

Enhancing Channel Availability Query to support database query for multiple locations based on multiple-point locations

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Multiple Locations Channel Availability Query				
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Abstract

- ❑ **This Presentation provides comment resolution for comments related with multiple locations channel availability query. The comments in general refer to the lack of the current TG 802.11af D1.0 draft to address the provision in the FCC 10-174 document that allows loading of channel lists for multiple locations so that mode II devices can operate in commonly available channels without contacting the database frequently.**
- ❑ What is stated in the rule “A Mode II personal/portable device may load channel availability information for multiple locations around, *i.e., in the vicinity of, its current location and use that information in its operation. A Mode II TVBD may use such available channel information to define a geographic area within which it can operate on the same available channels at all locations, for example a Mode II TVBD could calculate a bounded area in which a channel or channels are available at all locations within the area and operate on a mobile basis within that area*”. **FCC 10-174 Appendix B Final Rule,**

Comments to be addressed in this presentation

CIDs 117,119,120,121,122,123,124,125, 518, 946

CID	Comment	Resolution proposed by commenter
117	<p>as it stands out the "Channel Availability Query" is a generic channel availability request applicable for a particular location. For personal portable devices that support to define a geographic area (an area formed from multiple locations) within which they can operate based on availability of channel information for multiple locations, a separate query frame like "Multiple Locations Channel Availability Query" should be sent. The September FCC release 10-174 states " Mode II personal/portable device may load channel availability information for multiple locations around, i.e., in the vicinity of, its current location and use that information in its operation. A Mode II TVBD may use such available channel information to define a geographic area within which it can operate on the same available channels at all locations, for example a Mode II TVBD could calculate a bounded area in which a channel or channels are available at all locations within the area and operate on a mobile basis within that area." The current channel availability query doesn't have the provision to exploit the above concept.</p>	<p>Include an MLME service primitive exchange for a new frame "Multiple Locations Channel Availability Query". Details of such query is described in a comment resolution file DCN 11-11-0259-00-00af</p>

Comments to be addressed in this presentation

CID	Comment	Resolution provided by the commenter
119	Table 8-51 should include Multiple Location Channel Availability Query information element	Include Multiple Channel Availability Query in Table 8-51. The detail is described in a comment resolution file DCN DCN 11-11-0259-00-00af
120	Table 8-88 should include Multiple Location Channel Availability Query information element capability	Include Multiple Channel Availability Query capacity description in Table 8-88. The detail is described in a comment resolution file DCN 11-11-0259-00-00af
121	The information elements in this section should include "multiple locations channel availability query"	Include Multiple Channel Availability Query information element as section 8.4.2af7. The detail is described in a comment resolution file DCN 11-11-0259-00-00af
122	Section 8.4.5 should address / include "multiple location channel availability query"	Include Multiple Channel Availability Query information element ID in Table 8-45af1, and include Channel availability query information element format in section 8.4.5. The detail is described in a comment resolution file DCN 11-11-0259-00-00af
123	Section 8.5 should address / include action frame format for "multiple location channel availability query"	Include Multiple Channel Availability Query action field value in Table 8-131, and include Channel availability query public action frame format in section 8.5. The detail is described in a comment resolution file DCN 11-11-0259-00-00af
124	Section 8.5.11 should address / include protected dual of public action frame for "multiple location channel availability query"	Include Multiple Channel Availability Query protected dual of public action field value in Table 8-143, and include Channel availability query protected dual of public action frame description in section 8.5.11 The detail is described in a comment resolution file DCN 11-11-0259-00-00af
125	Section 10.12.1 should include procedure for multiple location channel availability query	Include multiple channel availability query procedure. The detail is described in a comment resolution file DCN 11-11-0259-00-00af

Comments to be addressed in this presentation

CID	Comment	Resolution provided by the commenter
518	Current specification does not support mobility for devices while operating in TVWS band. For example, as per FCC's rules, a Mode II devices can obtain list of available channel for multiple locations to utilize such information for their operation while moving. Other regulatory consultations currently ongoing (e.g. Ofcom, CEPT SE43) are also supportive of mobility of TV band devices.	Include the options as stated in the comment.
946	According to the FCC rule, a Mode II device may load channel availability information for multiple locations around, i.e., in the vicinity of, its current location and use that information in its operation.	Describe how channel available query protocol obtains the channel availability information for multiple locations. The device location information may include the vicinity information by extending resolution value of the location information.

