

# Recommendations for AFC System Approval Process: Public Trial & Demonstration Project

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## Requirements & Background

## FCC Requirements for Testing & Certification (from R&O)

- “Applicants that receive a conditional approval will then be required to provide a test system that will be subject to a public trial period to provide interested parties an opportunity to check that it provides accurate results.”**
- “This trial period will include thorough testing, both in a controlled environment (e.g., lab testing) and through demonstration projects (e.g., field testing).”**
- “We will not grant final approval for an AFC system operator to begin providing service until after the operator satisfactorily demonstrates that standard-power access points can operate under the control of its system without causing harmful interference to fixed wireless services.”**

## Additional Details from AFC Authorization PN

**“Applicants who receive a conditional approval will then be required to allow access to their AFC system for a public trial period to provide interested parties an opportunity to check that it provides accurate results.”**

**“This trial period will include thorough testing, both in a controlled environment (e.g., lab testing) and through demonstration projects (e.g., field testing).”**

- “OET will provide additional details on the testing process at a later date.”

## Summary

**AFC Systems must be tested and certified for commercial operation.**

**Testing and certification must also include a public trial / demonstration project.**

**Public trial period is supposed to provide interested parties an opportunity to check that AFC provides accurate results.**

Public Trial





## Public Trial

**“Public trial period to provide interested parties an opportunity to check that [AFC] provides accurate results.” (6 GHz Order at para 49)**

### **Proposed duration (44 contiguous calendar days)**

- 30 days for trial
- 7 days for public to file comments
- 7 days for AFC system operators to respond to any comments
- Note: this is based on best effort and may slip if unforeseen issues arise

**AFC system operators must provide interface for public trial or use AFC System Public Testing Portal**

**Based on FCC guidance for TVWS “45-Day Test” Test Requirements and Plan[1]**

**Note that AFC is much less complicated than TVWS[2]**

- Accesses fewer FCC databases
- No requirements for testing manual entry of incumbent data

[https://transition.fcc.gov/oet/whitespace/guides/TVWS\\_45day\\_test\\_plan\\_8-23-11.pdf](https://transition.fcc.gov/oet/whitespace/guides/TVWS_45day_test_plan_8-23-11.pdf)

## Public Trial Requirements (modeled after TVWS test plan)

### Test System Elements, AFC system operators must:

- Use the same calculation method that has been tested
- Update its database of incumbent systems from ULS
- Take appropriate measures to avoid hacking of the test system
- Protect all incumbent entities as specified in the rules

### Public Interface

- Public access through AFC system operator's web facilities (not through FCC website)
  - Might suggest a data-entry portal to facilitate entering data into multiple AFCs.
- Interface must be easy to understand and use
  - User-friendly access and session management including user registration and log-in process
  - Must provide contact information for users to obtain assistance if they encounter problems accessing or using the test system; must respond to access/use inquiries in a timely manner during normal business hours
- Processing and response time must be reasonably quick
- May require the tester to provide email address for follow-up responses

## Public Trial Requirements (modeled after TVWS test plan)

### III. Test Process

- a. Data entry
  1. Location input to be geographic coordinates (decimal degrees) and height AGL (m)
  2. Location uncertainty could be entered using either ellipse or polygon (may need to constrain)
  3. Height uncertainty could be entered as meters
  4. Other information would be made default (e.g., fccid, device serial number, etc.)
- b. Response to be list of the frequencies and channels available at the specified location for each Standard Power device and the maximum allowed EIRP for each.
- c. May provide capability for input of multiple location coordinates in a test entry, but only one at a time is required.
- d. Must allow reasonable feedback from testers to AFC system operator being tested.

## Public Trial Requirements (modeled after TVWS test plan)

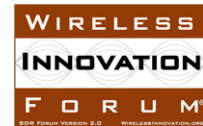
### AFC System Operator Response to Feedback

- Initial acknowledgement to reporting party with indication of investigation and responsive action to be taken as appropriate during testing or soon after testing is complete
- Subsequent explanations and corrective actions as appropriate to testing party with copy to FCC. AFC system operator can send single response to testing party addressing all comments.
- Not necessary to inform public at large of problems/corrections, but AFC system operators may provide log files upon request to facilitate quick resolution time cycle
- Fixes may be applied during testing period, but may necessitate re-certification (change management/advertisement)
- AFC system operators may include any additional information at their discretion.

