Project	**IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>**
Title	**Primitives in 802.16h – high level approach**
Date Submitted	**2008-05-01**
Source(s)	Mariana Goldhamer E-mail: mariana.goldhamer@alvarion.com Alvarion Ltd. 21A, Ha Barzel Street, Tel Aviv, Israel
Re:	LB 29
Abstract	The document is a proposal for profiles based on the poll taken in November 2007 meeting, in relation with comment 092 in database IEEE 802.16/07-53r2
Purpose	[Description of what *specific* action is requested of the 802.16 Working Group or subgroup.]
Notice	*This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

Primitives in 802.16h – high level approach

Mariana Goldhamer

Alvarion Ltd.

Introduction

In response to comments addressing the existence of the IP messages in the 802.16h Draft P802.16h/D4, are proposed a number of changes to enforce the primitives approach. The changes are based on the approach in P802.16Rev2/D4, which includes the 802.16g solutions.

Below is extracted the relevant text for the 802.16h work.

1. NCMS

1.4.4 Network Control and Management System (NCMS)

This abstraction is detailed in Figure 3 to show the different functional entities that make up such a Network Control and Management System. These entities may be centrally located or distributed across the network. The exact functionality of these entities and their services is outside the scope of this specification but shown here for illustration purposes and to better enable the description of the management and control procedures.

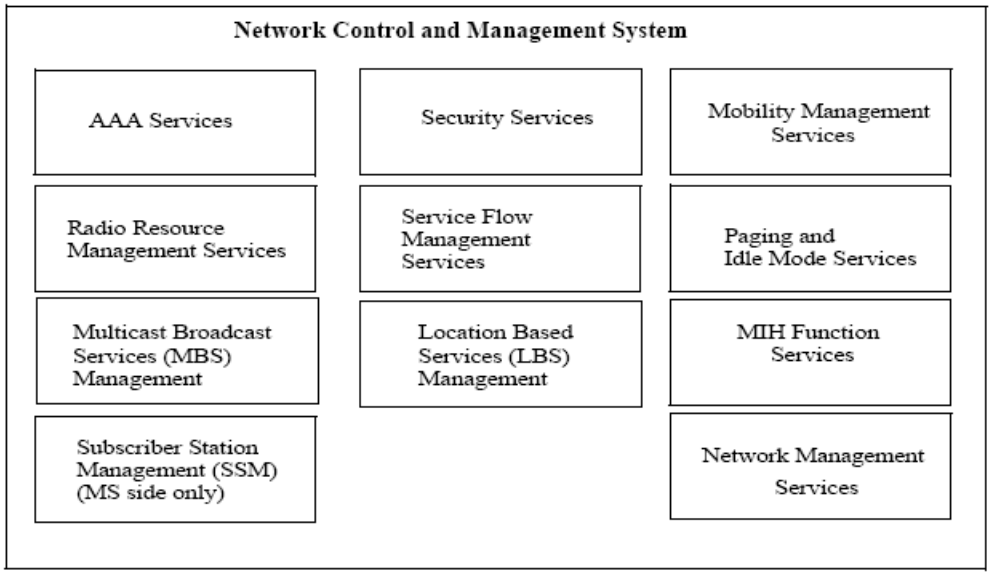

Figure 3—Illustration of the Network Control and Management System (Informational)

We will need to add a box named: Coexistence Services.

2. Network Reference Model

The model includes two Service Access Points: C-SAP and S-SAP. See fig. 4.

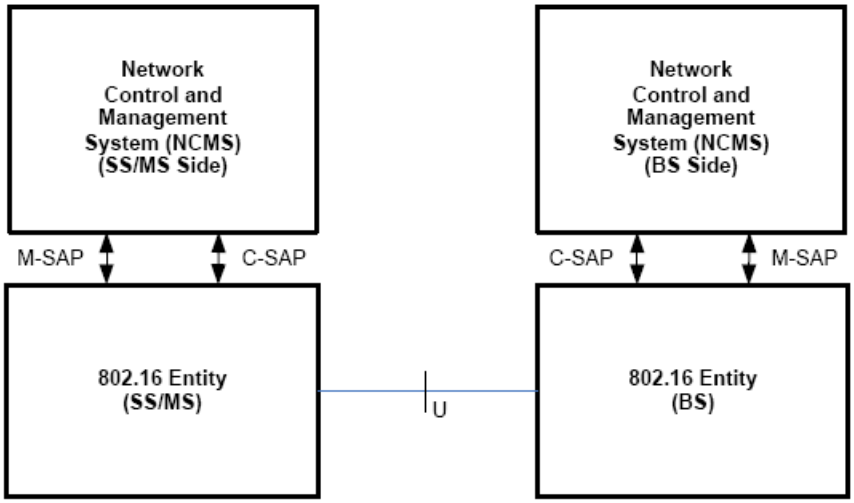

Figure 4—802.16 Network Reference Model

The M-SAP uses a higher latency transport and may be used for:

