6 GHz Supplementary Data Repository Technical Specification

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Contributors

The following individuals made significant contributions to this document:

Group Chair: Navin Hathiramani (Nokia)

Other Member Representatives:

- CommScope: Peter Young
- Sony: Sho Furuichi

6 GHz Supplementary Data Repositories Technical Specification

1 Introduction and Scope

In order to address ULS data issues observed by WINNF-RC-1010 [n.2], WINNF-TS-1014 [n.1] defines the methods to determine the parameters of fixed service receivers required for their protection. As those methods require information that is not recorded in the ULS, a set of Supplementary Data Repositories is needed to assist the AFC Systems.

The scope of this specification is to define the access to, schema and use of different Supplementary Data Repositories which assist AFC Systems in more accurately defining the level of protection required for fixed service receivers.

This version of the specification includes requirements for the following Supplementary Data Repositories:

1) FCC Category B1 Antenna Model Listing
2) High Performance Antenna Model Listing
3) Indoor Radio Unit Listing
4) FCC Fixed Service Channelization Repository

2 Keywords or Requirements Language

The key words "required", "shall", "shall not", "should", "should not", "recommended", "may", and "optional" in this document are to be interpreted as described in RFC-2119 [n.3]. In addition, the key word “conditional” shall be interpreted to mean that the definition is an absolute requirement of this specification only if the stated condition is met.

3 References

3.1 Normative references

[n.1] WINNF-TS-1014, “Functional Requirements for the U.S. 6 GHz Band under the Control of an AFC System”, Wireless Innovation Forum

[n.2] WINNF-RC-1010, “Recommendations for Addressing Blank, Uncollected, Erroneous, or Conflicting Database Elements for Incumbent Systems in the U.S. U-NII 5 & 7 Bands for the Purpose of Automated Frequency Coordination Systems”, Wireless Innovation Forum

[n.3] RFC-2119, "Key words for use in RFCs to Indicate Requirement Levels", March 1997.

[n.4] 47 C.F.R. §101.115(b)(2) available at https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-101#101.115.

[n.5] WINNF-6GHZ-0003-V0.0.1 6 GHz Supplementary Data Repository Policy

[n.6] ITU Recommendation ITU-R F.699-8, "Reference radiation patterns for fixed wireless system antennas for use in coordination studies and interference assessment in the frequency range from 100 MHz to 86 GHz", available at https://www.itu.int/rec/R-REC-F.699/en.

[n.7] 47 C.F.R. §101.147 available at https://www.ecfr.gov/current/title-47/section-101.147

4 Definitions and Abbreviations

Any previously undefined terms and abbreviations first used in the current version of this document are defined below. All previously defined terms and abbreviations are available at [n.1].

5 Access, Creation, Modification and Use of Supplementary Data Repositories

This section specifies the following items concerning the Supplementary Data Repositories:

- Access rights
- Record creation and update
- Use of the Repositories

5.1 Access to the Supplementary Data Repositories

The Supplementary Data Repositories shall have no read access control so that the records in the Supplementary Data Repositories are available to general public.

5.2 Supplementary Data Repository Creation and Update

Entities, members or individuals that desire to create a new Supplementary Data Repository or modify an existing Supplementary Data Repository shall follow WINNF-6GHZ-0003 [n.5].

5.3 Use of the Supplementary Data Repositories

The use of any data recorded in the Supplementary Data Repositories, specified within this document, by AFC Systems is subject to WINF-TS-1014 [n.1]. Supplementary Data Repositories will be stored at: https://github.com/Wireless-Innovation-Forum/6-GHz-AFC.

6 Descriptions of Supplementary Data Repositories

6.1 General

This section provides the information about the Supplementary Data Repositories.

6.2 FCC Category B1 Antenna Models Repository

The FCC Category B1 Antenna Models Repository is designed to be used by the AFC System to determine whether an antenna model provided in the FCC ULS is a Category B1 Antenna as defined by the FCC Rules [n.4] for the purpose of determining the radiation pattern envelope according to WINNF-TS-1014 [n.1].

Category B1 Antennas are generally older antennas and are not expected to change much over time based on current usage trends. Regardless, a repository is required to allow for changes, and to provide as complete a list as possible.

6.3 High Performance Antenna Models Repository

The High Performance Antenna Models Repository is designed to be used by the AFC System to determine whether an antenna model provided in the FCC ULS is a High Performance Antenna as defined by the FCC Rules [n.4] for the purpose of determining the radiation pattern envelope according to WINNF-TS-1014 [n.1].