### Completion of Public Tests

- AFC system operator to provide a summary report with:
  - Identification of problems reported and their dispositions
  - Descriptions of changes made to the system's frequency availability calculation function (also any other changes that were made relating to that function)

## Demonstration Projects



## Demonstration Project

**Note, this phase occurred in TVWS after full certification, but FCC was concerned that key aspects of the database system were not in place, so they limited commercial deployments to specific areas.**

- No filings or reports required for TVWS

**Could be similar to CBRS Initial Commercial Deployment (ICD), but not as detailed**

- “ICD will complement the testing done in a controlled laboratory setting by providing a real-world environment to assess certain aspects of compliance with the Commission’s rules that cannot be effectively verified under laboratory testing.”

## Demonstration Project

**Occurs after AFC system lab testing is complete**

**Could run concurrently with Public Trial**

**Suggested duration is 30 days (plus comment periods)**

**FCC issues PN outlining demonstration project process also giving AFC system operators permission to conduct demonstration projects**

**AFC system operators identify their demonstration project areas and file their own test plans with the FCC**

**AFC system operators notify Fixed Microwave Service licensees in the proposed demonstration project areas prior to operation.**

**AFC system operators perform demonstration projects and report on:**

- Demonstration project areas and the number of devices under management in each area
- Any reports of interference and resolution steps
- Other information as required by FCC

## Summary



## Summary

**Public Trials and Demonstration Projects occur after AFC system testing**

**Public Trials and Demonstration Projects could run concurrently**

**Suggested duration could be 30 days (plus comment periods)**

**AFC system operators interface directly with public testers to answer questions or address issues**

**AFC system data entry portal could streamline public testers' interaction with AFC systems**

**AFC system operators interface directly with incumbents in the unlikely event of interference during demonstration projects**

**AFC system operators provide reports back to FCC on both efforts (could be a single report)**

Thanks!



# Backup: Additional Background

## Public Trials

- **The FCC notes on their TVWS Database Administrators guide:**
  - *“Each database will be subject to a trial period of not less than 45 days before it is allowed to be made available for actual use by TV bands devices to allow interested parties an opportunity to check that the database is providing accurate results.”[1]*
- **The FCC conducted the TVWS public trial phase serially for TVWS database administrators and announced each TVWS database administrators’ public trial in a Public Notice, which reiterated the purpose of the public trial:**
  - *“This is a limited trial that is intended to allow the public to access and test [the Company’s] database system to ensure that it correctly identifies channels that are available for unlicensed radio transmitting devices that operate in the TV band (unlicensed TV band devices)...”[2]*
- **TVWS databases were required to access three FCC databases plus provide a capability for direct registration of data not contained in FCC databases.[3]**
- **In addition, TVWS databases were required to synchronize these records obtained through registration procedures with other TVWS databases.[4]**
- **There was no public trial period for SAS/ESC certification.**

<https://www.fcc.gov/general/white-space-database-administrators-guide>

multichannel video programming distributors and receive sites of temporary Broadcast Auxiliary Service links.