1.4.6 Management SAP (M-SAP)

The Management SAP may include, but is not limited to primitives related to:

- System configuration
- Monitoring Statistics

- Notifications/Triggers
- Multi-mode interface management

The Control-SAP will be 802.16h preferred SAP. It includes now a number of functions (see below).

1.4.7 Control SAP (C-SAP)

The Control SAP may include, but is not limited to primitives related to:

- Handovers (e.g. notification of HO request from MS, etc.)
- Idle mode mobility management (e.g. Mobile entering idle mode)
- Subscriber and session management (e.g. Mobile requesting session setup)
- Radio resource management
- AAA server signaling (Eg. EAP payloads).
- Media Independent Handover Function Services
- Location detection reporting capability

We need to add the functions which are contained in CXP.

In clause 14.1 we have the primitive definition template. It includes the following:

Operation

REQ - Request
RSP - Response to the REQ message
ACK - Acknowledgement to the reception of REQ or RSP or IND message
IND - Event Notification

- A service primitive of type REQ is used whenever a response to the primitive is solicited. If there is a REQ message on the radio interface, it is generally mapped to a REQ on C-SAP/M-SAP.
- A service primitive of type RSP is used in response to a REQ primitive. Moreover, if there is a RSP message on the radio interface, it is generally mapped to a RSP on C-SAP/M-SAP.
- A service primitive of type IND is used at C-SAP or M-SAP for event notification if a response to this primitive is not solicited, and if the primitive is not sent in response to a REQ primitive.
- A service primitive of type ACK can be used to acknowledge the receipt of a C-SAP primitive of type REQ, RSP or IND.

The actual primitive template is provided below for the operation type.

14.1.2 SAP service primitive object format

There are two types of services: M-SAP/C-SAP operation service primitive and M-SAP/C-SAP notification service primitive. The REQ and RSP operations shall use the operation service primitive and the IND operation shall use the notification service primitive. The ACK operation shall use the same primitive format as the primitive it acknowledges.

14.1.2.1 M-SAP/C-SAP operation service primitive:

This primitive is defined as Primitive_name () with a parameter list.

The format shall be:

Primitive_name
(
Operation_Type,
Action_Type,
Destination,
Attribute_list
)

In 16g the attribute list is provided as an array, each attribute having its code.

Proposed changes

Clause 1:

~~15.5~~ Add in Fig.3 a box named “Coexistence Services”

Clause **15.6 Messages for WirelessMAN-CX**

Coexistence management entities or a protocol are not defined in this specification. There are defined only the Service Access Points for such a protocol. In order to define the information to be transferred to/from the higher levels and to clarify the requested actions are defined the primitives to be exposed via SAP. For easing the understanding of the document the protocol primitives as a group are named CXP.

~~15.5.1~~ 15.6.1 Coexistence (CX) ~~messages (CX-REQ/RSP)~~ primitives

~~The Coexistence Protocol~~This document defines ~~employs~~ ~~two~~ four ~~message~~ primitives types to be used for CXP: ~~CX~~ Request (REQ), ~~(CX-REQ) and CX~~ Response (RSP), Indication (IND) ~~(CX-RSP)~~ and Acknowledge (ACK), as described in ~~*Table h 7*~~. Table h8.

In CXP the primitives are defined either between:

- C-SAP interface in a BS and the C-SAP interface in the peer BS;
- M-SAP interface in a BS and the M-SAP interface in the peer BS;
- M-SAP interface in a BS and M-SAP interface in the peer Server (BSIS or RAIS).

