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(Submitted by email)

**Subject:**        **Installation/site data elements listed in Annex B of CPC-2-1-23 -  
Licensing Procedure for Spectrum Licences for Terrestrial Services**

Dear Mr. Rochon,

On November 10, 2021, the Department requested the RABC provide preliminary comments on certain matters related to ISED's ongoing review of the required radiocommunication installation data (site data) elements listed in Annex B of CPC-2-1-23 - *Licensing Procedure for Spectrum Licences for Terrestrial Services*. The Department's request was assigned to the RABC Spectrum Management Innovation Committee, which held three calls to consider the proposed updates to Annex B of CPC-2-1-23.

The Board is pleased to provide the attached comments for the Department's consideration. We appreciate having had the opportunity to review the proposed changes.

Sincerely,



J. David Farnes  
General Manager

Attachment

cc:     Amy Jensen, Director, Spectrum Operation  
       Tara Rajan, Manager, Spectrum Operations  
       Sarah James, Analyst, Spectrum Operations

## **Comments Regarding Proposed Revisions to CPC 2-1-23, Annex B**

### **1. Proposed New Data Elements**

#### **1.1, 1.2 Site Type & Site Structure Type:**

- It may be useful for ISED to provide a code for ‘other street furniture’, which might include bus shelters, streetlights, signs, traffic lights, subway entrances and other structures lacking a civic address.

#### **1.3 Cell ID: 3GPP Cell Identifier, described in I. Facilitating Site Identification and Validation During Field Operations**

- This is relevant information that will be useful for frequency co-ordination between operators.
- The full Cell Global Identity (CGI = MCC, MNC, LAC, CI) should be used for applicable 3G systems.
- Some 3GPP systems (ex. LTE, 5G NR), have a Physical Cell ID (PCI), which should be part of the upload as a separate optional field.
- Non-3GPP systems may have an alternate mechanism for cell or sector designation that does not meet a standard format. This could be permitted in the Cell ID field if the field does not have a specified format.
- The format of this field should not be prescriptive; users should be free to enter the Cell ID in the format that is relevant to the technology used.

#### **1.4, 1.5 Radio Technology & Radio Certification Number:**

- RABC proposes that ISED provide codes for additional commonly used non-3GPP standards such as WiMAX and Wi-Fi. ISED should be prepared to expand this list to allow for future technologies.
- RABC proposes a text field to provide a description of the technology, if the technology is “Other”. This will assist with co-ordination between operators.

#### **1.6 Antenna Type:**

- The RABC notes that some antenna equipment may operate in a mode that is a hybrid of non-AAS correlated and non-AAS un-correlated mode. It is not clear why ISED would like to distinguish between non-AAS correlated and non-AAS uncorrelated, however if this distinction is important to ISED, a hybrid designation (Non-AAS Hybrid or Non-AAS Other) should be provided.
- ISED should clearly define and describe these antenna types, in particular the distinction between non-AAS correlated and non-AAS uncorrelated. To reduce confusion associated

with these definitions, ISED should include common industry terms in the definitions, for example:

- “Multi-User MIMO” and "spatial multiplexing" corresponding to non-AAS uncorrelated, and
- “Single-stream non-beamforming array” and “spatial or polarization diversity” corresponding to non-AAS correlated.

### **1.7, 1.8 Number of Tx Antennas & Number of Rx Antennas:**

- For active antenna systems (AAS), this information should be available in the radio certification data (see Section 1.5), and this field should not be necessary.
- ISED should be explicit in the guideline document as to what constitutes an ‘antenna’, that is, whether an antenna unit consisting of a single horizontal and single vertical element would be considered to be one or two antennas, or whether an antenna with two vertical elements would be considered to be one or two antennas.
- The purpose of this field is to observe trends and potentially to check compliance, but this field is also used to calculate overall antenna gain if gain is reported per-element in Sections 2.14 and 2.15.
- Sections 2.14 and 2.15 refer to ‘massive’ MIMO antennas. If there is a reporting distinction between ‘massive MIMO’ and other MIMO (i.e., based on the number of elements), this should be explicit and clearly stated here.