## Demonstration Projects

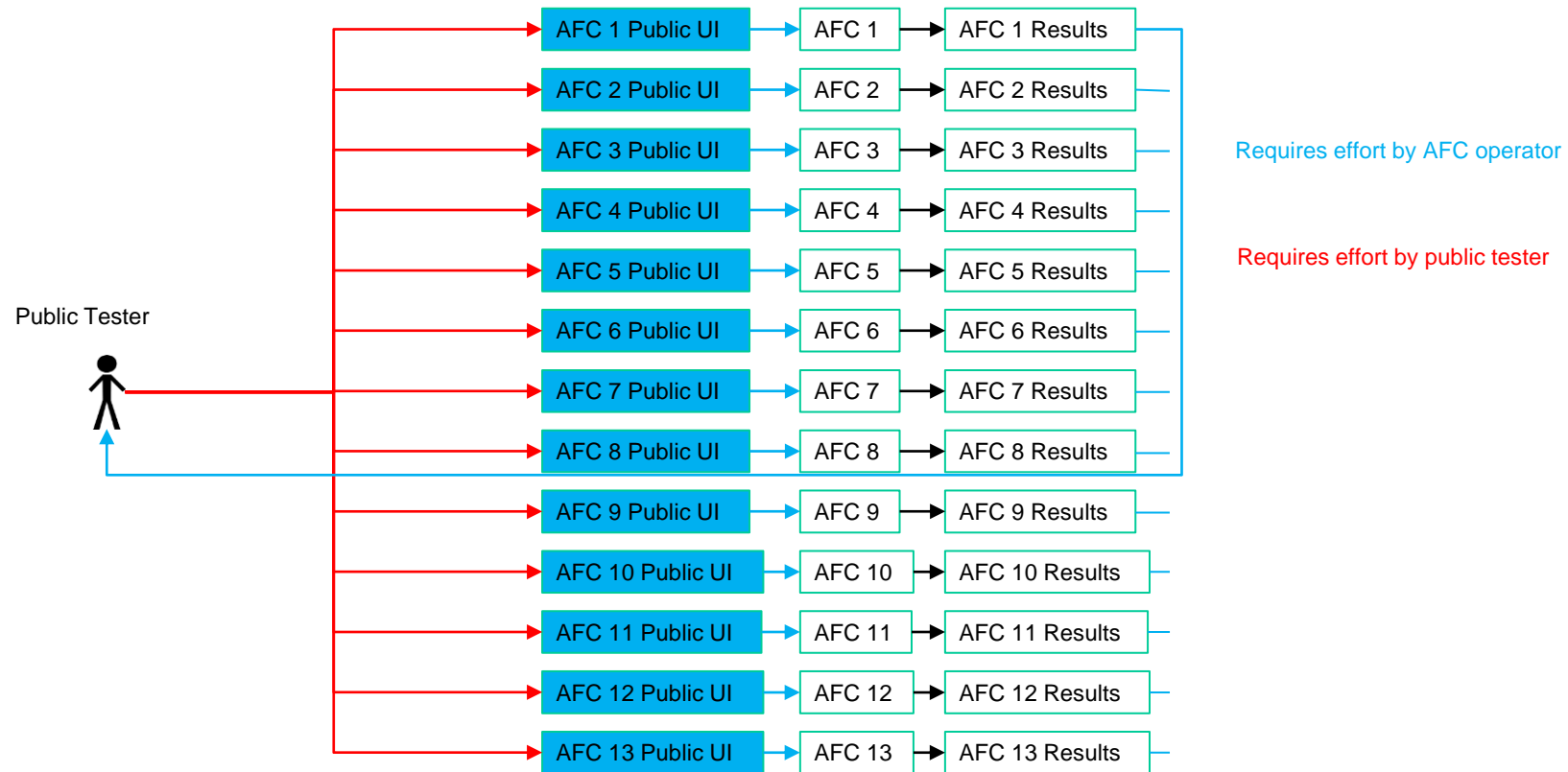
- **There was no demonstration project phase *per se* for TVWS.**
  - The FCC allowed limited commercial TVWS deployments in localized areas after TVWS databases were certified because a critical ULS registration capability was still under development.[1]
  - Once the ULS registration capability was completed, TVWS database operators were permitted to operate nationwide.[2]
- **Therefore, demonstration projects are more like the CBRS initial commercial deployment (ICD) phase.[3]**

# Backup: Portal Concept to Support Public Trial

## Background

- **We suggest a convenient method for the public to submit test registrations to the AFC Systems.**
- **Options:**
  - Each AFC system operator could write their own public UI (which might be a simple online form).
  - A simple centralized form could be used and the inquiries distributed to the AFC System operators.
  - AFC System operators can write their own UIs while others use the centralized portal.
- **This proposal further serves the public because it means the public does not have to figure out the proprietary authentication protocol for each of the AFC systems under test, which may otherwise be required.**
- **An online form could be a lightweight method to allow public testing without every AFC System having to create its own public user interface and without public testers having to navigate a multitude of interfaces to the various AFC Systems.**
- **Portal can be tested by interested AFC system operators**