The notation of the service primitives is as follows:

- C or M (for Control or Management), followed by CX;
- Mnemonic of the primitive;
- Type of the primitive (REQ, RSP, IND, ACK).
-

~~**Table h7—CX messages**~~

~~CXP Type Value~~	~~Message name~~	~~Message description~~
~~71~~	~~CX-REQ~~	~~Coexistence Resolution and Negotiation Request~~
~~72~~	~~CX-RSP~~	~~Coexistence Resolution and Negotiation Response~~

~~These CX messages can be encapsulated as MAC Messages, over the 802.16 air interface, or as Internet Protocol messages (TCP/IP or UDP). The CX management messages are exchanged between peers, e.g. BS and BSIS or BS and BS or BS and SS., and distinguish between CX requests (BS -> BS/BSIS/SS or SS -> BS) and CX responses (BS/BSIS/SS -> BS or SS ->BS). Each MAC/IP message encapsulates one CX message in the Management Message Payload. Coexistence Protocol messages exchanged between the BS and BS or between BS and BSIS or between BS and SS shall use the form shown in ***Error! Reference source not found.*** and ***Error! Reference source not found.***.~~

Table h8—CX ~~message~~ primitives ~~codes~~

Code	CX~~P~~ ~~Message~~ Primitive Name	~~CXP Message Type over the backhaul~~	~~Protocol type~~	Direction	~~Connection~~	SAP type	Precedence	Reliability
0	Reserved	~~—~~	~~—~~	—	~~—~~			
1	Search Neighbors Request (M-CX-SRC-REQ)	~~CX-REQ~~	~~TCP~~	BS~~IS~~->BSIS	~~Basic~~	M-SAP	Low	High
2	Search Neighbors Response (M-CX-SRC-RSP)	~~CX-RSP~~	~~TCP~~	BSIS->BS~~IS~~	~~Basic~~	M-SAP	Low	High
3	~~BSD~~	~~CX-REQ~~	~~n/a~~	~~BS -> SS~~	~~Broadcast~~			
4	~~SSURF~~	~~CX-REQ~~	~~n/a~~	~~SS -> BS~~	~~Basic~~			

5	Leaving Neighborhood Indication (M-CX-LV-NBR-IND)	~~CX REQ~~	~~TCP~~	BS-> BSIS	~~Basic~~	M-SAP	Low	High
6	Leaving Neighborhood ~~Reply~~Response (M-CX-LV-NBR-RSP)	~~CX RSP~~	~~TCP~~	BSIS->BS	~~Basic~~	M-SAP	Low	High
7	Add Coexistence Neighbor Request (M-CX-ADD-NBR-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Basic~~	M-SAP	Low	High
8	Add Coexistence Neighbor Response~~ply~~ (M-CX-ADD-NBR-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	M-SAP	Low	High
9	Delete Coexistence Neighbor Request (M-CX-DEL-NBR-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Basic~~	M-SAP	Low	High
10	Delete Coexistence Neighbor ~~Reply~~Response (M-CX-DEL-NBR-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	M-SAP	Low	High
11	Get_Param_For_Radio_Signature_Request (C-CX-R-SIG-REQ)	~~CX REQ~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
12	Get_Param_For_Radio_Signature_~~Reply~~Response (C-CX-R-SIG-RSP)	~~CX RSP~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
13	Evaluate_Interference_Request (C-CX-EV-INTRF-REQ)	~~CX REQ~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
14	Evaluate_Interference_~~Reply~~Response (C-CX-EV-INTRF-RSP)	~~CX RSP~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
15	Work_~~In_Parallel~~as_Slave_Request (C-CX-SLAVE-REQ)	~~CX REQ~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
16	Work_~~In_Parallel~~as_Slave_~~Reply~~Response (C-CX-SLAVE-RSP)	~~CX RSP~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
17	Reduce_Power_or_Quit_Sub_Frame_Request (C-CX-RED-PWR-REQ)	~~CX REQ~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
18	Reduce_Power_or_Quit_Sub_Frame_~~Reply~~Response (C-CX-RED-PWR-RSP)	~~CX RSP~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
19	CMI_Interference_Resolution_Indication (C-CX-INTRF—RES-IND)	~~CX REQ~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
20	CMI_Interference_Resolution_Response (C-CX-INTRF-RES-RSP)	~~CX RSP~~	~~UDP~~	BS->BS	~~Basic~~	C-SAP	High	Low
21								
22								
23	Channel Switch Request (C-CX-CH-SWTCH-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
24	Channel Switch ~~Reply~~Response (C-CX-CH-SWTCH-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
25	Token Advertise Request (C-CX-CT-~~CX~~-ADV-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Broadcast~~	C-SAP	Low	High
26	Token Advertise_Response (C-CX-CT-~~CX~~-ADV-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
27	Token Negotiation Request (C-CX-CT-~~CX~~-NEG-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
28	Token Negotiation Response (C-CX-CT-~~CX~~-NEG-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
29	Token Resource Allocation Request (C-CX-CT-~~CX~~-RA-REQ)	~~CX REQ~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
30	Token Resource Allocation Response (C-CX-CT-~~CX~~-RA-RSP)	~~CX RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
31	~~CT-CX-ADPD~~	~~CX RSP~~	~~TCP~~	~~BS->BS~~	~~Multicast~~			
32	~~CT-CX-ACK~~	~~CX RSP~~	~~TCP~~	~~BS->BS~~	~~Basic~~			
33	~~CT-CX-NTF~~	~~CX RSP~~	~~TCP~~	~~BS->BS~~	~~Basic~~			