Resolution provided to the comments CIDs 117,119,120,121,122,123,124,125, 518, 946

Resolution: Agree in principle, modify the current channel availability query to include the possibility of requesting for common channel list applicable to a bounded region by two points in addition to the channel list for the current location.

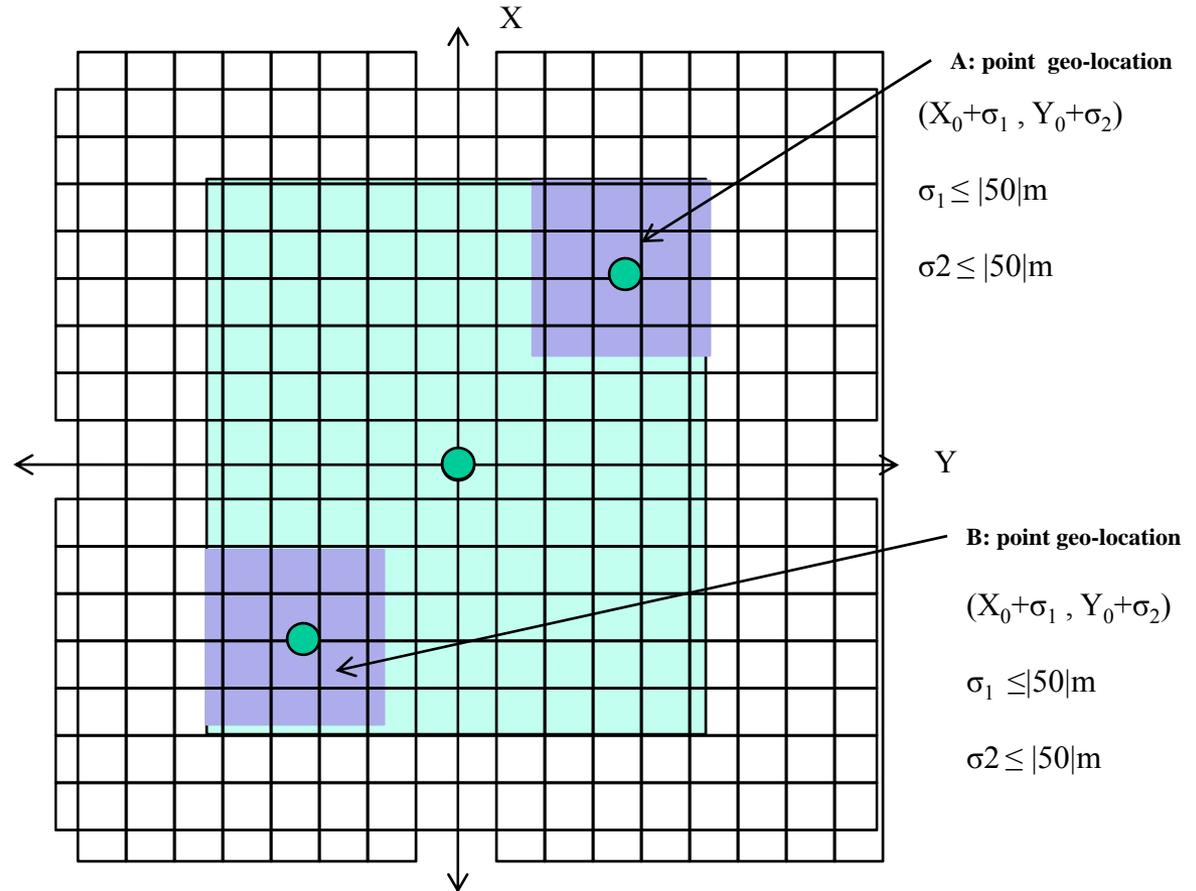
- 1- Add reason result code values in the CAQ reason result code table to represent success to provide common channel list
- 2- Use one bit in the CAQ information field serving as a flag during request for the common channel list applicable to a bounded region
- 3- Include option for multiple locations in the CAQ request frame to create a bounded region of interest
- 4- WSM field in the CAQ response frame either contains available common channel list for the bounded region depending on the CAQ information field

