

FCC FACT SHEET***Innovation Zones**

Public Notice, ET Docket No. 19-257

Background: The FCC supports a robust experimental licensing program under Part 5 of its rules. Among the licensing options for innovators is the Program Experimental License created in 2013, which promotes innovation by reducing regulatory delay and uncertainty as qualified institutions may conduct any number of unrelated experiments at defined geographic locations under the licensee's control without needing explicit approval from the FCC. The Innovation Zone takes this concept a step further by effectively providing an extension of a Program License's authorized area of operation by permitting Program Licensees to operate within an Innovation Zone, under the parameters set for that particular Zone, without having to modify their licenses to cover the new location. There are two previously identified Innovation Zones that are managed by the National Science Foundation's Platforms for Advanced Wireless Research (PAWR) program. This PN would create two new innovation zones and expand an existing Innovation Zone, all of which would be managed by PAWR. These designations would, among other positive impacts, help spur the development and integration of 5G network technologies and open radio access networks, or Open RAN.

What the Public Notice Would Do:

- Approve the creation of two new Innovation Zones, in Boston, MA and Raleigh, NC.
 - The Boston Innovation Zone, at Northeastern University, will support the transition of the Defense Advanced Research Projects Agency's Colosseum network emulator to a shared platform usable by the research community, allowing researchers to take advantage of Colosseum's unique capabilities, including the ability to emulate full-stack communications, to support artificial intelligence and machine learning algorithms.
 - The Raleigh Innovation Zone, at North Carolina State University, will house the Aerial Experimentation and Research Platform for Advanced Wireless. This project will create a city-scale platform to focus on new use cases for advanced wireless technologies that are emerging for unmanned aerial systems, including telecommunications, transportation, infrastructure monitoring, agriculture, and public safety.
- Approve the expansion of the geographic area of an existing Innovation Zone, in New York City.
 - The New York City Innovation Zone would be enlarged to cover additional area. This city-scale outdoor testbed has a technical focus on ultra-high-bandwidth and low-latency wireless communications with tightly coupled edge computing.
- Prior to operating in an Innovation Zone, details for each Program Licensee experiment will be posted to the FCC webpage to serve as notification for nearby licensees and federal users.
- Collectively, these Innovation Zones are expected to provide valuable research on new advanced technologies, such as Open RAN and prototype networks, such as those that can support 5G technologies outside a traditional small campus or laboratory setting.

* This document is being released as part of a "permit-but-disclose" proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in ET Docket No. 19-257, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. See 47 CFR § 1.1200 et seq.



PUBLIC NOTICE

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FCC ANNOUNCES TWO NEW INNOVATION ZONES AND AMENDS ONE EXISTING INNOVATION ZONE FOR PROGRAM EXPERIMENTAL LICENSE*

ET Docket No. 19-257

By this Public Notice, the Federal Communications Commission (FCC) creates two new Innovation Zones for Program Experimental Licenses in designated areas in and nearby the campuses of North Carolina State University (NC State Innovation Zone) in Raleigh, NC and Northeastern University (Northeastern Innovation Zone) in Boston, MA and expands the geographical boundary of the previously established Innovation Zone in New York City. The NC State Innovation Zone is intended to study new use cases for advanced wireless technologies that are emerging in unmanned aerial systems (UAS); the Northeastern Innovation Zone will enable researchers to use the Colosseum wireless network emulator to extend and accelerate research in wireless networked systems.¹ Both of these Innovation Zones will help promote platforms to test the integration of Open radio access networks (Open RAN). Additionally, we slightly extend the geographic boundaries of the established New York City Innovation Zone and increase the permitted maximum power for certain frequency bands within that designated area.² We authorize these Innovation Zones as part of our ongoing efforts to provide opportunities for qualified licensees to test new advanced technologies and prototype networks – such as those that can support 5G technologies – outside a traditional small campus or laboratory setting.

* This document has been circulated for tentative consideration by the Commission at its August 2021 open meeting. The issues referenced in this document and the Commission's ultimate resolutions of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Acting Chairwoman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The Commission's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. See, e.g., 47 CFR §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. See 47 CFR §§ 1.1200(a), 1.1203.

¹ See Letter from Joseph Kochan, Project Director, Platforms for Advanced Wireless Research (PAWR) Program Office, to Ira Keltz, Office of Engineering and Technology, Federal Communications Commission (January 15, 2021) (*PAWR 2nd Request*) (available in ET Docket No. 19-257).

² PAWR identified some necessary deployment changes while designing and constructing their New York City testbed. See *Id.* The New York City site provides a cloud enhanced open software-defined mobile wireless testbed for city-scale deployment. *Office of Engineering and Technology Announces First Innovation Zones for Program Experimental Licenses*, ET Docket No. 19-257, Public Notice, 34 FCC Rcd 8130 (10) (OET, 2019) (*Innovation Zone Public Notice*). In the Innovation Zone Public Notice, we also authorized an Innovation Zone in Salt Lake City, Utah as a platform for open wireless data-driven research with massive multi-input multi-output (MIMO) capabilities.