34	Token Frame Status Update Indication (M-CX-CT- ~~CX-~~ FRSU-IND)	~~CX-RSP~~	~~TCP~~	BS->BS	~~Broadcast~~	M-SAP	Low	High
35	Regulatory Authority Request (M-CX-REG-AUTH-REQ)	~~CX-REQ~~	~~TCP~~	RAIS ->BS~~IS~~	~~Basic~~	M-SAP	Low	High
36	Regulatory Authority Response (M-CX-REG-AUTH-RSP)	~~CX-RSP~~	~~TCP~~	BS~~IS~~ ->RAIS	~~Basic~~	M-SAP	Low	High
36'	Regulatory Authority Acknowledge (M-CX-REG-AUTH-ACK)			RAIS ->BS		M-SAP	Low	High
37	FREQ_AVOIDANCE Request (C-CX-FRQ-AV-REQ)	~~CX-REQ~~	~~TCP~~	BSIS-BS	~~Basic~~	C-SAP	Low	High
38	FREQ_AVOIDANCE Response (C-CX-FRQ-AV-RSP)	~~CX-RSP~~	~~TCP~~	BS-BSIS	~~Basic~~	C-SAP	Low	High
39	Master sub-frame Switch Request (C-CX-M-SWTCH-REQ)	~~CX-REQ~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
40	Master sub-frame Switch ~~Reply~~Response (C-CX-M-SWTCH-RSP)	~~CX-RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
41	OCSI back-off request message (C-CX-OCSI-BOFF-REQ)	~~CX-REQ~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
42	OCSI back-off response message (C-CX-OCSI-BOFF-RSP)	~~CX-RSP~~	~~TCP~~	BS->BS	~~Basic~~	C-SAP	Low	High
43-255	reserved							

Table h8—

~~Formats for each of the~~ CXP ~~messages~~ primitives are described in the following subclauses. The descriptions list the CXP attributes contained within each CXP ~~message~~ primitive~~type~~. ~~The attributes themselves are described in each message.~~ Unknown attributes ~~shall~~ should be ignored on receipt and skipped over while scanning for recognized attributes. The BS/BSIS/RAIS ~~shall~~ should silently discard all requests that do not contain ALL required attributes. The BS ~~shall~~ should silently discard all responses that do not contain ALL required attributes.

~~The following Type-Length-Value (TLV) types may be present in the CXP payload depending on the Message_Type:~~

Table h9 gives a list of possible attributes.

Table h9—~~TLV types for CXP payload~~Attributes for CXP primitives

Table h9—

Type	Parameter Description	Length (bytes)	Comment
01	BSID of source BS	6	
02	GPS coordinates	2	
03	BS ~~IP~~ Network Address of source BS	Variable	Depends of the network addressing within a protocol. For example, in case of for IP usage: 4 bytes if IPv4 is supported 16 bytes if IPv6 is supported
04	MAC Frame duration	1	
05	MAC Frame number	1	
06	Sub-frame number	1	