Assumptions in the proposed resolution

- **TVWS data base can identify commonly available channels for a given volume (bounded by multiple point-locations)**
- **When applicable TVWS data responds to location information with multiple point-locations by looking at the device type, and location information**
- **All TVWS databases might not be capable to process and respond with a common channel to location information with multiple point-locations**

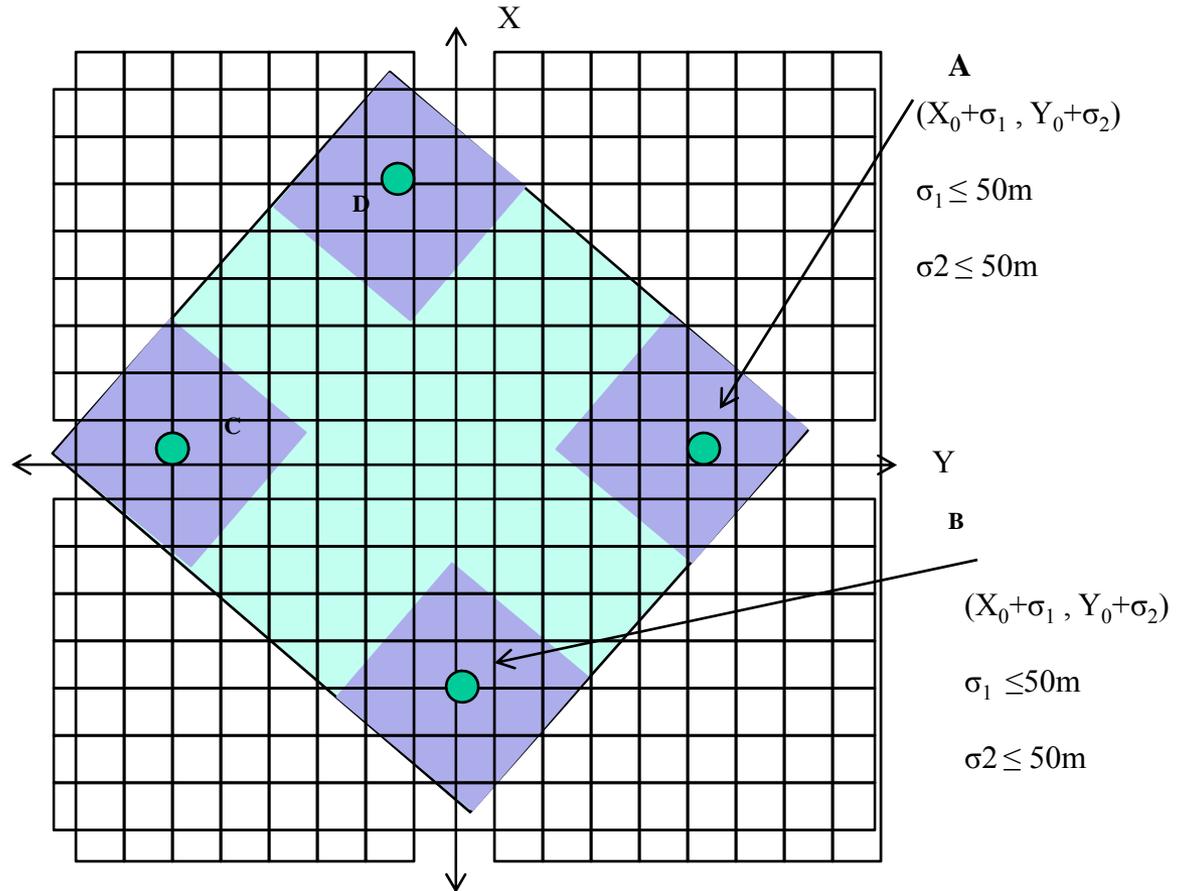
Explanation: How to determine a bounded region by using two or more location points

- Illustrative example II (*elevation info is omitted for presentation purpose*)
- Location A and B are the two point locations (each with +/-50 meter coordinates accuracy). The geographic volume between the two locations (A & B) defines the required available channel list.