### **1.9, 1.10 Tx Antenna Vertical Beam & Tx Antenna Horizontal Beam:**

- The RABC notes that for AAS, this information should be part of the radio certification information that is referenced in Section 1.5 above, and this field should not be necessary.

### **1.11 Downlink Resource Allocation:**

- The percentage downstream utilization (duty cycle) is adequate for Safety Code 6 calculations.
- Additional information, such as subframe configuration, would be useful for coordination with other operators. Combined with the technology field, this would provide complete information for standard technologies.

### **1.12 Site ID**

- This ID corresponds to the physical site; ISED would like to have a unique Site ID for each telecommunications site Canada.
- RABC members have very strong concerns regarding an ISED-imposed site identification nomenclature.
- Most companies currently have a site ID system that is heavily integrated with their site databases and is cross-referenced across many systems. It is not feasible to change this

Site ID internally. It would be onerous and potentially error-prone to require a cross-reference to an ISED-imposed site ID system.

- Since all internal company site IDs are unique, pre-pending a company abbreviation to the company-specific site ID would create a site code that is unique to Canada. This mechanism would not impose a heavy administrative burden. For example, a Shaw/Freedom site code might be FRE-OTR0123, which may happen to be collocated with a Bell Mobility site code BEL-W4567. This could be achieved either by having the uploader prepend their site ID with their abbreviation, or by having ISED alter the field upon upload. ISED should make the requirement clear.
- If ISED retains the Company Code field, then the combination of the Company Code and Site ID would provide a unique site ID.
- An outcome of such a mechanism would be that a single site would be identified by a different site ID by each operator at the site.
- In the field, there are a number of scenarios where the definition of ‘site’ may be difficult to determine. For example, several towers in close proximity may be considered a single site, or several distinct sites. On a large rooftop (for example on a shopping mall or large retail outlet), there may be individual supporting structures located a long distance from one another which may be considered a single site or several distinct sites. As more small-cell deployments are built onto street furniture, it will become more challenging to identify a ‘site’.
- The RABC believes that it is not feasible to implement a mechanism that will define a single unique Site ID for each telecommunications site in Canada.
- It would be useful for ISED to include the carrier-specific Site ID with the information available for download. This information is useful for internal cross-reference and for directing site-specific enquiries to other carriers.

### 1.13 Site Owner:

- The RABC notes that this is an onerous requirement. Site owner information is typically stored in a separate real estate database that is not readily cross-referenced with the deployment database.
- ISED should clarify what entity should be identified in the Site Owner field. In the case of a commercial rooftop, for example, this could be the building owner, or a company contracted by the building owner to manage rooftop access, or the telecommunications operator that owns the pole on which their antenna is mounted.
- If the site owner is an individual, for example a farmer on whose silo the antenna is mounted, ISED should permit the text “private individual” in order to protect the privacy of the structure owner in these cases.
- The RABC submits that if the structure owner is not a licensee, the owner of the site does not need to be named. ISED should permit the text “non-licensee corporation”.

### 1.14 Site Sharing Indicator:

- RABC members expressed concern that this information is not readily extracted from any database. The provision of this information would be very onerous, requiring extensive manual cross-referencing for most carriers. The RABC recommends that ISED not include this field.
- The RABC further notes that this information can be determined by ISED through information that is already provided to ISED separately in the Tower Sharing Report as well as Safety Code 6 compliance reporting. In the Tower Sharing Report, carriers are required to enter site sharing agreement dates and operators on site information respectively.
- Should ISED choose to include this field against the RABC recommendation, the RABC notes that the appropriate entry for ‘Site Sharing Indicator’ will depend on both how the Site Owner is defined (see Section 1.13), and how ‘Site’ is defined (see Section 1.12).