07	Repetition interval between two Master sub-frames, measured in MAC-frames	1	
08	Time shift from the MAC Frame start	2	(in microsec)
09	Duration of the time slot	2	(in microsec)
10	Repetition information for the Base Station radio-signature transmission	2	In MAC Frames number
11	Repetition of the Subscriber Station radio-signature transmission	2	In MAC Frames number
12	List of other used sub-frames, in the interval between two Master sub-frames		
13	Country Code	1	(in ASCII - bytes)
14	Operator contact - phone	1	(in ASCII - bytes)
15	Operator contact – E-mail	1	(in ASCII - bytes)
16	Channel information	2	The channel information of the requested BS. Containing Modulation mode, alternative Channel Flag
17	Maximum coverage at Max. power		
18	Tx power	1	in dBm
19	Channel Center Frequency(*ChannelCenterFrequency*)	4	in 10kHz
20	Transmit antenna type (1 - omni, 2 - directional)	1	
21	Transmit antenna gain (dBi)	1	Signed value
22	Acceptance indication:	1	1 - accepted 2 - rejected 3,... - message dependent
23	Channel width	2	In 0.01MHz
24	Type	1	message specific
25	Reduction of transmit power	1	in dB
26	Gap DIUC/UIUC insertion	1	1 - for this system 2 - for systems which do not comply with the criteria at type
27	Number (message specific)	1	Number of distinct BS configurations < 20 Number of SSs < 200
28	Two field structure	2	Each element in the structure is coded with 8 bits)

29	Radio signature type	1	Radio Signature type: 1 - RSS1 of this system, signature from SS1 (logical numbering) 2 - RSS2 of this system . . 199 - RSS199 of this system 200 - RBS1 of this system (BS in configuration 1, logical numbering) 201 - RBS2 of this system, configuration 2 . . 220 - RBS20 of this system, configuration 20 221 - maximum interference from all the CX_SS (compatible with WirelessMAN-CX), which operate inside the frequency block 222- maximum interference from all the CX_BS, which operate inside the frequency block 223 - maximum interference from all the CX_SS, which operate in a channel, which overlaps the operating channel of the requesting BS 224 - maximum interference from all the CX_BS, which operate in a channel, which overlaps the operating channel of the requesting BS 225 - maximum interference from all the NON-CX_SS, which operate in a channel, which overlaps the operating channel of the requesting BS 226 - maximum interference from all the NON-CX_BS, which operate in a channel, which overlaps the operating channel of the requesting BS 227 - maximum interference from all the CX_SS, which operate in the upper adjacent channel relative to the operating channel of the requesting BS 228 - maximum interference from all the CX_BS, which operate in the upper adjacent channel relative to the operating channel of the requesting BS 229 - maximum interference from all the CX_SS, which operate in the lower adjacent channel relative to the operating channel of the requesting BS 230 - maximum interference from all the CX_BS, which operate in the lower adjacent channel relative to the operating channel of the requesting BS
30	Renting_out_start_time	2	in millisecond
31	Renting_out_end_time	2	in millisecond
32	Negotiation_Mode_Bit_Flag (NMBF)	1	scalar
33	T_renting_sub-frame	2	in millisecond
34	Start_negotiation_time	2	in millisecond
35	End_negotiation_time	2	in millisecond
36	Pricing_Bit_Flag (PBF)	1	Scalar
37	Minimum number of Credit Token (MNCT)	6	in number of credit tokens

38	Requester_bid	6	in number of credit tokens
39	Rented_resource_amount	1	Scalar
40	Renting_in_start_time	2	in millisecond
41	Renting_in_end_time	2	in millisecond
42	Minimal_payoff	6	scalar
43	Maximal_payoff	6	scalar
44	Requester_bid_update	6	in number of credit tokens
45	Resource_Granting_Bit_Flag (RGBF)	1	scalar
46	Clearing_price	6	in number of credit tokens
47	Renting_sub-frame_start_time	2	in millisecond
48	Renting_sub-frame_end_time	2	in millisecond
49	Acceptation_Bit_Flag (ABF)	1	scalar
50	LC	1	scalar
51	Coexistence_community_BSID	24	List of the BSID of the systems belonging to the community of the offeror for CT-CXP

