u>maxTotalBandwidth</u>	<u>REAL</u>	Shall be set to indicate maximum total bandwidth of one channel, if available
<u>maxContiguousBandwidth</u>	<u>REAL</u>	Shall be set to indicate maximum channel bandwidth that can be used contiguously, if available
<u>resolutionBandwidth</u>	<u>REAL</u>	Shall be set to indicate resolution bandwidth if available
<u>typeOfAvailablefrequency</u>	<u>TypeOfFrequency</u>	Shall be set to indicate the type of available frequency if the regulator specifies. The details are shown in Annex A.
<u>locationValidity</u>	<u>REAL</u>	Shall be set to indicate radius of the circle centered on the reported geo-location of the GCO, outside of which the available frequencies are not valid, if this parameter is available.
<u>aggInterfControlParam</u>	<u>AggregatedInterferenceControlParameters</u>	Shall be set to indicate the parameters of aggregate interference control if available as specified in following table.

The following table shows *AggregatedInterferenceControlParameters* parameter element.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u>referencePointID</u>	<u>INTEGER</u>	Shall be set to indicate reference ~~Reference~~ point ID to be protected in controlling aggregated interference from the other ~~WSOGCO~~ (s) if available
<u>installationParameters</u>	<u>InstallationParameters</u>	Shall be set to indicate installation parameters of reference point
<u>geolocation</u>	<u>Geolocation</u>	Geolocation information of the reference point ID
<u>#CS</u>	<u>REAL</u>	Adjacent Channel Selectivity of the reception to be protected at the

		reference point if available
<i>aCLR</i>	<i>REAL</i>	Referenced adjacent channel leakage ratio if available
<i>antennaHeight</i>	<i>REAL</i>	Potential antenna height of the reception to be protected if available
<i>antennaGain</i>	<i>REAL</i>	Potential antenna gain of the reception to be protected at the reference point if available
<i>protectionRatio-ratio</i>	<i>REAL</i>	Shall be set to indicate the protection ratio of the reception to be protected at the reference point for the frequency if available.

The following table shows ***InstallationParameters*** parameter element.

<u><i>Parameter</i></u>	<u><i>Data type</i></u>	<u><i>Value</i></u>
<i>geolocation</i>	<i>Geolocation</i>	Shall be set to indicate the geolocation of reference point antenna.
<i>antennaCharacteristics</i>	<i>AntennaCharacteristics</i>	Shall be set to indicate the antenna characteristics
<i>eirpCapability</i>	<i>REAL</i>	Not used here.
<i>aclr</i>	<i>REAL</i>	Not used here.
<i>guaranteedQoSOfBackhaulConnection</i>	<i>GuaranteedQoSOfBackhaulConnection</i>	Not used here.
<i>receiverInfo</i>	<i>ReceiverInfo</i>	Shall be set to indicate receiver information if available.
<i>indoorDeployment</i>	<i>BOOLEAN</i>	Shall be set to indicate whether the GCO is deployed indoor if the regulatory rule (e.g., C.F.R Part 96) requires. In other cases, this parameter may be set. True: indoor False: outdoor

The following table shows ***ReceiverInfo*** parameter element.

<i>receiverType</i>	<i>ReceiverType</i>	Shall be set to indicate receiver type if available.
<i>modulationType</i>	<i>ModulationType</i>	Shall be set to indicate modulation type if available.
<i>filterCharacteristics</i>	<i>FilterCharacteristics</i>	Shall be set to indicate filter characteristics if available.
<i>tolerableInterferenceLevel</i>	<i>REAL</i>	Shall be set to indicate tolerable interference level of the receiver if available.

The following table shows ***Geolocation*** parameter element.

<u><i>Parameter</i></u>	<u><i>Data type</i></u>	<u><i>Value</i></u>
<i>coordinates</i>	<i>Coordinates</i>	Shall be set to indicate the coordinates of GCO, if available.

The following table shows ***Coordinates*** parameter element.

<u>Parameter</u>	<u>Data type</u>	<u>Value</u>
<u>longitude</u>	<u>REAL</u>	Shall be set to indicate the longitude of GCO.
<u>latitude</u>	<u>REAL</u>	Shall be set to indicate the latitude of GCO.
<u>altitude</u>	<u>REAL</u>	Shall be set to indicate the altitude of GCO.
<u>locationUncertainty</u>	<u>REAL</u>	Shall be set to indicate the location uncertainty if available.

The following table shows ~~networkGeometryClass~~ parameter element.

<u>Parameter</u>	<u>Data type</u>	<u>Value</u>
~~networkGeometryClass~~	~~INTEGER~~	0: Network geometry class 1 1: Network geometry class 2 2: Network geometry class 3 3: Network geometry class 4 4 x: Others

The following table shows AntennaCharacteristics parameter element.

