CPI and TPA:
In the CBRS Ecosystem

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What is a Certified Professional Installer (CPI)? Why do I need one in CBRS?

"CPIs…are responsible for assuring that the registration data entered into the Spectrum Access System (SAS) for certain types of CBRS devices is accurate and the device valid to be registered and request a grant to operate." **-** WInnForum Press Release on First TPAs.

Historical Perspective – Why CPI in CBRS Ecosystem:

a) **Earlier use of "Professionally Installed" – Some licensed bands, TVWS,**

b) **Issues with errors alleged in TVWS. Geographic errors.**

c) **Need for additional verification and validation of registration information for Federal incumbents protection.**

d) **System creates a balance between the SAS, operator, CPI and CA.**

e) **Central point of reference.**

Is the CPI the ACTUAL Physical Installer of CBSDs?

A CPI or Certified Professional Installer (Under Part 96 and WInnForum Specifications) is the party responsible for entering accurate data to the SAS for registration and grant requests.

The CPI may be a physical installer, but that role is NOT required by Part 96 or WInnForum Specifications.

The CPI must fulfill its roles, but a full CBSD installation may require additional skills and functions beyond a CPIs requirements.

CPIs may work with physical installers or be the same person.
CPIs are responsible for accuracy and verification.

All Category B CBSDs (30 dBm-47 dBm/10MHz) require CPI (Also known as: Base Stations, CPE or High-Power Clients, eNodeB, AP, Subscriber Units, etc.)

Most Category A CBSDs (23 dBm-30 dBm/10 MHz) require CPI (Indoor CBSDs, Low Power Outdoor fixed devices, etc.) Indoor Above 6M Height Above Average Terrain (HAAT). And, if unable to Self Geo-Locate (latitude-longitude-height/altitude).

End User Devices – EUDs (up to +23 dBm/10 MHz) do not require CPI (Mobile phones, low Power non-serving devices – do not communicate with the SAS).

Why CPIs? Why do we Need Them?

Accurate Registrations: Ensure accuracy of data for CBSD registration to SAS.

Uniformity in Ecosystem: Provides uniform way of ensuring installs in the CBRS ecosystem. SASs depend on correct CPI data to protect incumbents, understand available spectrum, guidance on interference, and more.

Accountability: CPIs are independent and carry the responsibility of accuracy and completeness. It is their responsilbity.

Secure and Verified by Certificates of Authority (CA): Ensures that the CPIs are who they say they are and protect incumbents. Verification and validation.

Kept-up-to-Date: CPIs must stay current with
    Part 96 and WInnForum Specifications and other requirements.

Why are Certified Professional Installers Required?

47 USC Part 96: FCC rules regarding use of CPI (*see*):

§96.45   Additional requirements for category B CBSDs.

- (a) Category B **CBSDs must be professionally installed**.
- (b) In the 3550-3650 MHz band, Category B CBSDs must be authorized consistent with information received from an ESC, as described in §96.15.
- (c) Category B CBSDs are limited to outdoor operations.
- (d) When registering with an SAS, Category B **CBSDs must transmit** all information required under §96.39 plus the following additional information: antenna gain, beamwidth, azimuth, downtilt angle, and antenna height above ground level.

§96.43   Additional requirements for category A CBSDs.

- (a) **Category A CBSDs shall not be deployed or operated outdoors with antennas exceeding 6 meters height above average terrain.** CBSDs deployed or operated outdoors with antennas exceeding 6 meters height above average terrain will be classified as, and subject to, the operational requirements of Category B CBSDs.
- (b) When registering with an SAS, Category A CBSDs must transmit all information required under §96.39. This transmission *shall* also indicate whether the device will be operated indoors or outdoors.
- (c) **Any CBSD operated at higher power than specified for Category A CBSDs in §96.41 will be classified as, and subject to, the operational requirements of a Category B CBSD.**

§96.39   Citizens Broadband Radio Service Device (CBSD) general requirements.

This section applies to all CBSDs. Additional rules applicable only to Category A or Category B CBSDs are set forth in §§96.43 and 96.45.

(a) *Geo-location and reporting capability.*

- (1) All CBSDs must be able to determine their geographic coordinates (referenced to the North American Datum of 1983 (NAD83)) to an **accuracy of ±50 meters horizontal and ±3 meters of elevation.** Such geographic coordinates shall be reported to an SAS at the time of first activation from a power-off condition.