52	Radio Application Identifier (guidance from ECC Decision 25)	8	ASCII coding: AGA - Air Ground Air BSS - Broadcasting Satellite Service CRS - Central Radio Station DCS 1800 - Digital Communication System DECT - Digital Enhanced Cordless Telecommunication System DME - Distance Measuring Equipment DSI - Detailed Spectrum Investigation DVB-T - Terrestrial Digital Video Broadcasting EESS - Earth Exploration-Satellite Service EGSM - Extended GSM ENG - Electronic News Gathering EPIRB - Emergency Position-Indicating Radiobeacon ERMES - European Radio Messaging System FSS - Fixed Satellite Service FWA - Fixed Wireless Access GMDSS - Global Maritime Distress and Safety System GNSS - Global Navigation Satellite System GSM - Global System for Mobile Communications HAPS - High Altitude Platform Systems HDTV - High Definition Television HIPERLAN - High Performance Radio Local Area Network IBCN - Integrated Broadband Communications Network ILS - Instrument Landing System IMT-2000- International Mobile Telecommunications ISM - Industrial, Scientific and Medical applications JTIDS - Joint Tactical Information Distribution System MIDS - Multifunctional Information Distribution System MLS - Microwave Landing System MSI - Maritime Safety Information MSS - Mobile Satellite Service MWS - Multimedia Wireless Systems NGSO - Non-geostationary Satellite Orbit OB - Outside Broadcasting OR - Off-Route PAMR - Public Access Mobile Radio (PMR) PMR - Professional Mobile Radio, Private Mobile Radio R - Route RA - Radio Astronomy SAB - Services Ancillary to Broadcasting SAP - Services Ancillary to Programming S-PCS - Satellite Personal Communication System SRD - Short Range Device TETRA - Terrestrial Trunked Radio RFID - Radio Frequency Identification systems RLAN - Radio Local Area Network RTTT - Road Transport & Traffic Telematics SNG - Satellite News Gathering SRD - Short Range Devices SSR - Secondary Surveillance Radar T-DAB - Terrestrial Digital Audio Broadcasting TACAN - Tactical Air Navigation System VLBI - Very Long Baseline Interferometry (Radio Astronomy) VOR - VHF Omni-directional Range VTS - Vessel Traffic System (radar) VSAT - Very Small Aperture Terminal
53	Radius of protection area	1	In km
54	Date	3	Format: day (5 bits): month (4 bits):year(8bits) - decimal digits, day being most significant
55	Absolute time	4	Format: hour(5bits): minutes (6 bits): seconds (6 bits) - decimal digits, hour being most significant
56	Antenna direction	2	In degrees, clock-wise, reference North (180 for South)
57	Long duration	3	In minutes, hex number
58	Adjacent Channel Leakage Ratio (ACLR)	1	Ratio of the transmitter power to the leakage power in the adjacent channel, in dB
59	Number of structures	1	Number of structures to be listed in continuations
60	Number of TLVs in a structure	1	Used in conjunction with the Number of structures

61	ID of the destination forwarding SS	6	
62	Notification Bit Flag (NBF)	1	This flag indicates whether the forwarding SS is selected to complete the CT-CXP operations or not: 1: forwarding SS is selected 0: forwarding SS is not selected
63	BSID of destination	6	
64	BS IP of destination BS	variable	4 bytes if IPv4 is supported 16 bytes if IPv6 is supported
65	BS EIRP	1	dBm
66	BS_GPS_LOC	4	16 MSB for BS Lat 16 LSB for BS long
67	BS_HGHT	2	Height of BS antenna above sea level in meters.
68	BS_RF_Sector_ID	5	bits 0-3: ID bits 4-7: gain (dBi),2dB resolution bits 8-15: azimuth, 2 degree resolution bits 16-23: 3dB aperture, 2 degrees resolution bites 24-25: polarization, with: 00 - vertical, 01- horizontal, 11: circular bit 26: beam-forming, 1=yes bits 27-30 no.of antenna elements bits 31-34 no.of possible beams bit 35 - Interference cancellation capability bit 36 - MIMO capability (which can imply interference cancellation to the same PHY cases) bits 37-39: reserved Note: In the case of beamforming the antenna gain refers to the gain of a single beam The azimuth and 3dB aperture refers to the whole sector covered Beam directions will be considered as uniformly spaced within the sector Beamwidth will be approximated as the sector beamwidth divided by the number of antennas A "1" in either MIMO capability or Interference cancellation capability would mean that the BS/SS is able to devote antenna resources to cancel external interference.
69	SSID	6	
70	SS EIRP	1	dBm