<u>Parameter</u>	<u>Data type</u>	<u>Value</u>
<u>antennaHeight</u>	<u>REAL</u>	Shall be set to indicate the antenna height of GCO, if available.
<u>antennaHeightType</u>	<u>HeightType</u>	Shall be set to indicate the antenna height type if available. AGL (above ground level) or ASL (above sea level) is used.
<u>antennaGain</u>	<u>REAL</u>	Shall be set to indicate the antenna gain if available.
<u>antennaType</u>	<u>AntennaType</u>	Shall be set to indicate the antenna array type if the number of antennas is two or more.
<u>numberOfAntenna</u>	<u>INTEGER</u>	Shall be set to indicate the number of antennas.
<u>mimoType</u>	<u>MIMOType</u>	Shall be set to indicate the MIMO type if the number of antennas is two or more.
<u>multiAntProCap</u>	<u>MultiAntProCap</u>	Shall be set to indicate the antenna processing capability includes directional beam forming if the number of antennas is two or more.
<u>azimuthAngle</u>	<u>REAL</u>	Shall be set to indicate the antenna boresight azimuth angle direction measured in degree against longitude facing north in clockwise direction. (i.e., an azimuth angle of zero degrees) is a horizontal line in the direction to the north pole, starting from the antenna if the number of antennas is two or more.
<u>downtiltAngle</u>	<u>REAL</u>	Shall be set to indicate the antenna down-tilt angle.
<u>beamwidth</u>	<u>REAL</u>	Shall be set to indicate the antenna beamwidth.

The following table shows *FilterCharacteristics* parameter element.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u><i>acs</i></u>	<u><i>REAL</i></u>	Shall be set to indicate the adjacent channel selectivity.
<u><i>fbmcOverlappingFactor</i></u>	<u><i>INTEGER</i></u>	Not used here.

The following table shows *listOfOperatingFrequencies* parameter element.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u><i>freqRankIndex</i></u>	<u><i>INTEGER</i></u>	Shall be set to indicate priority index of <i>frequencyRange</i> in this table if available.
<u><i>frequencyRange</i></u>	<u><i>FrequencyRange</i></u>	Shall be set to indicate operating frequency range. ~~Operating frequency range~~
<u><i>operatingEirp</i></u>	<u><i>REAL</i></u>	Shall be set to indicate the operating equivalent isotropically radiated power (EIRP) of the GCO in <i>frequencyRange</i> .
<u><i>resolutionBandwidth</i></u>	<u><i>REAL</i></u>	Shall be set to indicate the resolution bandwidth of available frequency where GCO is operating, if applicable.
<u><i>typeOfOperatingFrequency</i></u>	<u><i>TypeOfFrequency</i></u>	Shall be set to indicate the frequency type if the regulatory specifies.
<u><i>occupancy</i></u>	<u><i>REAL</i></u>	Optionally present. If present, this parameter shall be set to indicate occupancy of the GCO frequency range.
<u><i>energyDetectionInfo</i></u>	<u><i>EnergyDetectionInfo</i></u>	Optionally present. If present, this parameter shall be set to indicate energy detection information.
<u><i>modulationParameters</i></u>	<u><i>ModulationParameters</i></u>	Shall be set to indicate modulation parameters.
<u><i>sicDemodulationProcedure</i></u>	<u><i>SICDemodulationProcedure</i></u>	Optionally present. If present, this parameter shall be set to indicate SIC demodulation procedures to be configured as shown in 7.2.2.13.
<u><i>coChGCOLimit</i></u>	<u><i>CoChGCOLimit</i></u>	Shall be set to indicate the limit on the maximum number of co-channel GCOs that shall operate simultaneously within a given region and frequency
<u><i>freqUtilizationPattern</i></u>	<u><i>FreqUtilizationPattern</i></u>	May be set to indicate the frequency utilization pattern.

The following table shows *listOfMasterCMCandidate* parameter element.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u><i>cmID</i></u>	<u>~~exID~~CxID</u>	Shall be set to indicate CM ID
<u><i>ipAddress</i></u>	<u>~~IOAddress~~OCTET STRING</u>	Shall be set to indicate IP address of

		the subject CM
~~portnumber~~ <u>portNumber</u>	~~PortNumber~~ <u>INTEGER</u>	<u>Shall be set to indicate its port number.</u> ~~Its port number~~

The following table specifies the elements of *FreqUtilizationPattern*.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<u>frequencyRange</u>	<u>FrequencyRange</u>	<u>Shall be set to indicate operating frequency range to be estimated.</u>
<u>parameterType</u>	<u>ParameterType</u>	<u>Shall be set to indicate the parameter type of frequency utilization pattern</u>
<u>timeThresholdForSuccessfulUsage</u>	<u>REAL</u>	<u>Shall be set to indicate the threshold of time duration for successful usage</u>
<u>windowStartTime</u>	<u>GeneralizedTime</u>	<u>Shall be set to indicate the start time of window</u>
<u>windowStopTime</u>	<u>GeneralizedTime</u>	<u>Shall be set to indicate the stop time of window</u>
<u>coverageArea</u>	<u>CoverageArea</u>	<u>Shall be set to indicate the coverage area associated with frequency utilization pattern</u>
<u>parameterValue</u>	<u>INTEGER</u>	<u>Shall be set to indicate the value of frequency utilization pattern</u>

6.3 CM operation

6.3.2 Profile 1

6.3.2.1 General description

Change 6.3.2.1 as shown:

The entity operation for the CM shall consist of the following 6 states:

- Inactive
- Active
- Waiting engagement
- Engaged
- Request sent
- Request received

Each state shall represent as followings:

- Inactive: the state where it is impossible to set up any interfaces with other ~~802.19.1~~ entities in coexistence system. The inactive state goes to the active state when initialization process is finished.
- Active: the state where it is possible to set up interface with other ~~802.19.1~~ entities in coexistence system. The Active state goes to the inactive state when shutdown process is finished.