Antennas that are considered high performance not only meet FCC Category A, they also are comparable to the patterns provided by the formulas in ITU-R F.699-8[n.6]. This repository list is expected to change over time based on current usage trends. This repository is required to allow for changes and to provide as complete a list as possible.

6.4 Indoor Unit Models Repository

Deprecated. Replaced by 6.9 Transmit Radio Unit Architecture Repository.

6.5 FCC Fixed Service Channelization Repository

The FCC Fixed Service Channelization Repository is designed to be used by the AFC System to determine the bandwidth that a fixed service receiver is receiving in the event that it cannot be determined from the FCC ULS record according to WINNF-TS-1014 [n.1].

FCC Rule Part 101.147(i) and 101.147(k) provides a listing of frequencies by authorized bandwidth. The assigned frequency in the FCC ULS for a record may be used to look up the authorized bandwidth. As a convenience, this repository provides a listing of the FCC authorized frequencies by bandwidth and is not expected to change significantly over time.

6.6 Billboard Reflector Data Repository

The Billboard Reflector Data Repository is designed to be used by the AFC System to determine whether an antenna model provided in the FCC ULS is a Billboard Reflector for the purpose of determining the type of passive repeater in use according to WINNF-TS-1014 [n.1].

This repository list is expected to change over time based on current usage trends. This repository is required to allow for changes and to provide as complete a list as possible.

6.7 Back-to-back Antenna Data Repository

The Back-to-back Antenna Repository is designed to be used by the AFC System to determine whether an antenna model provided in the FCC ULS is a Back-to-back Antenna for the purpose of determining the type of passive repeater in use according to WINNF-TS-1014 [n.1].

This repository list is expected to change over time based on current usage trends. This repository is required to allow for changes and to provide as complete a list as possible.

6.8 Antenna Model, Diameter and Gain Repository

The Antenna Model, Diameter and Gain Repository is designed to be used by the AFC System to determine the diameter and gain based on the antenna model provided in the FCC ULS. This information is used to validate the antenna's main beam gain, determine the antenna diameter, and determine the antenna's radiation pattern envelope for use according to WINNF-TS-1014 [n.1].

This repository list is expected to change over time based on current usage trends. This repository is required to allow for changes and to provide as complete a list as possible.

6.9 Transmit Radio Unit Architecture Repository

The Transmit Radio Unit Architecture Repository is designed to be used by the AFC System to determine whether a transmit radio model provided in the FCC ULS is an indoor unit, outdoor unit, or unknown architecture when employing fixed service receiver feeder loss according to WINNF-TS-1014 [n.1].

Indoor unit radios were used exclusively around 20 years ago. Since then, outdoor unit radios that have low or no loss between the radio and antenna have become popular. Indoor unit radios, however, continue to be developed and sold, so this repository list is expected to

change over time based on current usage trends. This repository is required to allow for changes and to provide as complete a list as possible. In the event that it is unclear what the transmit radio architecture is, Unknown will be recorded. This approach will allow AFC System operators identify when new radio models are added and need to be classified.

7 Repository Schema

7.1 General

The Repository is provided in CSV format.

The first row of the CSV file for each Repository shall contain the Column Names. Each row in the CSV file shall have columns with header values defined in the following table. R/O/C defines whether the value of a column of a CSV file must be fulfilled (Required), must be fulfilled when the specified condition is met (Conditional), or may be fulfilled (Optional).

7.2 Schema of the FCC Category B1 Antenna Models Repository

Table 1: Schema of the FCC Category B1 Antenna Models Repository

Column Name	R/O/C	Column Information
manufacturerNormalized	Required	This field is the normalized manufacturer name for the antenna listed in the FCC ULS. This field does not need to match the FCC ULS manufacturer.
antennaModelPrefix	Required	This field provides the normalized antenna model prefix. Any antenna model in the FCC ULS, when converted to upper case and stripped of any characters that are not alpha-numeric (A-Z, 0-9), that begins with this string shall be considered to be an FCC Category B1 antenna.
Notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.3 Schema of the High-Performance Antenna Models Repository

Table 2: Schema of the High-Performance Antenna Models Repository

Column Name	R/O/C	Column Information
manufacturerNormalized	Required	This field is the normalized manufacturer name for the antenna listed in the FCC ULS. This field does not need to match the FCC ULS manufacturer.
antennaModelPrefix	Required	This field provides the normalized antenna model prefix. Any antenna model in the FCC ULS, when converted to upper case and stripped of any characters that are not alpha-numeric (A-Z, 0-9), that begins with this string shall be a high-performance antenna that meets both the FCC Category A and are comparable to the patterns provided by the formulas in ITU-R F.699-8 [n.6].
Notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.4 Schema of the Indoor Unit Models Repository