71	SS_RF_Sector_ID	5	bits 0-3: ID bits 4-7: gain (dBi), 2dB resolution bits 8-15: azimuth, 2 degree resolution bits 16-23: 3dB aperture, 2 degrees resolution bits 24-25: polarization, with: 00- vertical, 01- horizontal, 11- circular bit 26: beam-forming, 1=yes bits 27-30 no. of antenna elements bits 31-34 no. of possible beams bit 35 - Interference cancellation capability bit 36 - MIMO capability (which can imply interference cancellation to the same PHY cases) bits 37-39: reserved Note: In the case of beamforming the antenna gain refers to the gain of a single beam The azimuth and 3dB aperture refers to the whole sector covered Beam directions will be considered as uniformly spaced within the sector Beamwidth will be approximated as the sector beamwidth divided by the number of antennas A "1" in either MIMO capability or Interference cancellation capability would mean that the BS/SS is able to devote antenna resources to cancel external interference.
72	DFS_LE_PWR_FRQ	4	Bit 0: Set to 1 for non-WirelessMAN-CX Bits1-5: Device Type Bits 6-15: Device detection specific Bits 15-31: CCID
73	CX Proxy ~~IP~~ network address 4 bytes~~IPv4~~	4	to support for example IPv4
74	CX Proxy ~~IP~~ network address ~~IPv6~~6 bytes	16	to support for example IPv6
75	GPS location for Fixed SS	2	provides additional information regarding SS location for a protocol sniffer
76	DL Master sub-frame	1	Indicator of the MAC Frame in CX-Frame
77	Coordinated Coexistence type	1	1: CX-Frame 2. CX-Frame and CX-CBP

The detailed description of the service primitives is provided in continuation.

~~15.5.1.1~~ 15.6.1.1 Search Neighbors Request (M-CX-SRC-REQ)~~message~~

Function: ~~The BSIS requests to the foreign BSIS about geographical information of the requested WirelessMAN-CX BS.~~
This primitive is used by a Base Station to request BSIS to provide the geographical information of the neighbors Base Stations.

Semantics:

M-CX-SRC-REQ

(
Destination: BSIS
Attribute_List:
(
Null
)

~~Attributes are show in *Error! Reference source not found.*~~

~~Table h10—Search Neighbors Request message attribute~~

~~Attribute~~	~~Contents~~
~~BSID~~	~~BSID of the BSIS.~~
~~Latitude~~	~~The latitude information of the BS.~~
~~Longitude~~	~~The longitude information of the BS.~~
~~Altitude~~	~~The altitude information of the BS.~~
~~Maximum coverage at Max. power~~	~~The maximum radius at maximum allowed/designed power that the BS intends to detect its coexistence neighbors.~~

When generated:

- when the BS is installed for the first time
- when the BS wants to up-date its internal data-base

Effect of Receipt:

- BSIS shall respond with a message based on the CX_M_SRCH_NBR_RSP primitive.

15.6.1.2 Search Neighbors Response (CX_M_SRCH_NBR_RSP) ~~message~~

Function:

The foreign BSIS responds to the requesting BSIS to Search Neighbors Request with a Search Neighbors Response message.
The query results are in the format of a list of structures, each structure describing a Base Station using the attributes defined in Table h11. ~~Coexistence Neighbor Topology Parameter Set, each result will contain the attributes shown in *Error! Reference source not found.*. Each BSID TLV indicates start of new result.~~

Semantics:

M-CX-SRC-RSP
(
Destination: BS
Attribute List:
Number of Structures
for (i=0, i < Number of structures)
(

BSID
Channel Center Frequency
Channel Width
Channel information
Latitude
Longitude
Altitude
Maximum coverage at Max. power
)
)

Table h11—Search Neighbors Response message attribute

Attribute	Contents
Number of structures	The number of Base Stations for which is provided the information
BSID	The BSID of the requested BS.
Channel Center Frequency	in10kHz
Channel Width	in10kHz
Channel information	The channel information of the requested BS. Containing Modulation mode, alternative Channel Flag ???
DL Master sub-frame	Indicator of the MAC Frame in CX-Frame
Coordinated coexistence type	The coordinated coexistence type (CX-Frame or CX-Frame + CX-CBP)
Latitude	The latitude information of the BS.
Longitude	The longitude information of the BS.
Altitude	The altitude information of the BS.
Maximum coverage at Max. power	The maximum radius at maximum allowed/designed power that the BS intends to detect its coexistence neighbors.

When generated:

- As response to the message using the **M-CX-SRC-REQ** primitive.

Effect of Receipt

- BS should up-date the list of its neighbors.