- Waiting engagement: the state where one entity has requested for interface setup to the other entity, and is waiting for response from it.
- Engaged: the state where two entities are ready to communicate with each other by exchanging messages or primitives.
- Request sent: the state where the request has been sent from home entity to remote entity, and the home entity is waiting for response from the remote entity.
- Request received: the state where the request has been received from remote entity to home entity, and home entity is waiting for the completion of the request.

State transition shall be occurred as follows:

- The active state goes to the waiting engagement state if CM sends connection request to CDIS/another CM.
- The waiting engagement state goes to the engaged state if CM receives connection response from CDIS/another CM within time limit. If not, it goes back to the active state.
- The engaged state goes to the request received state if CM receives request from CE/CDIS/another CM. After CM sends corresponding response to CE/CDIS/another CM it goes back to the engaged state.
- CM sends corresponding event response to CE/another CM at the engaged state without receiving event request from CE/another CM if CM received the event request from CE/another CM in advance.
- The engaged state goes to the request sent state if CM sends request to CE/CDIS/another CM. After CM receives corresponding response from CE/CDIS/another CM it goes back to the engaged state.
- CM receives corresponding event response from CE/another CM at the engaged state without sending event request to CE/another CM if CM sent the event request to CE/another CM in advance.
- CM stays the engaged state if it periodically sends being-engagement request to CDIS/another CM.
- The engaged state goes to the active state if CM receives disconnection request from CDIS/another CM, or fails to receive being-engagement request from CE/another CM periodically.
- The engaged state goes to the active state if CM sends disconnection request to CDIS/another CM.

Flowchart of CM operation is depicted in Figure ~~5561~~ and Figure ~~5662~~.

After CM authentication is successfully done, a CM shall perform CM subscription procedure and shall switch to the engaged state, where it shall check for incoming messages from CE/CM/CDIS/another CM. Authentication is out of scope of this standard

If the CM received subscription information from a CE, the CM shall perform ~~WSOGCO~~ subscription procedure and ~~WSOGCO~~ registration procedure in sequence, and back to the engaged state.

If the CM received event indication from CE, CM shall perform sending event indication from CE to CM procedure and back to the engaged state.

If the CM received event indication from another CM, CM shall perform sending event indication from CM to another CM procedure and back to the engaged state.

If the CM requires available channel list from ~~WSOGCO~~, CM shall perform obtaining available channel list from ~~WSOGCO~~ procedure and back to the engaged state.

If the CM received channel classification request from CE, CM shall perform obtaining channel classification information by CE procedure and back to the engaged state.

If channel classification of ~~WSOGCO~~ is updated, CM shall perform announcing channel classification information update to CE procedure and back to the engaged state.

If channel classification of CM is updated, CM shall perform announcing channel classification information update to CM procedure and back to the engaged state.

If the CM requires channel classification of another CM, CM shall perform obtaining channel classification information by CM procedure and back to the engaged state.

If the CM requires measurement result from ~~WSOGCO~~, CM shall perform requesting measurement procedure and back to the engaged state.

If the CM received measurement result from ~~WSOGCO~~ and the CM requested one-time measurement, CM shall perform obtaining one-time measurement procedure and back to the engaged state.

If the CE received measurement result from ~~WSOGCO~~ and the CM requested scheduled measurement, CM shall perform obtaining scheduled measurement procedure and back to the engaged state.

If the CM is subscribed for discovery service of inter-CM coexistence discovery only, the CM shall execute a coexistence discovery for intra-CM domain and the CM shall perform obtaining coexistence set information. Otherwise, the CM shall perform obtaining coexistence set information without execution of coexistence discovery by itself.

If the ~~WSOGCO~~ subscribed for information service and the CM received coexistence report request from the CE, the CM shall perform obtaining coexistence report procedure and back to the engaged state.

If the ~~WSOGCO~~ subscribed for management service, CM shall perform one of coexistence decision makings; autonomous, centralized, and distributed.

- If CM operates autonomous decision making, CM shall perform its decision making independently from its neighbor CM.
- If CM operates centralized decision making, master CM shall perform both its decision making and slave CM's decision making.
- If CM operates distributed decision making, CM shall perform its decision making through negotiation among neighbor CMs.

If the CM operates centralized decision making, i.e., master CM or slave CM is required, the CM shall perform master/slave CM selection procedure.

- If master/slave CM selection procedure is succeeded to select the master and the slave CM, the CM shall perform master/slave CM configuration procedure.
 - If CM is selected as the slave CM, and received reconfiguration request from the master CM, the CM shall perform sending reconfiguration request from CM to another CM procedure. After that, the CM shall perform ~~WSOGCO~~ reconfiguration procedure and back to the engaged state.
 - If CM is selected as the master CM, the CM shall perform coexistence decision making for both ~~WSOGCOs~~ of slave CM and its registered ~~WSOGCOs~~. After that, the CM shall perform sending reconfiguration request from CM to another CM procedure and shall perform ~~WSOGCO~~ reconfiguration procedure and back to the engaged state.
- If master/slave CM selection procedure is failed to select the master and the slave CM, the CM shall determine it operates distributed decision making or autonomous decision making.