### 1.15 Additional data fields

- The RABC proposes an open text field that can be used by operator for internal cross-reference.
- The RABC proposes a Physical Cell Id (PCI) field (see 1.3 above).
- The RABC proposes a text field associated with the Radio Technology field, in which the respondent could describe any technology described as “Other” (see 1.4 above).
- The RABC proposes a field that would hold the Subframe, Special Subframe, and frame offset identifiers for the cell.
  - A field containing this information will assist in frequency co-ordination. This field will enable operators to synchronize TDD operations in order to mitigate interference.
  - While not required to demonstrate compliance, this field will be valuable to industry users.
- The RABC proposes a field that flags an entry for removal from the database if a legacy entry persists in the database. Refer to Section 4.1 below.

## 2. Proposed Data Element Modifications

### 2.1 Make Upload **Reference Number** optional.

- RABC has no comments or concerns.

### 2.2 Limit the use of **Structure Height** to outdoor structure types.

- RABC has no comments or concerns.

**2.3 Rename Tx Channel Frequency** or Tx Lower Frequency Limit as Tx Channel Frequency and request only the Tx centre frequency of the channel. AND:

**2.4 Rename Rx Channel Frequency** or Rx Lower Frequency Limit as Rx Channel Frequency and request only the Rx centre frequency of the channel.

- The RABC notes that this field is quite problematic in cases where a transmitter transmits in a wide channel that includes more than one licence. For example, if a transmitter has a channel width of 15 MHz and occupies three 5 MHz individually licensed channels, then the operator must split this transmitter in to three separate inputs, one for each licence. This is very onerous and error prone.
- The RABC notes that currently, the SMS system permits the upload of a channel that extends beyond the licence block, provided the centre frequency is within the spectrum block.
- The RABC proposes that the database should automatically determine which licence(s) are implicated in each line of the upload file. This would require the maintenance (deletion) of old records.
- Some installations do not have an Rx Channel – for example, 700 MHz band 29, asymmetric AWS, and supplemental downlink cells. The RABC proposes that ISED accept “NULL” in the Rx Channel Frequency field.

**2.5 Rename Tx Radio Model Number** as **Tx Radio HVIN** to reinforce a standard syntax for radio model information. AND:

**2.6 Rename Rx Radio Model Number** as **Rx Radio HVIN** to reinforce a standard syntax for radio model information.

- The RABC notes that the HVIN is currently not always easy to discover. The Radio Equipment List contains numerous lines for very similar radio models. The REL is not easily searchable.

**2.7 Replace existing code system for Tx Radio Manufacturer Code.** AND:

**2.8 Replace existing code system for Rx Radio Manufacturer Code.**

- RABC has no comments or concerns.

**2.9 Rename Transmitter Output Power** as **Transmitter TCP-TRP** and request different data based on the Antenna type. Change unit of measurement from Watts to dBm.

- The RABC supports the use of dBm instead of Watts.

- ISED should make it clear in the accompanying guide that for non-AAS antennas, the TCP (the power at the antenna input) is used for non-AAS, and that for AAS, the TRP (the radiated power from the antenna) should be used since the operator does not have access to the antenna ports.
- For AAS antennas, the TCP should be available in the radio certification data (See 1.5 above), and this field should not be necessary.
- For non-AAS multi-antenna (i.e., MIMO) systems, the TCP should be used, with the antenna gain reported separately.

**2.10** Replace existing code system for **Tx Antenna Manufacturer Code**. AND

**2.11** Replace existing code system for **Rx Antenna Manufacturer Code**.

- RABC has no comments or concerns.

**2.12** Expand **Tx Antenna Height** to accept negative values in order to record underground sites.

**2.13** Expand **Rx Antenna Height** to accept negative values in order to record underground sites.

- An operator may not know exactly how deep underground an antenna is.
- The RABC proposes that a value of -1 would indicate a site that is underground at an unknown depth.