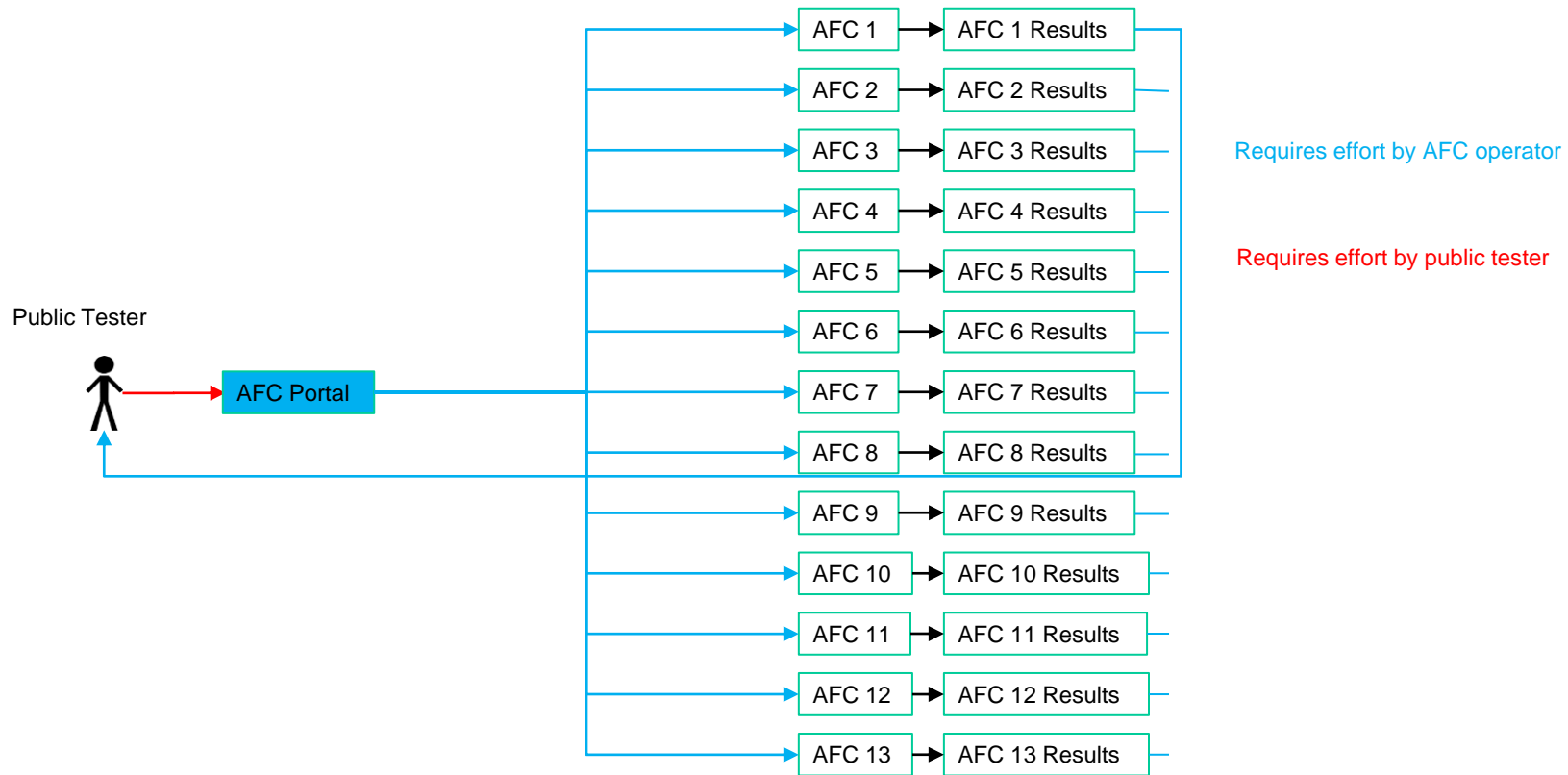
# Allowing Public Access to AFC Systems – No Central Portal