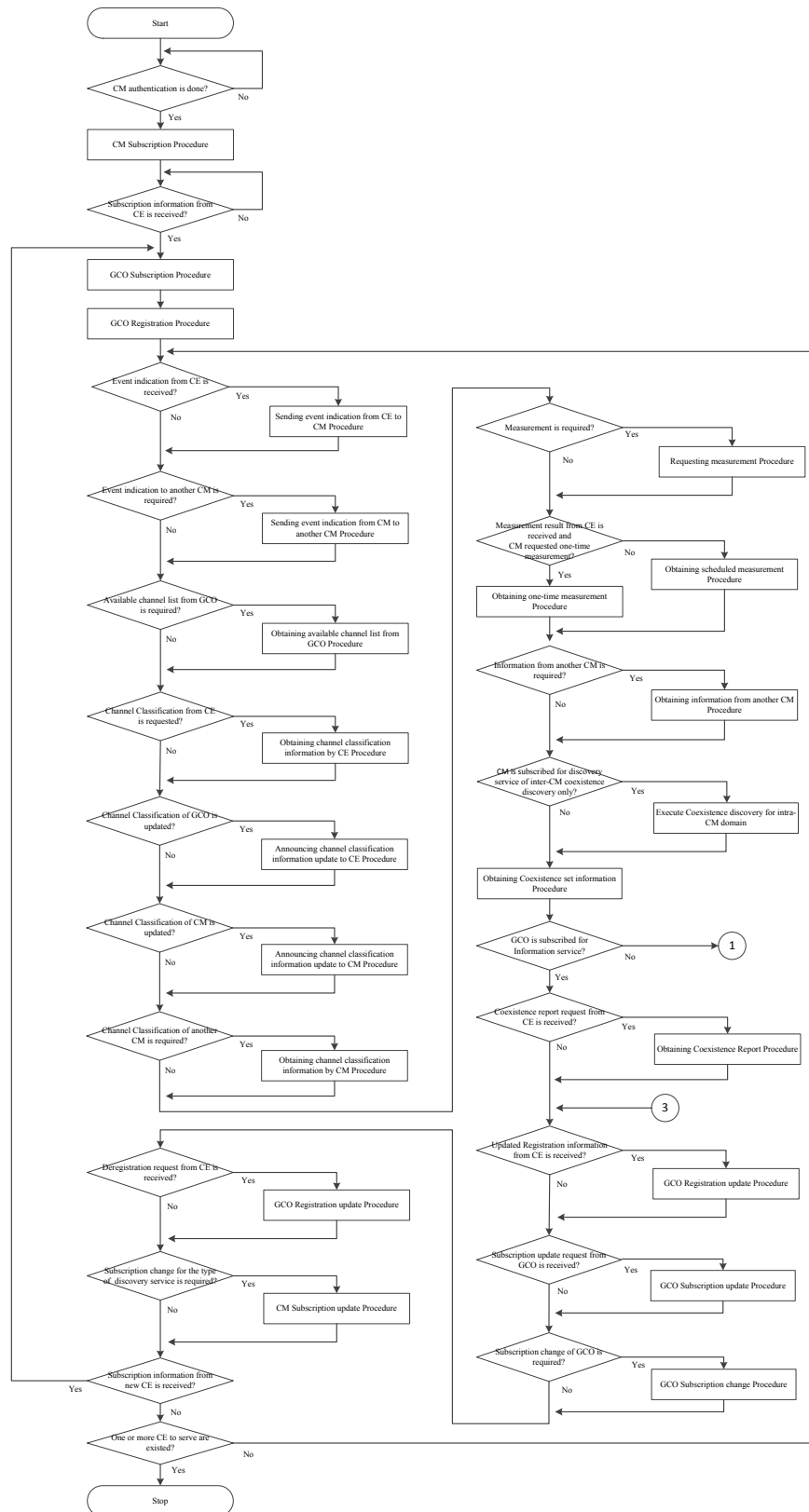


Figure 5561—CM operation (part 1)