- (2) **For professionally installed CBSDs, geographic coordinates to the same accuracy specified in paragraph (a)(1) of this section may be determined and reported to the SAS as part of the installation and registration process. Geographic coordinates must be determined and reported each time the CBSD is moved to a new location.**

- (3) A non-professionally installed CBSD must check its location and report to the SAS any location changes exceeding 50 meters horizontal and ±3 meters elevation from its last reported location within 60 seconds of such location change.
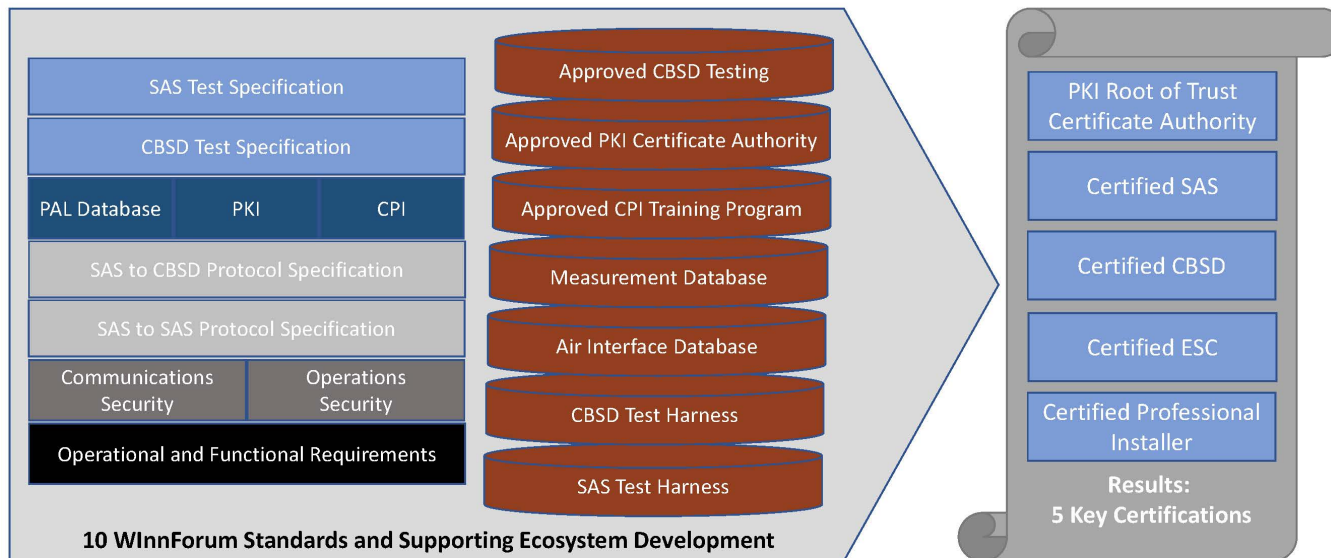
Where else has CPI been used?

Other Places "Professionally Installed" has been previously required:

- TV White Space Spectrum (TVWS)
- Licensed Spectrum

Why is CBRS CPI Requirements Different?

- Cross-purpose/Incumbent uses in the band including government uses (such as Naval Radar).
- Ensure uniform deployment in CBRS of CBSDs.
- SAS resource and diversity of technologies and uses in CBRS.
- Accuracy of registration.

Where do CPI and TPA fit in the CBRS Ecosystem and WInnForum Specifications? (WInnForum source)

10 WInnForum Standards and Supporting Ecosystem Development		
SAS Test Specification		
CBSD Test Specification		
PAL Database	PKI	CPI
SAS to CBSD Protocol Specification		
SAS to SAS Protocol Specification		
Communications Security		Operations Security
Operational and Functional Requirements		

- Approved CBSD Testing
- Approved PKI Certificate Authority
- Approved CPI Training Program
- Measurement Database
- Air Interface Database
- CBSD Test Harness
- SAS Test Harness

Results: 5 Key Certifications

- PKI Root of Trust Certificate Authority
- Certified SAS
- Certified CBSD
- Certified ESC
- Certified Professional Installer

WInnForum as the CPI TPA Accrediting Body and Database Holder:

- **WInnForum serves at the CBRS ecosystem CPI Training Program Administrator (TPA) Accrediting Body.**

- **Approves TPAs to train and oversee CPIs.**

- **WInnForum maintains and up-to-date Database of CPIs as entered by the TPAs and visible to the SASs.**

- **Creates Specifications: WInnForum's -0247 (WINNF-TS-0247) Specification is the WInnForum Standard used for CPIs.**

- **Follows Part 96 is among the required rules for CPIs and industry best practices.**

CBRS
WInnForum Standards

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Approved by WInnForum for CPI Training (Administrator Programs):

Current List (as of June 18, 2019):

CommScope

Federated Wireless, LLC

Google, LLC

Nokia Corp.

Others: As Announced by WInnForum (*see*):

https://cbrs.wirelessinnovation.org/cpi-program-administrator

What does a Training Program Administrator (TPA) do?

- Trains CPI Trainers in required and optional CPI curriculum to pass CPI exam/certification and be competent in education to meet obligations.

- Keeps CPIs current with WInnForum and the FCC on changes which affect CPIs role and performance.

- Has a working relationship with a Certificate of Authority (PKI) provider for CA keys needed for CPIs.

- Enters current data in CPI database – SAS can then verify CPIs certification status. TPA can suspend/activate status in database.

- Maintains records, responds to inquiries, updates CPIs (keeps current), renews, discipline reviews, and more.