Explanation: How to determine a bounded region by using two or more location points

- Illustrative example III (*elevation info is omitted for presentation purpose*)
- Location A, B, C, D are four point-locations (each with ± 50 meter coordinates accuracy). The geographic volume bounded by the four point-locations (A,B,C,D) defines the required available channel list.



Explanation: Channel Availability Query modified to support multiple locations channel load

Info ID	Length	Requester STA Address	Responder STA Address	Reason Result Code	Channel Query Info	Device Class	Device Identification Information	Device Location Information	WSM element body fields
1	2	6	6	1	1	variable	variable	variable	variable

Figure 8-45af4—Channel Availability Query element format

Extended CAQ

Info ID	Length	Requester STA Address	Responder STA Address	Reason Result Code	Channel Query Info	Device Class	Device Identification Information	Device Location Information	WSM element body fields
1	2	6	6	1	1	variable	variable	variable	variable

Can be repeated to indicate multiple locations



Octets

Explanation: Channel Availability Query modified to support multiple locations channel load

○ Remarks:

- When a Mode II device, uses extended CAQ to request channel availability for multi-location purpose
 - Indication is done in the channel query info field
 - Multiple locations are provided. The multiple locations are used to define a bounded region for which common channel list is computed and returned

Explanation: Channel Availability Query modified to support multiple locations channel load

- Remarks:
 - When a Mode II device, uses extended CAQ to obtain channel availability for multi-location purpose,
 - success to provide common channel list is indicated in the reason result code
 - success to provide current location channel list is indicated in the reason result code

Explanation: The Reason Result Code Table is modified to support multiple locations channel load

Table 8-45af2—Reason Result Code field values

Reason Result Code field value	Description
0	Reserved
1	Channel Availability List requested
2	Reserved
3	Success with the Available Channel List result
4	Request declined
5	Request not successful because of Device ID verification failure
6	Request not successful as one or more parameters have invalid values
7	Handshake timeout
8-255	Reserved

- Add Reason Result Code field value (4) with description **Common Available Channel List result returned**
- Modify the result code for success (3) with description **Current Location Available Channel List returned**

Explanation: The channel query info field format is modified to support multiple locations channel load

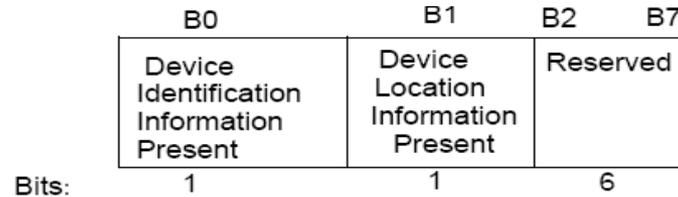
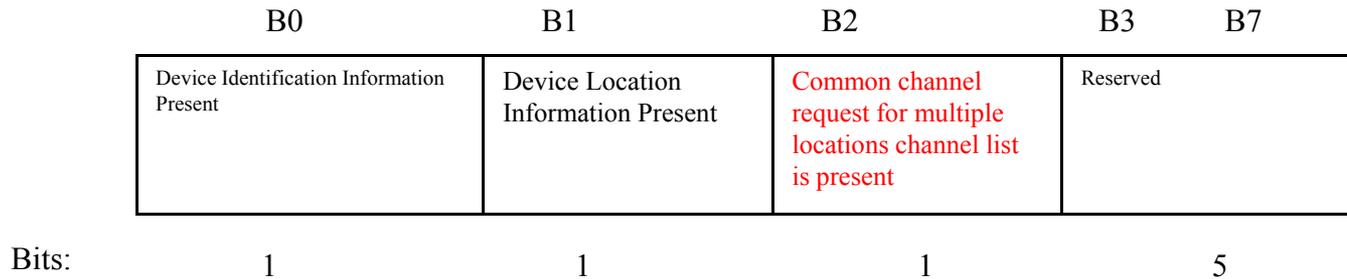


Figure 8-45af5—Channel Query Info field format



- B2: Common channel request for multiple locations channel list present. If the bit of this field set to 1, channel availability query applies to the region of geo-location bounded by the multiple locations supplied
- Modify the reserved field B3-B7