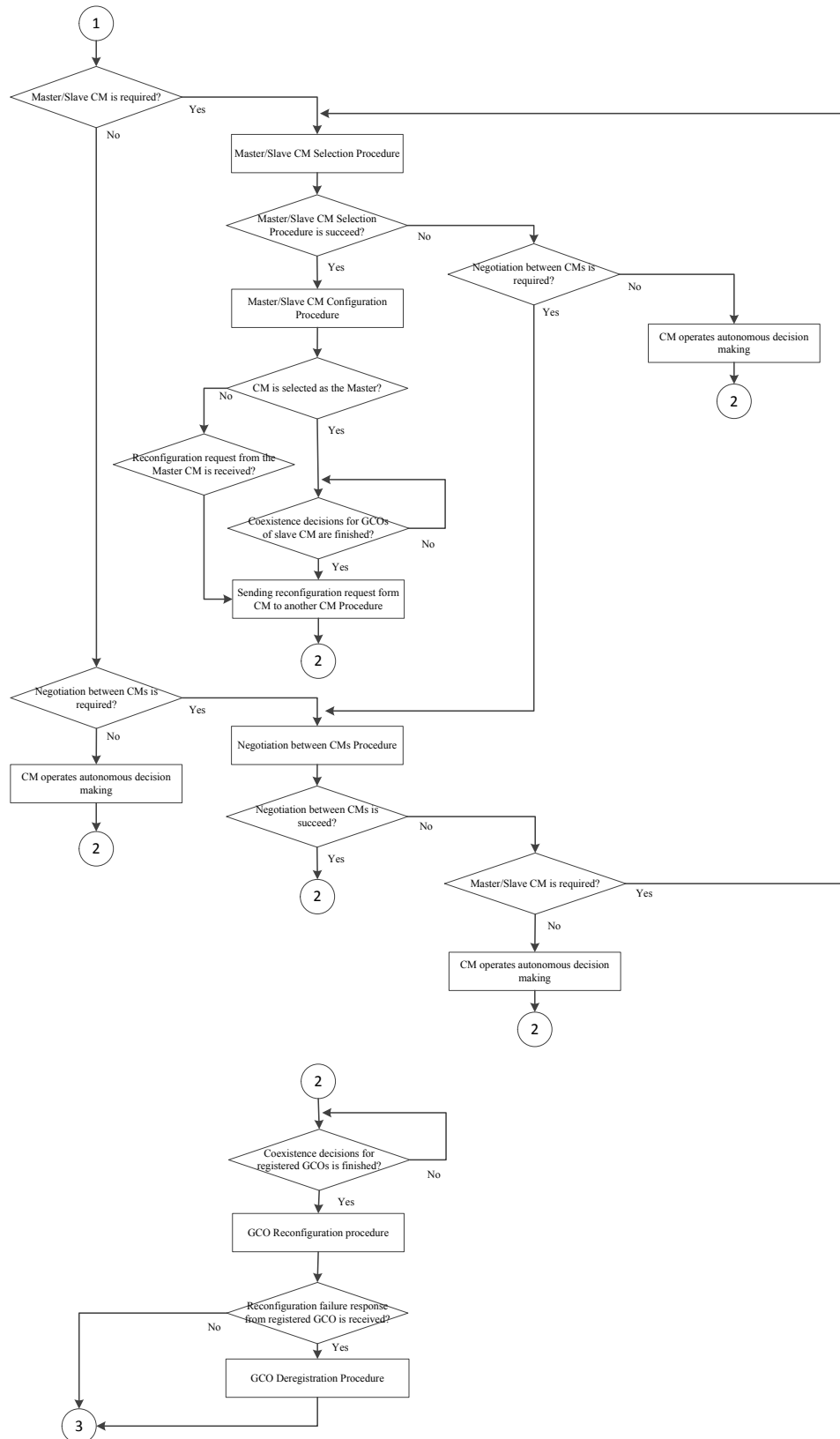


Figure 5662—CM operation (part 2)

If the CM operates distributed decision making, i.e., negotiation between CMs is required, the CM shall perform negotiation between CMs procedure.

- If negotiation is succeeded, based on results on negotiation, if coexistence decision making for registered ~~WSOGCOs~~ is finished, CM shall perform ~~WSOGCO~~ reconfiguration procedure and back to the engaged state.
- If negotiation is failed, the CM shall determine it operates centralized decision making or autonomous decision making.

If the CM operates autonomous decision making and coexistence decision making for registered ~~WSOGCOs~~ is finished, the CM shall perform ~~WSOGCO~~ reconfiguration procedure and back to the engaged state.

If the CM received reconfiguration failure response from registered ~~WSOGCO~~, the CM shall perform ~~WSOGCO~~ deregistration procedure and back to the engaged state.

If the CM received updated registration information from CE, CM shall perform ~~WSOGCO~~ registration update procedure and back to the engaged state.

If the CM received subscription update request from CE, CM shall perform ~~WSOGCO~~ subscription update procedure and back to the engaged state.

If the CM requires subscription change of ~~WSOGCO~~, CM shall perform ~~WSOGCO~~ subscription change procedure and back to the engaged state.

If the CM received deregistration request from CE, a CM shall perform ~~WSOGCO~~ registration update procedure and back to the engaged state.

If the CM requires subscription change for the type of discovery service from the CDIS, CM shall perform CM subscription update procedure and back to the engaged state.

If the CM received new subscription information from new CE, the CM shall perform ~~WSOGCO~~ subscription procedure and ~~WSOGCO~~ registration procedure in sequence, and back to the engaged state.

If there is no CE to serve for coexistence service, the CM shall switch to the active state.

Related procedures, messages, and data types are listed in the following subsections.

6.3.2.2 CM subscription

Change the sixth paragraph as shown:

The following table shows the parameters in the *subscriptionResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>status</i>	~~Status~~ BOOLEAN	status

6.3.2.3 CM subscription update

Change the sixth paragraph as shown:

The following table shows the parameters in the *subscriptionResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>status</i>	~~Status~~ BOOLEAN	status

Change the title, first, and fourth paragraphs in 6.3.2.4 as shown:

6.3.2.4 **WSOGCO** subscription

To subscribe **WSOGCO** for coexistence service provided by the CM, a CM shall perform the **WSOGCO subscription procedure** as shown in 5.2.1.1.

The following table shows the parameters in the *subscriptionResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
status	~~CxMediaStatus~~	status

Change the title, first, and fourth paragraphs in 6.3.2.5 as shown:

6.3.2.5 **WSOGCO** subscription update

To do the subscription update for **WSOGCO**, a CM shall perform the **WSOGCO subscription update procedure** as shown in 5.2.1.2.