What does it take to become a CBRS CPI:

- **Register with an approved Training Program Administrator (TPA) and pay applicable fees and costs.**
- **Take and complete an approved training course on CPI Certification.**
- **Pass an approved exam on CPI curriculum requirements.**
- **Obtain CA (public and private key) credentials.**
- **Learn technologies, interfaces (such as SAS), and necessary means to register accurate data to the SAS.**
- **Stay current with changes in FCC rules and WInnForum Specifications.**
- **Work according to rules and specifications and renew as needed.**

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How Long is the CPI Certification and Who Owns It? What Should a I know about CPIs?

- CPI Certification with class passed is **five (5) years** and is renewable.
- CPI CA (Certificate of Authority) is five (5) years or less.
- CPI Credentials are held by the CPI, not employer.
- A CPI's credentials and CA can be suspended or removed for failure to stay current, discipline, or expiry.
- CPIs are not necessarily physical equipment installers, despite the name.
- CPIs should be able to do their work for any CBSD operator and with any SAS or CBRS CBSD technology.

What Will it Cost to Have a CPI Register/Install my CBSD?

Costs Vary. Depends on market and CPI model.

What effects the price? Costs of Training, Certification/Exam, WInnForum Database Costs, Additional (optional) Training, CA, and other costs to CPI or CPI employer; availability, services requested, and market. Price not set by Part 96.

Ask your CPI.   Can be an independent contractor, employee, or business.

What Must a CPI Include in Registration Request to the SAS?

At least…

Location Information: Latitude, Longitude, Altitude (Geographic Coordinates).

Antenna Information: Downtilt, Azimuth, Gain, Beamwidth, and Antenna Height.

Power Information.

CPIR-ID and CA (PKI) Credentials.

CBSD Device Info: CBSD Device Serial Number, Model of CBSD.

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Other Things a CPI may do…Now or in the Future.

- Enter optional information such as grouping, specific technology information, other non-mandatory data requested by the SAS.

- Update or correct erroneous data pre-entered or entered before registration (One-step or Multipe Step Method).

- Provide data for PAL protection areas (PPAs).

- Assist with secondary market info to the SAS.

- Cooperate with the owner or SAS on other data entry for the CBSD – for example if a physical change is made.

TPAs, CPIs and CAs…How are they Related?

- TPA's train and maintain CPIs (they also train trainers).

- TPA's offer CA (in conjunction with a WInnForum. approved CA provider) services to CPIs.

- CPI's data is reported by TPAs to the WInnForum CPI Database which is addressed by SASs.

- TPAs and CAs are both approved by WInnForum.

- WInnForum is not related to CPIs (It is the Accrediting Body for the TPAs). TPA's have the relationship with the CPI.

- TPAs, CPIs and Cas must follow Part 96 and WInnForum Specifications.

What are Mandatory Requirements of a CPI and what are Optional Offerings/Entries by the CPI? Applicable:

Mandatory:

- **WInnForum Specifications (-0247 Specification and others -0112, etc.)**
- **FCC Rules (Including 47 USC Part 96) and applicable KDBs (or clarifications)**
- **Requirements of the SAS for Registration**

May be Optional or asked of a CPI:

- **Industry or technology specific further information.**
- **SAS Specific interface or requirements/requests.**
- **Grouping information as requested by operator.**
- **Other non-registration required data.**

Commonly Asked CPI Questions:

Where geographically do CPIs work? Anywhere CBRS (USA) operates. In all 50 states and eventually territories.

Do CPI's install/register PAL equipment? Yes. No difference between GAA and PAL in initial registration requirements for CPI. No PALs yet. CPI may enter PAL information in the future.

Should a CPI understand how to get information for required Registration Parameters? Yes. It is up to the CPI to accurately enter data with the SAS.

Are CPI's required for installations of CBSDs (Under Part 96) for Initial Commercial Deployment (ICD)? Yes. ICD is treated the same as full commercial deployment with a few exceptions. CPIs if required for full commercial deployment would be required for ICD.

Should I employ / have trained a CPI certified employee? Or, hire as needed from other places? Your choice. Many ISPs and operators will train their current installation technical staff. Others will see economy in hiring as needed from independent contractors.

Why not Eliminate CPIs and CPI Training Requirements?

Desired as an ecosystem protection by the FCC, NTIA, and government and commercial incumbents.

Uniformity of installation is desired. Changes can be made as the ecosystem evolves and actual data is created.

Automation may replace or change some of the roles of CPIs in the future.

Training programs for certifying CPIs are available NOW. *See* WInnForum approved TPAs.

Deployments for ICD begin when the FCC issues certification of SASs and then issues a Public Notice of beginning of ICD. At that point, formal installations by CPI may begin.

Open Discussion and Panel with TPAs

Ways to contact TPAs to become a trainer or train CPIs.

Different types of programs offered. - Online On-Demand, In-Person, Video-Live over Internet, Other…

Contact information for CPI TPAs.

Costs and what's included from the TPA. How to find out about cost and benefits?

Options for using or employing CPIs.

Relationship with a TPA – what Does it Include?

Questions and Answers. When and where available?

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