



# **CBRS Deployment Guidelines for Installers**

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# CBRS Deployment Guidelines Technical Report

## 1 Introduction

The Citizens Broadband Radio Service (CBRS) will allow a novel three tier spectrum sharing scheme for mobile broadband users deploying Citizens Broadband Radio Service Devices (CBSD) [1][2]. CBSDs may be deployed in a variety of environments and may or may not be professionally installed. The installation of a Category A CBSD need not be done by a Certified Professional installer if the CBSD is capable of automatic geo-location to within 50 m horizontal accuracy and  $\pm 3$  m vertical accuracy. All other CBSDs will be installed by a Certified Professional Installer (CPI). Category B registration is required by the FCC rules for all CBSDs with registered EIRP between 30 dBm and 47 dBm or if the CBSD is installed outdoor with its antenna at a Height Above Average Terrain (HAAT) above 6 m.

The installer of the CBSD attests whether it is operating indoors or outdoors as part of the registration parameters.

## 2 Scope

This Technical Report sets forth informational guidelines for deployment of CBSDs. In particular, the document addresses less obvious scenarios such as indoor classification of CBSDs and the matter of registering CBSDs representing distributed antenna placements.

This document is not to be interpreted as normative. It is however available as a reference to installers and is referenced in the CPI Training curriculum [3].

## 3 References

- [1] Report and Order and Second Further Notice of Proposed Rulemaking, Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, Federal Communications Commission, 21 April 2015.
- [2] Order on Reconsideration and Second Report and Order, Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, Federal Communications Commission, 2 May 2016.
- [3] WINNF-TS-0247 Version 1.0.0, "CBRS Certified Professional Installer Accreditation Technical Specification."
- [4] WINNF-TS-0016 Version 1.2.2, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) – Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification."

## 4 Abbreviations and Definitions

*CBRS*: Citizens Broadband Radio Service.  
*CBSD*: Citizens Broadband radio Service Device

<i>CPI:</i>	Certified Professional Installer
<i>DAS:</i>	Distributed Antenna System
<i>EUD:</i>	End User Device
<i>EIRP:</i>	Effective Isotropic Radiated Power
<i>HAAT:</i>	Height Above Average Terrain

## 5 Deployment Guidelines

### 5.1 General

The following deployment topics are addressed:

- 1) The FCC rules do not specifically define when a device is indoor, but at registration a CBSD is required to declare whether it will be operated indoors or outdoors. Guidelines augmenting the FCC rules are provided to assist an installer in making this determination.
- 2) The FCC rules require each antenna location to be registered as a separate CBSD with a unique identifier, but the FCC certifies radio equipment not antennas as CBSDs and expects FCC ID and manufacturers serial number to be sufficient to form a unique identifier for each CBSD. When deploying, for example, distributed antennas, remote radio heads, or multiple CBSDs that are associated with the same radio equipment, a single FCC ID and manufacturers serial number for the radio equipment will have to be augmented to create a unique identifier for each CBSD.
- 3) Guidelines are provided for the determination of HAAT at the location of a CBSD.

In this document, the term “installer” is used to refer to any person who installs a CBSD and calculates or sets installation parameters for CBSD registration.

### 5.2 Guidelines for Indoor/Outdoor Determination

- 1) An installer will determine whether a deployment environment is indoor or outdoor.
- 2) In general, CBSDs located in urban canyons and shadowed spaces, and that are not within the confines of a walled enclosure are declared as outdoors.
- 3) A CBSD located in a wholly enclosed space and primarily intended to serve EUDs within that space is declared as indoor; this includes enclosed spaces that have substantial amounts of glass in the construction.
- 4) An installer has discretion to register a CBSD as indoor under all the following simultaneous circumstances.
  - Substantial wall covering<sup>1</sup> that results in significant attenuation to the CBSD transmission, e.g. within stadiums and arenas,

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<sup>1</sup> In this respect, the term *substantial wall covering* indicates the presence of a surrounding wall structure of determinable height above ground that surrounds the property being covered over more than 80% of the circumference of the property. It is the responsibility of the installer to ensure that a declared indoor CBSD is not in

- A location that is more than 3 m below the height of the enclosure around the CBSD at a point of closest approach to the location of the CBSD,
  - The transmitted signal is adequately attenuated towards locations exterior to the premises, and
  - Max EIRP less than 30 dBm/10MHz.
- 5) A CBSD located in a tunnel, underground location, or a cave can be classified as indoor at the discretion of an installer.
- 6) An installer can use discretion to declare that any relevant environment is outdoor. The installer is responsible for ensuring that the CBSD follows all necessary conditions for operation at the registered maximum power levels.
- An example is a point-to-point link in a stadium, meant for video transport

### 5.3 CBSD Identifiers for Sectors, DAS and remote radio placements

Identifiers exist for radio equipment, but the FCC requires each transmission site to be identified as a separate CBSD. This can result in some challenges when defining a CBSD for registration purposes. Installers, including CPIs, may be called on to register multiple CBSDs associated with the same radio equipment such as sectors of a single physical site, DAS antenna sites geographically separate from the physical radio hardware, and remote radio placements subsidiary to a controlling radio site, including those that are geographically distributed from that controlling radio equipment. The following guidelines are provided for generating CBSD identifiers to handle such cases.

Some deployments of radio equipment may divide the transmission into sectors, e.g. the three sectors or cells of a single physical site. Each sector of such a deployment that is registered with the same FCC ID and Manufacturer's serial number can be assigned a unique Sector ID by the installer.

The installer may likewise assign a unique Sector ID to each radiator in a DAS and to each remote radio head subsidiary attached to a single certified radio equipment site with an identifiable FCC ID and Manufacturers Serial Number.

The FCC ID + Manufacturers Serial Number + Sector ID uniquely identifies the CBSD. The Sector ID is not explicitly defined in the CBSD registration parameters, but it can be provided to the SAS using a suffix in the cbsdSerialNumber [4]. Specifically, Sector ID can be appended to the Manufacturers Serial Number with a delimiter character ':' preceding the Sector ID; the ':' character is unlikely to be used in manufacturer serial numbers or in Sector IDs. The SAS can then parse the sector ID and make use of it if desired. If the CBSD uses an X.509 CBSD certificate to communicate with SAS, the serial number in the CBSD certificate used for TLS

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proximity of a clear field of view to areas that are considered exterior to the enclosing structure. When planning the installation, the installer is to pay regard to the effect of the CBSDs transmissions on incumbents in the vicinity of the location of the CBSD.

mutual authentication needs to be the same as the serial number in the registration message, i.e. with sector ID appended as described here.

Power levels at the site of the DAS radiator relative to the composite transmitter conducted power may be calculated or approximated.

#### 5.4 HAAT Calculations

The height above average terrain is determined as detailed in <https://www.fcc.gov/media/radio/haat-calculator>. When registering HAAT for an indoor CBSD, the actual HAAT must be added to the height of the antenna above the ground level at the location of the CBSD.

## 6 Document History

Document history		
V1.0.0	11 Dec 2018	Initial version