The following table shows the parameters in the *subscriptionResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
status	~~CxMediaStatus~~	status

Change the title, first, and sixth paragraphs in 6.3.2.6 as shown:

6.3.2.6 **WSOGCO** subscription change

To do the subscription change for **WSOGCO**, a CM shall perform the **WSOGCO subscription change procedure** as shown in 5.2.1.5. The CM shall perform this procedure when the **WSOGCO/CE** is not suitable for the current coexistence service from the CM; information service or management service. After the CM initiates this procedure, the **WSOGCO/CE** shall change its coexistence service subscription from one service to the other service.

The following table shows the parameters in the *subscriptionChangeResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
status	~~CxMediaStatus~~	status

Change the title, first, fourth, and fifth paragraphs in 6.3.2.7 as shown:

6.3.2.7 **WSOGCO** registration

To register **WSOGCO** to CDIS, a CM shall perform the **WSOGCO registration procedure** as shown in 5.2.2.1.

The following table shows the parameters in the *cmRegistrationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
operationCode	OperationCode	Operation code (new, modify, remove)
ceID	CxID	CE ID
networkID	OCTET STRING	Identifier of the network which the WSOGCO represents. As an example, in case of IEEE 802.11, this parameter

		contains the BSSID used by the ~~WSOGCO~~ .
<i>networkTechnology</i>	<i>NetworkTechnology</i>	Indicates the radio access technology which the ~~WSOGCO~~ uses.
<i>networkType</i>	<i>NetworkType</i>	Indicates network type as specified in regulations.
<i>discoveryInformation</i>	<i>DiscoveryInformation</i>	Discovery information of the ~~WSOGCO~~ .
<i>listOfSupportedChNumbers</i>	<i>SEQUENCE OF INTEGER</i>	List of supported channel number.

The following table shows the parameters of the *CxMessage* in the *RegistrationResponse* message.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<i>header</i>	<i>CxHeader</i>	<i>requestID</i>
<i>payload</i>	<i>CxPayload</i>	<i>rRegistrationResponse</i>

Change the title, first, fourth, and fifth paragraphs in 6.3.2.8 as shown:

6.3.2.8 ~~WSOGCO~~ registration update

To do the registration update, a CM shall perform the ~~WSOGCO~~ registration update procedure as shown in 5.2.2.2.

The following table shows the parameters in the *cmRegistrationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>operationCode</i>	<i>OperationCode</i>	Operation code (new, modify, remove)
<i>ceID</i>	<i>CxID</i>	CE ID
<i>networkID</i>	<i>OCTET STRING</i>	Identifier of the network which the ~~WSOGCO~~ represents. As an example, in case of IEEE 802.11, this parameter contains the BSSID used by the ~~WSOGCO~~ .
<i>networkTechnology</i>	<i>NetworkTechnology</i>	Indicates the radio access technology which the ~~WSOGCO~~ uses.
<i>networkType</i>	<i>NetworkType</i>	Indicates network type as specified in regulations.
<i>discoveryInformation</i>	<i>DiscoveryInformation</i>	Discovery information of the ~~WSOGCO~~ .
<i>listOfSupportedChNumbers</i>	<i>SEQUENCE OF INTEGER</i>	List of supported channel number.

The following table shows the parameters of the *CxMessage* in the *RegistrationResponse* message.

<i>Parameter</i>	<i>Data type</i>	<i>Value</i>
<i>header</i>	<i>CxHeader</i>	<i>requestID</i>
<i>payload</i>	<i>CxPayload</i>	<i>rRegistrationResponse</i>

6.3.2.9 Event indication to CM

Change the second paragraph as shown:

After the CM has received the *EventIndication* message from the CE, the CM shall generate and send the *EventConfirm* message to the CE that serves the ~~WSOGCO~~.

Change the title, first, and second paragraphs in 6.3.2.11 as shown:

6.3.2.11 Available channel list from WSOGCO

To obtain available channel list from WSOGCO, a CM shall perform the **obtaining available channel list from WSOGCO procedure** as shown in 5.2.4.1.

First the CM shall generate and send the *AvailableChannelsRequest* message to the CE that serves the WSOGCO and wait for the *AvailableChannelsResponse* message from the CE.

6.3.2.12 Channel classification request by CE

Change the first and second paragraphs as shown:

To provide channel classification information for WSOGCO, the CM shall perform the **obtaining channel classification information by CE procedure**, as shown in 5.2.5.2.

After the CM has received the *ChannelClassificationRequest* message from the CE, the CM shall generate and send the *ChannelClassificationResponse* message to the CE that serves the WSOGCO.

6.3.2.13 Channel classification update to CE

Change the fifth paragraph as shown:

After the CE has received the *ChannelClassificationAnnouncement* message from the CM, the CE shall generate and send the *ChannelClassificationIndication* primitive to the WSOGCO.

6.3.2.16 Measurement request

Change the first paragraph as shown:

To request measurement to the WSOGCO, the CM shall perform the **requesting measurements procedure**, as shown in 5.2.7.1.

6.3.2.17 One-time measurement

Change the first paragraph as shown:

To provide one-time measurement results from WSOGCO to CM, a CE shall perform the **providing one-time measurement procedure**, as shown in 5.2.7.2.