**2.14** In **Tx Antenna Gain**, require that the gain of the antenna elements be provided for massive-MIMO systems.

**2.15** In **Rx Antenna Gain**, require that the gain of the antenna elements be provided for massive-MIMO systems.

- For AAS, this information should be available from the radio certification data (see Section 1.5), and this field should not be necessary.
- For passive (non-AAS) multi-element (MIMO) antennas, ISED should be very explicit in describing whether the gain should be per-element or per-antenna.
- ISED should provide a simple example to illustrate the per-element gain calculation. For example, if the overall gain of an antenna unit containing two dual-polarized antennas (= 4 elements) is 15 dBi, then the per-element gain is  $15 \text{ dBi} - 3 \text{ dB} - 3 \text{ dB} - 3 \text{ dB} = 4 \text{ dBi}$ .
- ISED should be clear what constitutes ‘massive’, if there is a distinction between MIMO and massive-MIMO antennas. For example, antennas with 8 or fewer antenna elements might report the aggregate antenna gain, and antennas with more than 8 elements might report per-element gain. If such a distinction is made, the reporting standard for the

number of elements (Section 1.7 & 1.8) should take this into account and should be very clearly described.

#### **2.16 Site Data file uploads will be accepted exclusively in a CSV file format.**

- Allowing semicolon-delimited files may be of use to licensees using French-language versions of spreadsheet programs to export to .csv format.
- It would be forward-thinking of ISED to migrate towards accepting files in **.json** format.

#### **2.17 Additional Data Element Modifications**

- The RABC proposes that ISED standardize on decimal degree format rather than degrees-minutes-seconds format.
- The RABC proposes that the Licence Number field be standardized to accept the unchanging part of the licence number, and that the version/issue of the licence number (i.e., -001, -002, -003, etc.) be removed. Since the issue number changes on an irregular basis, it is onerous to keep records current to the correct version/issue number. However, if ISED implements a mechanism that detects the licence (see section 5.1 below), this would be redundant.

### **3. Proposed Data Element Removals**

#### **3.1 Removal of Certain Fields**

- The RABC members have some concern regarding the removal of the Site Elevation field. In some isolated cases, the site elevation from the ISED terrain database will be significantly different from the actual site elevation – for example, near cliffs, on steep terrain, or atop isolated buttes. The site elevation data taken from the operator’s site survey is generally very accurate.
- The RABC recommends that ISED use the site elevation provided by the operator.
- If ISED chooses to use an internally generated site elevation, the RABC recommends that ISED provide a warning to users if the uploaded site elevation is different from the calculated site elevation. Refer to section 5.1 below.
- If ISED does choose to remove site elevation as an input field, ISED should publish the calculated site elevation as a field in the SMS export and in response to SMS queries so that operators a) have a common and well-accepted reference value upon which to base coordination assessments, and b) have an opportunity to observe any significant errors.
- ISED should clarify what an operator should do if the calculated site elevation is significantly different from the actual site elevation – for example, an operator might alter the antenna height AGL in order to compensate for the site elevation error.



### 3.2 Additional Data Element Removals

- The RABC proposes that the Company Code field be removed. This is implied by the licence.

## 4. Further Questions for RABC:

**4.1** How should licensees and ISED manage **legacy data** that has already been entered into the site database?

- In terms of legacy data, several RABC members note that, while a new upload should erase all previous uploads for that licence, it appears to be the case that certain entries remain in the SMS even though the cell is not active (and thus not included in the latest upload). Further, it appears as though some superseded uploads appear as ‘current’ in the upload display window.
- The RABC recommends that ISED take measures to ensure that the database is cleaned of legacy entries with each new upload.
- The RABC further recommends that ISED include a field to flag an entry for removal, if that entry persists in the database despite a recent upload that does not include that entry.

**4.2** What would RABC members consider an appropriate **timeframe to transition** to/adopt these new data collection and reporting requirements?

- The RABC members ask that ISED provide at least 3 months from the time of distribution of the new, finalized, data upload format to the deadline for providing all uploads in this new format.
- The RABC members ask that ISED allow a brief time period (1 or 2 months) during which both the old and new data upload formats are accepted. This may require the maintenance of two databases for a short period of time, since is not practical to have a field with values in two different units (i.e., W and dBm).

