

Enhanced Channel Availability Query to support database query for multiple locations

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Authors:

Multiple Locations Channel Availability Query				
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Summary

- ❑ **As a comment resolution to comments, 518, ... ,this document provides a proposal to adapt the 802.11af draft to include the multiple geo-locations channel loading capability as specified in the FCC 10-174 document**
 - **Enhancement of channel availability query to support database query for multiple locations at a time.**

Discussion: 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. **Appendix B Final Rule,***
- A Mode II personal/portable device shall incorporate a geo-location capability to determine its **geographic coordinates** to an accuracy of +/- 50 meters.

Assumptions

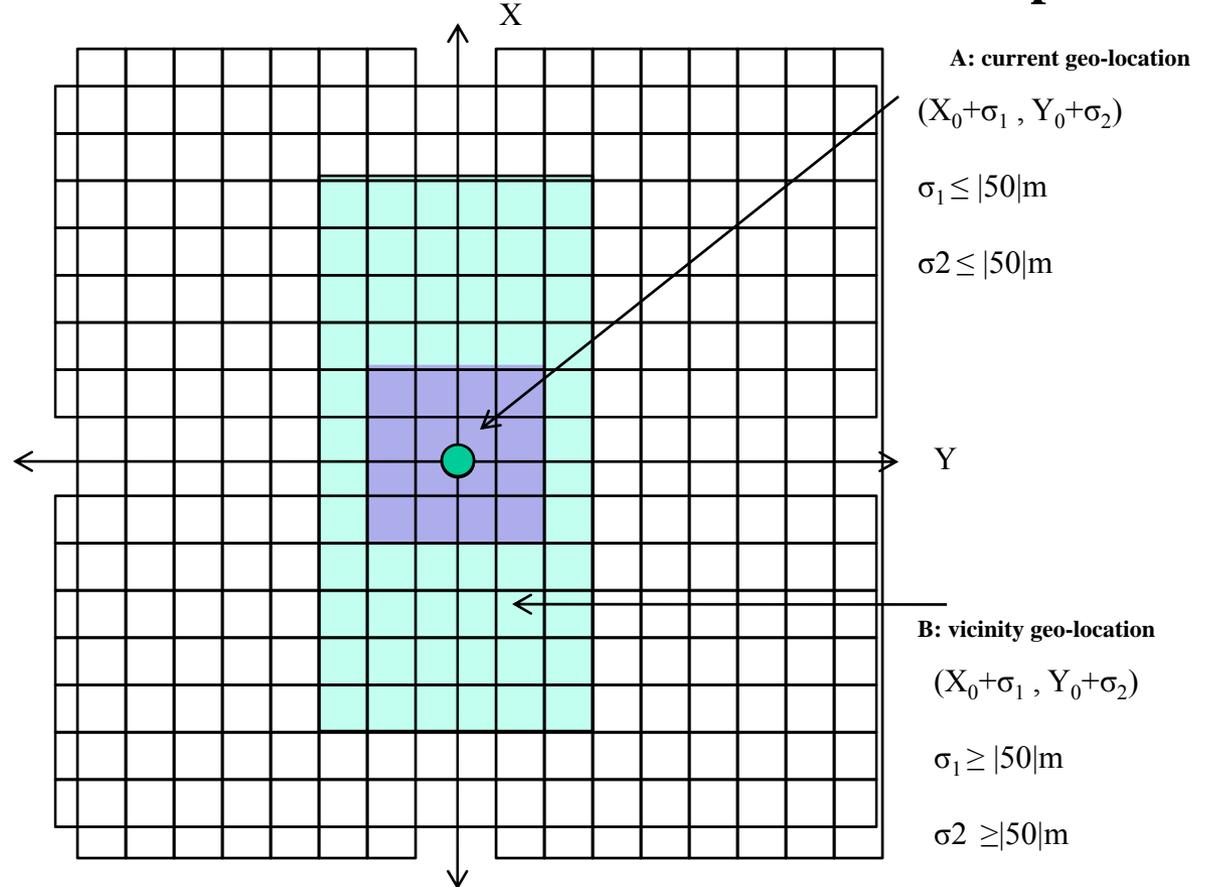
- **TVWS data base can identify commonly available channels for a given volume (indicated by the resolution bits of location information or bounded by 2 or more point-locations)**
- **When applicable TVWS data responds to location information with resolution bits or multiple point-locations by looking at the device type, and location information**
- **All TVWS data bases might not be capable to process and respond to location information with resolution bits or multiple point-locations**