Each AFC System Operator provides results back to the Public Tester

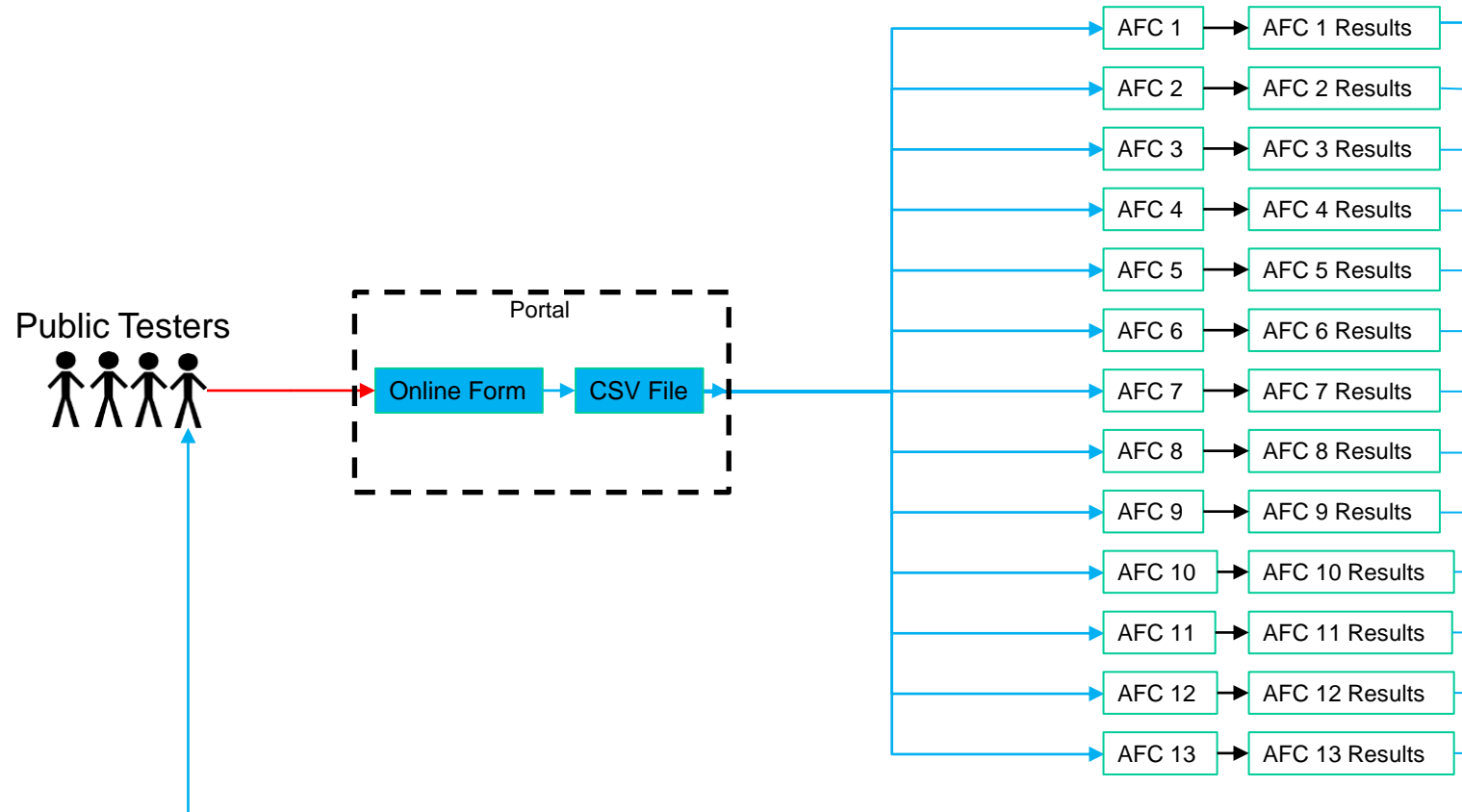


# Allowing Public Access to AFC Systems – No Central Portal



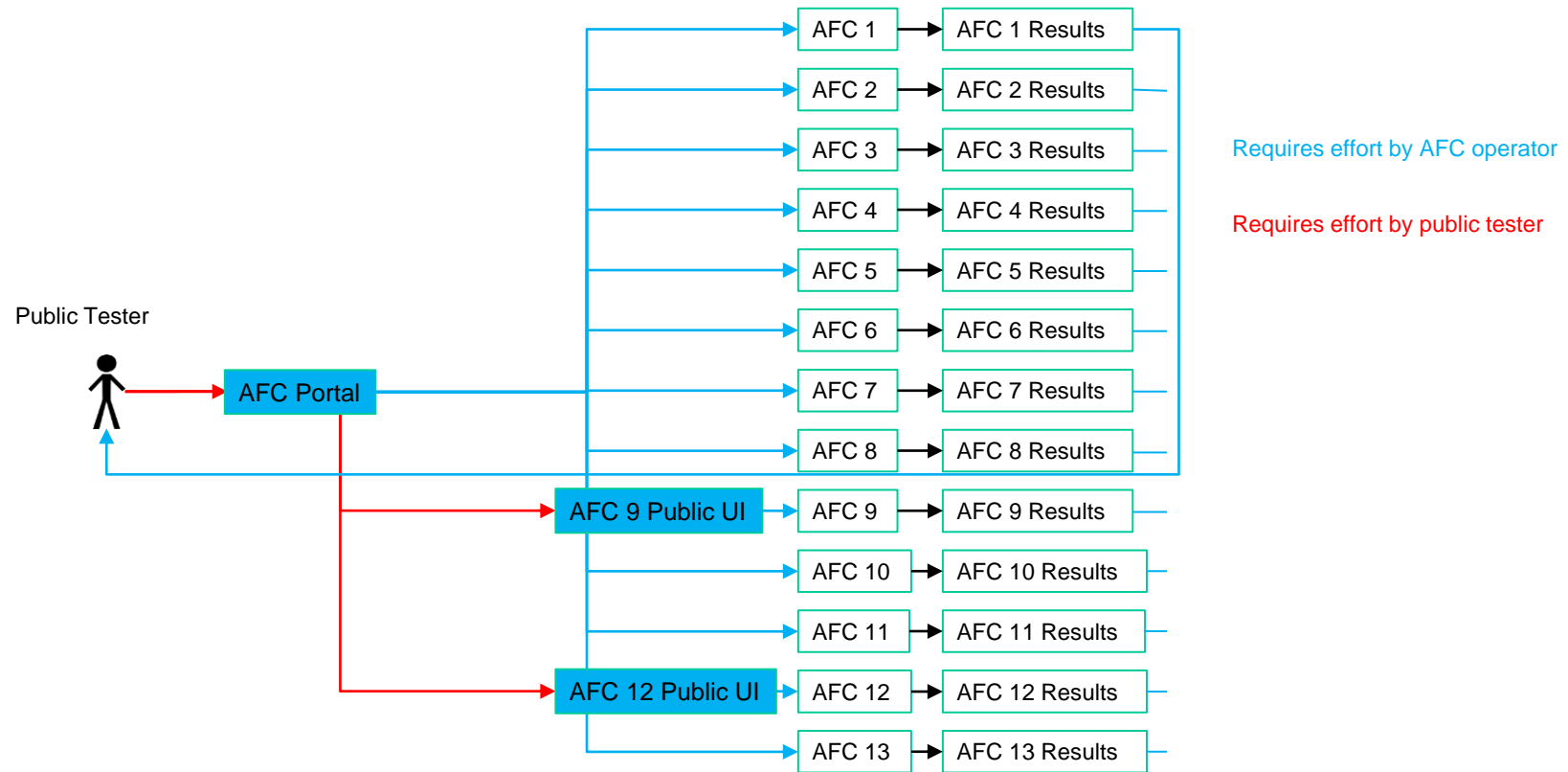
Each AFC System Operator provides results back to the Public Tester

# Concept



Each AFC System Operator provides results back to the Public Tester

# Hybrid Option



Each AFC System Operator provides results back to the Public Tester

# Portal Data Entry Form

## 6 GHz AFC System Public Test Input

This form allows submission of 6 GHz AFC System trial unlicensed device registration data. These data will be collected and then submitted to all participating AFC Systems on a regular basis. The results for those inputs will be emailed back to you separately by each of the participating AFC Systems operators ([list participating AFC Systems]).