## 5. Other General Suggestions for Improvements

### 5.1 Automatic Licence / Tier Detection

- It is very onerous to separate transmitters across several licence uploads, where those transmitters use a channel width that spans several spectrum licence blocks. The RABC recommends that ISED permit uploads that span several licences, and that the SMS system should automatically detect which licences are implicated in an upload entry.
- This automated licence detection should also address the issue of incrementing licence version/issue numbers, as described in Section 2.17 above.

- RABC requested that ISED publish the service area (tier) in the database. ISED has noted that this is planned.
- It is somewhat onerous to separate licences into service areas, and it will become very onerous to separate licences into Tier 5 service areas once these areas are in use. The RABC recommends that the SMS system should automatically determine which service areas (and hence licences) are implicated in an upload entry.

## **5.2 API for Automated Uploads and Upload Size**

- For operators with numerous individual licences, the manual upload process is cumbersome and time-consuming.
- The RABC proposes that ISED provide an API that can be used to automatically upload data.
- Operators with numerous deployments (upload files of 100,000 entries) have observed that the upload process sometimes fails, and it is necessary to attempt an upload several times in order to ensure that the upload has been successful. ISED should ensure that large file sizes can be reliably accepted. The use of an API would mitigate this concern.
- ISED should permit partial uploads. This would mean that records that are no longer valid must be removed by the operator by marking the line for deletion as described in Section 1.15 above.

## **5.3 Observations Regarding Invalid Co-Ordinates**

- Several RABC members report that the system currently does not appear to accept co-ordinates for sites located near the borders of the service area, and sites located in some coastal locations near (or beyond) the edges of the geographical service area file. In these instances, operators will either misreport the site location, or omit the site. ISED should make the service area geographical boundaries that are used to validate site co-ordinates widely available, so that users can validate their site locations. In coastal areas, ISED should re-define the service areas to extend over the water, rather than cropping some points of land.
- The RABC recommends that ISED publish geo-referenced data files for sub-divided tiers in a single, widely accessible repository.

## **5.4 Improved Error Logs and Warnings**

- The existing error messages are unhelpful, particularly for upload files with many entries. The RABC recommends that ISED provide a log file that identifies (1) the entry / line number of the error, and (2) the field that caused the error, or a description of the error. In the case of an API interface for automated upload, the log file should also clearly identify the upload file.

- Some entries in the current SMS database display information that is highly unusual and likely to be an error, for example exceedingly high values of Tx Power or Antenna Height. The RABC recommends that ISED define a ‘normal range’ for these and other similar fields, and that the log file contain warnings when these values fall outside the normal range. The SMS database should, nonetheless, accept these unusual values as they may be valid.
- Wherever warnings are provided, they should be clearly distinguished from errors.

### **5.5 Compatibility with FCC AFC Database**

- Current AFC database solutions (ex. 6 GHz and TVWS) include some standardized fields, for example ‘receiver noise figure’, which are not currently included in the proposed data upload format. Some of these fields may be accessible using the radio certification information. The RABC recommends that ISED ensure that standard AFC extract fields are available and supported by the SMS upload system in order to future-proof the SMS database should any of the bands become managed by an AFC-type database system.

### **5.6 General Clarity and Field Descriptions**

- The RABC recommends that ISED provide a full and clear description of each field, including the units of the field, and where this information is to be sourced (in the case of references to other ISED resources). ISED should include examples where appropriate. The technical terms used by ISED may, in some cases, not be used by equipment manufacturers, so technical terms (such as non-AAS correlated and uncorrelated antenna types) should be clearly described.

### **5.7 Licensing Database Availability**

- ISED should provide a downloadable database of all spectrum licences, including all fields that are publicly available through the Spectrum Licence Browser (licensee, dates, tier, frequencies, conditions, etc.).

### **5.8 Consolidation of Company Identifiers**

- In many cases, a single company has multiple company names / codes in the SMS database. The RABC proposes that ISED consolidate these multiple company identifiers when all refer to the same company.