How it works

- Identify the current geo-location
- Select the intended mobility region by the mode II device, and determine the resolution of altitude, longitude and elevation with respect to the current geo-location to cover the intended mobility region.
- Send channel availability query (CAQ) with the geo-location with the specified resolution bits, and a flag indicating that the resolution bits has been set
- If the database supports to process location information with resolution bits, it will provide available channel list applicable to the requested area/region
- If the database doesn't support to process the location information with resolution bits, it will return the CAQ by resetting the multilocation flag to 0, and send the available channel list applicable to the current location with the range of 100 meter radius.
- If a mode II device uses the available channel list applicable to an area more than 100m radius, it can operate on those channels on mobile basis without contacting further the database with in the next 24 hrs as long as it is with in the bound of the geographic region defined by the resolution bits.
- The device should re-recheck its position every 60s and if the location is detected to be outside the stored boundary of the operating geographic area, the device must contact the database to obtain a valid channel list for that area.

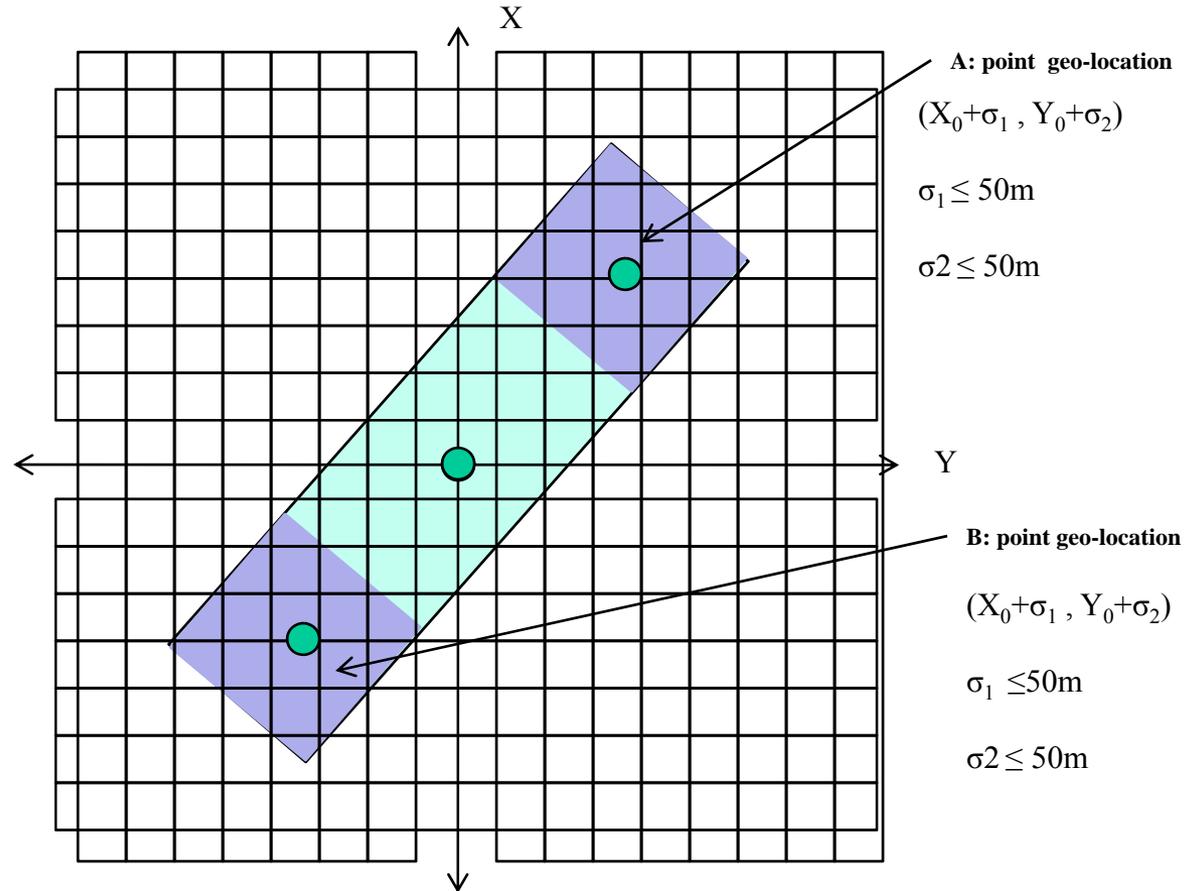
How to determine vicinity geo-locations around the current location based on the “resolution concept”

- Illustrative example I (*elevation info is omitted for presentation purpose*)
- Location A is the current location and it is specified by LCI with in +-50 meter resolution of the coordinates.
- Location B is the current location and it is specified by LCI with resolution bits set to indicate the volume coverage needed for mobility.