6.3.2.18 Scheduled measurement

Change the first paragraph as shown:

To provide scheduled measurement results from WSOGCO to CM, a CE shall perform the **providing scheduled measurements procedure**, as shown in 5.2.7.3.

6.3.2.20 Coexistence report for information service

Change the first, fifth, and sixth paragraphs as shown:

To provide coexistence information to ~~WSOGCO~~, a CM shall perform the **obtaining coexistence report procedure** as shown in 5.2.3.5.

The following table shows the parameters in the *coexistenceReportResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>coexistenceReport</i>	<i>CoexistenceReport</i>	Information about coexistence set elements of the ~~WSOGCO~~ in form of a coexistence report
<i>channelPriority</i>	<i>ChannelPriority</i>	Channel priority.

The following table shows the data type of the each element of the sequence in the *CoexistenceReport* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>networkID</i>	<i>OCTET STRING</i>	Neighbor network ID.
<i>networkTechnology</i>	<i>NetworkTechnology</i>	This parameter shall be set to the neighbor ~~WSOGCO~~ network technology.
<i>listOfOperatingChNumbers</i>	<i>ListOfOperatingChNumbers</i>	The neighbor operating channel numbers.

6.3.2.21 Coexistence set information

Change the fourth, and sixth through eighth paragraphs as shown:

The following table shows the parameters in the *coexistenceSetInformationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>listOfNetworkID</i>	<i>SEQUENCE OF OCTET STRING</i>	Network ID list of ~~WSOGCO~~ for which coexistence set information is requested

The following table shows the parameters of the each element of the sequence in the *coexistenceSetInformationResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>networkID</i>	<i>OCTET STRING</i>	~~WSOGCO~~ for which coexistence set information is requested
<i>listOfNneighborCM</i>	<i>ListOfNeighborCM</i>	Indicates the list of neighbor CM (see the following)

The following table shows the data type of the each element of the sequence in the *listOfneighborCM* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
<i>neighborCMID</i>	<i>CxID</i>	Neighbor CM ID
<i>listOfCoexSetElement</i>	<i>ListOfCoexSetElement</i>	Indicates the list of neighbor ~~WSOGCO~~ (see the following)

The following table shows the data type of the each element of the sequence in the *listOfCoexSetElement* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
networkID	OCTET STRING	Neighbor network ID.
networkTechnology	NetworkTechnology	Neighbor ~~WSOGCO~~ network technology.

6.3.2.22 Negotiation between CMs

Change the sixth paragraph as shown:

The following table shows the data type of the *NegotiationStatus*.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
neegotiationSuccess	Boolean	Negotiation success
neegotiationFailure	Boolean	Negotiation failure
underNeegotiation	Boolean	Under negotiation

Change title, first, fourth, and seventh paragraphs as shown:

6.3.2.23 ~~WSOGCO~~ reconfiguration for management service

To request ~~WSOGCO~~ reconfiguration, a CM shall perform the ~~WSOGCO~~ reconfiguration procedure as shown in 5.3.2.23.

The following table shows the parameters of the each element of the sequence in the *reconfigurationRequest* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
oOperatingChNumbers	SEQUENCE OF INTEGER	Operating channel list for the ~~WSOGCO~~ .
txPowerLimit	SEQUENCE OF REAL	Transmission power limitation
channelsShared	SEQUENCE OF BOOLEAN	TRUE , if the frequency channel will be shared with other ~~WSOGCOs~~ , FALSE otherwise.
txSchedule	txSchedule	Transmission schedule
chClassInfo	ChClassInfo	Channel classification information

The following table shows the parameters in the *ReconfigurationResponse* payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
status	~~Status~~BOOLEAN	Reconfiguration parameter from the received <i>PerformReconfigurationResponse</i> primitive.
failedParameters	FailedParameters	Failed parameters from the received <i>PerformReconfigurationResponse</i> primitive.

6.3.2.24 Sending reconfiguration request from CM to another CM

Change first, fourth, and seventh paragraphs as shown:

To request ~~WSOGCO~~ reconfiguration registered to another CM, a CM shall perform the **sending reconfiguration request from CM to another CM** procedure as shown in 5.2.10.2.

The following table shows the parameters of the each element of the sequence in the **cmReconfigurationRequest** payload. The CM shall generate this payload for each CE that is registered to another CM. The total number of payload shall be equal to the number of CEs that is registered to another CM but managed by the CM.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
reconfigTarget	CxID	Indication for CE to be reconfigured
oOperatingChNumbers	SEQUENCE OF INTEGER	Operating channel list for the ~~WSOGCO~~ .
txPowerLimit	SEQUENCE OF REAL	Transmission power limitation
channelsShared	SEQUENCE OF BOOLEAN	TRUE , if the ~~frequency~~ channel will be shared with other ~~WSOGCOs~~ , FALSE otherwise.
txSchedule	txSchedule	Transmission schedule
chClassInfo	ChClassInfo	Channel classification information

The following table shows the parameters in the **cmReconfigurationResponse** payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
reconfigTarget	CxID	Indication for CE to be reconfigured
status	~~Status~~ BOOLEAN	Reconfiguration parameter from the received PerformReconfigurationResponse primitive.
failedParameters	FailedParameters	Failed parameters from the received PerformReconfigurationResponse primitive.