Deprecated. Replaced by 7.9 Schema of the Transmit Radio Unit Architecture Repository

Table 3: Deprecated

7.5 Schema of the FCC Fixed Service Channelization Repository

Table 4: Schema of the FCC Fixed Service Channelization Repository

Column Name	R/O/C	Column Information
channelFrequency	Required	This field is the center frequency in MHz of the channel listed in section 101.147 (i) and (k) of the FCC Rules [n.7].
channelBandwidth	Required	This field provides the maximum bandwidth based on the FCC Rules for the center frequency in MHz [n.7].
Notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.6 Schema of the Billboard Reflector Data Repository

Table 5: Schema of the Billboard Reflector Data Repository

Column Name	R/O/C	Column Information
manufacturer	Required	This field is the manufacturer name for the antenna listed in the FCC ULS.
antennaModel	Required	This field provides the normalized antenna model as listed in the FCC ULS.
height_ft	Optional	This field is informative and provides the height of the billboard in feet.
width_ft	Optional	This field is informative and provides the width of the billboard in feet.

Column Name	R/O/C	Column Information
height_m	Required	This field provides the height of the billboard in meters with up to 2 decimals of precision which is primarily used for comparing to FCC ULS data.
width_m	Required	This field provides the width of the billboard in meters with up to 2 decimals of precision which is primarily used for comparing to FCC ULS data.
notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.7 Schema of the Back-to-back Antenna Data Repository

Table 6: Schema of the Back-to-back Antenna Data Repository

Column Name	R/O/C	Column Information
manufacturer	Required	This field is the manufacturer name for the antenna listed in the FCC ULS.
antennaModel	Required	This field provides the normalized antenna model as listed in the FCC ULS.
notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.8 Schema of the Antenna Model, Diameter and Gain Repository

Table 7: Schema of the Antenna Model, Diameter and Gain Repository

Column Name	R/O/C	Column Information
manufacturer	Required	This field is the manufacturer name for the antenna listed in the FCC ULS.

Column Name	R/O/C	Column Information
antennaModel	Required	This field provides the antenna model as listed in the FCC ULS.
standardModel	Required	This field provides the standard antenna model and is determined by converting the FCC ULS antenna model to uppercase, and stripping of any characters that are not alpha-numeric (A-Z, 0-9). The lookup of this data repository is done by matching exactly the converted FCC ULS Antenna Model to the standardModel string for use with [TS-1014].
diameter_ft	Required	This field provides the antenna diameter in feet as provided by the manufacturer.
diameter_m	Required	This field provides the antenna diameter in meters with up to 2 decimals of precision as provided by the manufacturer.
gain_dBi	Required	This field provides the mid-band gain of the antenna as provided by the manufacturer.
notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

7.9 Schema of the Transmit Radio Unit Architecture Repository

Table 8: Schema of the Transmit Radio Unit Architecture Repository

Column Name	R/O/C	Column Information
manufacturerNormalized	Required	This field is the normalized manufacturer name for the transmit radio listed in the FCC ULS. This field does not need to match the FCC ULS manufacturer.

Column Name	R/O/C	Column Information
radioModelPrefix	Required	This field provides the normalized transmit radio model prefix. Any transmit radio model in the FCC ULS, when converted to upper case and stripped of any characters that are not alpha-numeric (A-Z, 0-9), that begins with this string shall be considered a match and the corresponding architecture is used.
architecture	Required	This field identifies the transmit radio architecture for the radioModelPrefix. Allowed architectures are: • "IDU" for indoor unit radios. • "ODU" for outdoor unit radios or split-mount radios, where the transceiver is mounted directly to the antenna with no feeder or waveguide. • "Unknown" for any radio that is not known to be one of the above architectures.
Notes	Optional	This optional field may indicate various things for human consumption, including the source of the data and/or the contributor.

Annex A (Informative) Document History

Document history		
V1.0.0	31 May2022	Initial Version
V1.1.0	1 September 2022	Technical revision supporting various changes

Document history		
V1.2.0	9 March 2023	Technical revision to incorporate: • WINNF-22-I-00145-schema of the Antenna Model, Diameter and Gain Repository to TS-5008 Approved.docx • WINNF-23-I-00004 - CR for TS-5008 - Change Indoor Unit Model to Radio Architecture Repository-Aprv.docx