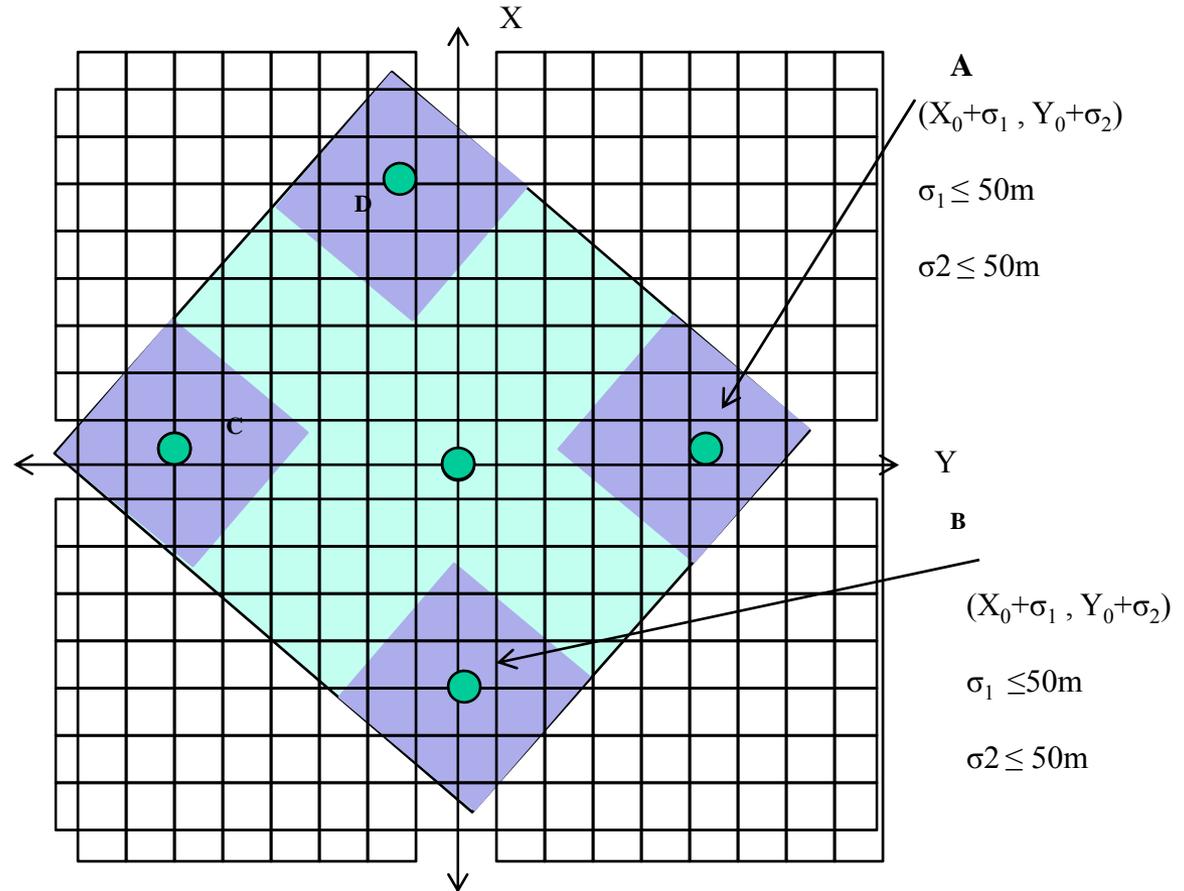
How to determine vicinity geo-locations around the current location based on a “multi point-location” concept

- 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.



How to determine vicinity geo-locations around the current location based on a “multi point-location” concept

- 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.