6.3.2.25 Master/slave CM selection

Change the first and seventh paragraphs as shown:

To select master and slave CM for centralized coexistence decision making, a CM shall perform the **master/slave CM selection procedure** as shown in 5.2.9.1. The CM intended to become slave CM shall perform this procedure for number of candidate CM for the master CM, one by one. The CM intended to become slave CM shall determine list of ~~WSOGCO~~/CE that supposed to be managed by the master CM.

The following table shows the parameters in the **masterCMResponse** payload.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
status	~~CxMedia~~ Status	status

6.3.2.26 Master/slave CM configuration

Change the seventh, ninth, and tenth paragraphs as shown:

The following table shows the parameters in the **masterSlaveCMConfigurationResponse** payload. The slave CM shall generate this payload for each CE managed by the master CM. The total number of payload shall be equal to the number of CEs that is registered to the slave CM but managed by the master CM.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
operationCode	OperationCode	Operation code (new, modify, remove)
slaveCeID	CxID	Slave CE ID

networkID	OCTET STRING	Identifier of the network which the ~~WSOGCO~~ represents. As an example, in case of IEEE 802.11, this parameter contains the BSSID used by the ~~WSOGCO~~ .
networkTechnology	NetworkTechnology	Indicates the radio access technology which the ~~WSOGCO~~ uses.
networkType	NetworkType	Indicates network type as specified in regulations.
discoveryInformation	DiscoveryInformation	Discovery information of the ~~WSOGCO~~ .
txScheduleSupported	BOOLEAN	Indicates whether scheduled transmission is supported or not
listOfAvailableChNumbers	ListOfAvailableChNumbers	Information about available white space channels (see following table).
listOfSupportedChNumbers	SEQUENCE OF INTEGER	List of supported channel number.
listOfOperatingChNumbers	ListOfOperatingChNumbers	The ~~WSOGCO~~ operating channel numbers (see following table).
requiredResource	RequiredResource	Resource required for the ~~WSOGCO~~ operation (see following table).
measurementCapability	MeasurementCapability	Measurement capability of the ~~WSOGCO~~ (<i>Energy detection</i> or <i>feature detection</i>)

The following table shows the data type of the each element of the sequence in the *listOfOperatingChNumbers* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
cChannelNumber	INTEGER	operating channel number
occupancy	REAL	If occupancy is not known, this parameter is not used. If it is known, this parameter is set to its value. Range is from 0 to 1.

The following table shows the data type of the *requiredResource* parameter.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
requiredBandwidth	REAL	Required bandwidth for the ~~WSOGCO~~ operation.
occupancy	REAL	If expected occupancy is not known, this parameter is not used. If it is known, this parameter is set to its value. Range is from 0 to 1.

Change the title, first, fourth, sixth, and tenth paragraphs in 6.3.2.27 as shown:

6.3.2.27 ~~WSOGCO~~ deregistration

To deregister ~~WSOGCO~~ from CM, a CM shall perform the ~~WSOGCO~~ deregistration procedure as shown in 5.2.2.3. The CM shall perform this procedure when the ~~WSOGCO~~/CE subscribed for the management service not accept reconfiguration request from the CM. After the CM completes this procedure, the ~~WSOGCO~~/CE shall perform one of the followings;

- To switch its coexistence service from the management service to the information service
- To subscribe its coexistence service to new CM and register to the CM

The following table shows the parameters in the *PerformDeregistrationRequest* primitive.

<i>Parameter</i>	<i>Data type</i>	<i>Description</i>
~~wsogco~~Deregistration	BOOLEAN	TRUE

The following table shows the parameters in the *deregistrationResponse* payload.

Parameter	Data type	Description
<i>status</i>	~~CxMedia~~ <i>Status</i>	status

The following table shows the parameters of the *CxMessage* in the *RegistrationResponse* message.

Parameter	Data type	Value
<i>header</i>	<i>CxHeader</i>	<i>requestID</i>
<i>payload</i>	<i>CxPayload</i>	~~r~~ <i>RegistrationResponse</i>

6.3.4 Profile 3

6.3.4.1 General description

Change the text, insert new material, and change figure numbering as follows:

A CM that operates as per Profile 3 shall support the following procedures:

- CM association
- ~~WSOGCO~~ subscription
- ~~WSOGCO~~ subscription update
- ~~WSOGCO~~ subscription change
- ~~WSOGCO~~ registration
- ~~WSOGCO~~ registration update
- ~~WSOGCO~~ reconfiguration
- Obtaining coexistence set information
- Providing coexistence report
- Master/slave CM configuration procedure
- Sending reconfiguration request from CM to another CM
- Proxy coexistence service procedure
- Inter-CM association procedure
- Inter-CM association procedure over COE
- Obtaining operating frequency information procedure
- Obtaining operating frequency information procedure over COE

CM association procedure is performed to establish connection for communication with CE when the CM receives request for CM association procedure.

A high-level flowchart of the CM operation except for CM association procedure is provided in ~~Figure 59~~Figure 65.

After receiving requests for both ~~WSOGCO~~ subscription procedure and its registration procedure, a CM shall start operation either management service operation or information service operation for the subject ~~WSOGCO~~. In case of information service operation, the overall operation is as shown in ~~Figure 60~~Figure 66. Until receiving either a stop request of coexistence service subscription for the subject CE or