- One registration input is possible with each form submission. Multiple form submissions may be made.
- Latitudes and longitudes should be in the NAD83 reference frame, which is the reference frame used by most modern GPS units, online maps, and GPS phone apps.
- For latitudes and longitudes, please be sure to use decimal degrees, not, for example, dd.mmss. If your latitude or longitude are in degrees, minutes, seconds format, convert to decimal degrees using: decimal degrees = degrees + (minutes/60.) + (seconds/3600.).
- The antenna height value must be the height of the antenna above the ground level directly below it, *not* the height above mean sea level that most GPS/phone apps return.
- The data will be validated by AFC Systems prior to returning spectrum availability. Invalid queries (for example, locations outside the U.S.) will not be analyzed.
- The maximum allowed EIRP, in 1 MHz increments, will be determined by the AFC Systems across both the U-NII 5 and U-NII 7 bands (5925-6425 MHz and 6525-6875 MHz, respectively).
- The participating AFC System operators reserve the right to refuse submissions that appear to be spam or otherwise intended to negatively impact AFC Systems under test (for example, DDOS attacks).

[Note: This form is currently conceptual only. No submitted data will be analyzed by any AFC System or sent to the FCC.]

 [aclegg@google.com](mailto:aclegg@google.com) (not shared) [Switch account](#) 

\* Required

### Your email address \*

Results from each participating AFC System operator will be separately sent to this address

Your answer \_\_\_\_\_

### Unique request ID

Optional, but allows you to identify this request if you submit more than one.

Your answer \_\_\_\_\_

### Unlicensed device antenna latitude in decimal degrees \*

North positive. Example: 36.17891

Your answer \_\_\_\_\_

### Unlicensed device antenna longitude in decimal degrees \*

West positive. Example: 77.29671

Your answer \_\_\_\_\_

### Unlicensed device antenna height in meters above ground level (AGL) \*

*Important:* This is height above ground level, not the height above mean sea level that most GPS units and apps provide. Example: 19.1

Your answer \_\_\_\_\_

### Horizontal location uncertainty in meters \*

Example: 51.3. Must be between 0 and 1600 meters (= 1 mile).

Your answer \_\_\_\_\_

### Vertical location uncertainty in meters \*

Example: 6.2. Must be between 0 and 25 m.

Your answer \_\_\_\_\_

### Unlicensed device indoor/outdoor status

The device will be assumed to be outdoors if no response is provided.

Indoor

Outdoor

Submit

Clear form

[available online](#)



# Portal Form CSV Output Sample

	A	B	C	D	E	F	G	H	I	J
1	Timestamp	Unlicensed device antenna latitude in decimal degrees	Unlicensed device antenna longitude in decimal degrees	Unlicensed device antenna height in meters above ground level (AGL)	Horizontal location uncertainty in meters	Vertical location uncertainty in meters	Unlicensed device indoor/outdoor status	Your email address	Unique request ID	
2	5/19/2022 12:25:30	38.889484	77.035279	45.2	13.2	8.1	Indoor	washington@monument	WM1234	
3	5/19/2022 12:26:52	44.427963	110.588455	142.8	50	3	Outdoor	yogi@yellowstone.gov	YS-addd-23456	
4	5/19/2022 12:28:02	39.115531	94.626787	13.5	25.3	4.1		kc@masterpiece.com	bbq-dfs 548101	
5										
6										

- This spreadsheet (or derivative JSON files in WFA spectrum inquiry format) will be sent on a regular basis to each of the participating AFC system operators
  - The input data could undergo basic validation before distribution, for example rejecting coordinates outside the U.S.; or they could be sent to AFC system operators “as is”
- Each AFC system operator would process the test inquiries and send the results back to the submitter via the provided email address.
  - The results for each AFC system would go directly to the tester, and not to the other AFC system operators.
- Testers can contact AFC system operators via email. Participating AFC system operators’ email would be provided on the portal input form.
- Note: Registration data required by FCC rules that are not captured by the input form (such as FCC ID and device serial number) can be set to defaults by AFC system operators. Validation of an FCC ID and device serial number is not part of the test.

## Security

- **To prevent spam, the form could implement some form of access control**
  - For example, require a login to submit a response
  - Alternatively (or in addition), require a captcha
- **The form header notes that we reserve the right to reject submissions suspected to be spam and/or potentially harmful**