Extend Channel Availability Query to support multiple locations channel load for the “resolution concept”

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
Octets: 1	2	6	6	1	1	variable	variable	variable	variable

Figure 8-45af4—Channel Availability Query element format

Extended

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	
Octets	1	2	6	6	1	1	variable	variable	variable	variable

Modify Reason Result Code fields of CAQ for the “resolution concept”

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 (8) with description failed to load multiple locations channel availability
- Add reason result code field value (9) with description success to load channel availability applicable to multiple locations

Modify the channel query info field format for the “resolution concept”

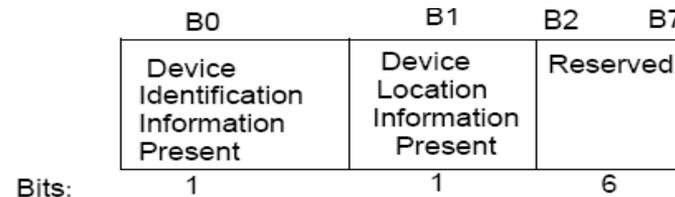
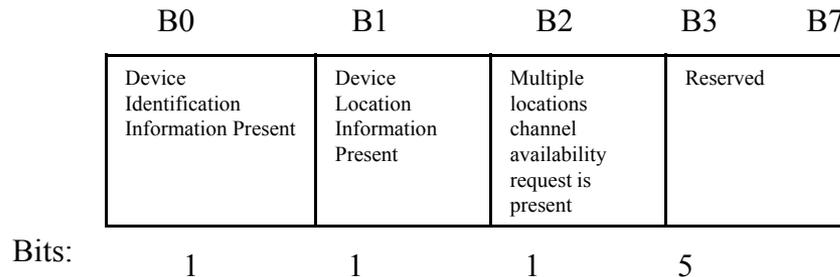


Figure 8-45af5—Channel Query Info field format



- B2: Mutple locations channel availability request is present. If the bit of this field set to 1, channel availability query applies to the volume of geo-location bounded as indicated by the device location information and resolution bits
- Modify the reserved field B3-B7

Extend Channel Availability Query to support multiple locations channel load for the “multi point-location concept”

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
Octets: 1	2	6	6	1	1	variable	variable	variable	variable

Figure 8-45af4—Channel Availability Query element format

Extended

Repeat this as indicated in the length



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
Octets	1	2	6	6	1	1	variable	variable	variable

Modify Reason Result Code fields of CAQ for the “multi point-location concept”

Table 8-45af2—Reason Result Code field values

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- Add Reason Result Code field value (8) with description failed to load multiple locations channel availability
- Add reason result code field value (9) with description success to load channel availability applicable to multiple locations

Modify the channel query info field format for the “multi point-location concept”

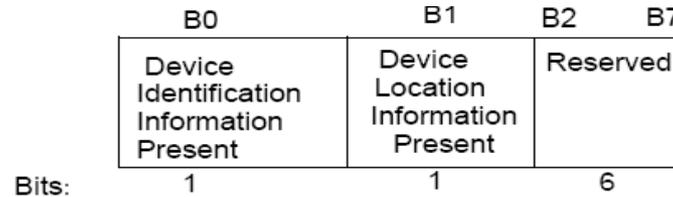
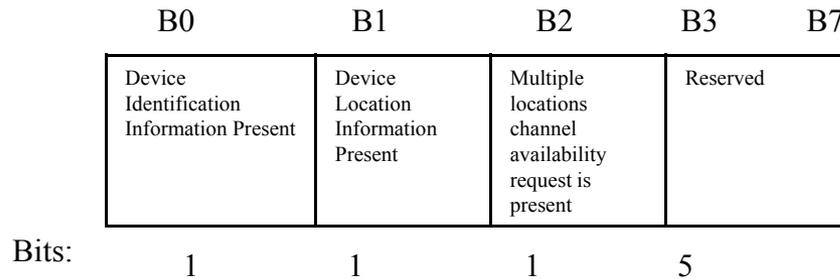


Figure 8-45af5—Channel Query Info field format



- B2: Mutple locations channel availability request is present. If the bit of this field set to 1, channel availability query applies to the volume of geo-location bounded by the locations supplied
- Modify the reserved field B3-B7

Way forward

Suggested straw poll to gather opinion of the audience

- 1- Are you interested to include in the current draft, a provision for querying available channel list applicable to a bounded area by providing a point-location with resolution bits set to indicate the bounded area to the database.
- 2- Are you interested to include in the current draft, a provision for querying available channel list applicable to a bounded area through identifying and providing multiple locations to the database