The two new zones we establish herein are based on detailed proposals from the PAWR program. This program for new technology experimentation is funded by the National Science Foundation along with a consortium consisting of over thirty technology and telecommunications companies.³ According to PAWR, this program, "... will enable experimental exploration of robust new wireless devices, communication techniques, networks, systems, and services that will revolutionize the nation's wireless ecosystem, thereby enhancing broadband connectivity, leveraging the emerging Internet of Things (IoT), and sustaining US leadership and economic competitiveness for decades to come."⁴ We anticipate that the experimentation done at these zones may also materially improve understanding of opportunities for and capabilities of open, standards-based wireless networks. PAWR program testbeds are equipped for Open RAN research and testing, and PAWR teams are actively engaged with the Open RAN development community.⁵

These Innovation Zones will provide new capabilities and complement the existing Innovation Zones in Salt Lake City and New York City. More specifically, in Raleigh, North Carolina, PAWR is initiating AERPAW – Aerial Experimentation and Research Platform for Advanced Wireless. This project will create a city-scale platform to focus on new use cases for advanced wireless technologies that are emerging for unmanned aerial systems. AERPAW will focus on how cellular networks and advanced wireless technologies can enable beyond visual line-of-sight unmanned aerial systems to accelerate development, verification, and testing of transformative advances and breakthroughs in telecommunications, transportation, infrastructure monitoring, agriculture, and public safety. Notably, the AERPAW testbed will be the first platform to allow testing at scale of open 5G-and-beyond solutions in unmanned aerial system verticals.⁶

At Northeastern, PAWR will be supporting the transition of the Defense Advanced Research Projects Agency's (DARPA) Colosseum network emulator to a shared platform that is usable by the research community. Colosseum, the world's largest wireless network emulator, was originally designed to support DARPA's Spectrum Collaboration Challenge.⁷ With the conclusion of that challenge, the larger research community will now be able to take advantage of Colosseum's unique capabilities, including the ability to emulate full-stack communications, and to support artificial intelligence and machine learning algorithms and hardware in the loop. This project is expected to bring academia, government and industry researchers together to accelerate advancements in wireless networked systems including Open RAN.

Under a Program License, qualified institutions may conduct testing for multiple non-related experiments under a single authorization within a defined geographic area under control of the licensee and where the

³ See *PAWR 2nd Request*. PAWR, Platforms for Advanced Wireless Research, <https://advancedwireless.org> (last visited June 7, 2021); National Science Foundation, Platforms for Advanced Wireless Research (PAWR): Establishing the PAWR Project Office (PPO) (PAWR/PPO), https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505316 (last visited June 7, 2021).

⁴ See *PAWR 2nd Request*.

⁵ For example, POWDER in Salt Lake City and COSMOS in New York City served as hosts for the North American O-RAN Alliance plugfest in 2020. See <https://www.o-ran.org/blog/2020/10/24/second-global-o-ran-alliance-plugfest-demonstrates-the-accelerated-readiness-of-multi-vendor-o-ran-compliant-network-infrastructure>.

⁶ "AERPAW will develop a software-defined, reproducible and open-access advanced wireless platform with production-like networking and experimentation features spanning 5G technologies and beyond. The AERPAW platform in Raleigh and Cary joins existing PAWR testbeds..., all of which are targeting early-stage research in next-generation wireless devices, techniques, protocols and services. These platforms are designed to accelerate the development and commercialization of promising technologies..." See <https://advancedwireless.org/nsf-names-third-pawr-wireless-research-platform-in-north-carolinas-research-triangle/>.

⁷ See darpa.mil/about-us/timeline/spectrum-collaboration-challenge.

licensee has institutional processes to manage and oversee experiments.⁸ The Innovation Zone takes this concept a step further by effectively providing an extension of a Program License's authorized area of operation. Such licensees are permitted to operate within an Innovation Zone, under the parameters set for that particular Zone, without having to modify their licenses to cover the new location.⁹

We are using the Office of Engineering and Technology's (OET) Experimental Licensing System webpage to post the Innovation Zone designations and detail the guidelines we have established for each particular zone – including the specific geographic area(s) we have designated and applicable technical parameters, such as frequency bands and power limits.¹⁰ Those wishing to test in an Innovation Zone must meet the Program License eligibility requirements, hold an existing Program License and operate in accordance with the geographic areas and technical limits established for the Innovation Zone.¹¹ Prior to operating in an Innovation Zone, details for each Program Licensee experiment will be posted to the FCC webpage as described below. This posting will implement the Program License rules procedures that require notification of intended operations so that all nearby licensees and federal users have full knowledge of operations in an area.¹² Program licensees must still meet the timing requirements prescribed by the Commission's rules and agreements with other Federal agencies. Specifically, program licensees are required to wait 10-days prior to beginning tests on spectrum allocated exclusively for non-federal use and 15-days when using spectrum allocated for federal use including shared non-federal/federal use.¹³ Finally, as detailed below, the PAWR Project Office will serve as a frequency coordinator for these Innovation Zones; operation may not commence without prior coordinating through that office.¹⁴

Innovation Zone Term

Both the NC State and Northeastern Innovation Zones are established for a period of five years from the release date of this public notice.¹⁵ The term may be renewed upon request at the end of this term.

Program License Registration within Innovation Zones

⁸ 47 CFR Part 5, subpart E.

⁹ 47 CFR § 5.313.

¹⁰ The Experiments Licensing System webpage can be accessed at: <https://www.fcc.gov/els>.

¹¹ Program licensees with experimentation needs that differ from those permitted an Innovation Zone will be required to apply for and obtain a conventional experimental license through the Commission's experimental licensing system prior to operating. In such instances, requests to operate on federally allocated spectrum will be coordinated with NTIA.

¹² See 47 CFR § 5.309.

¹³ See 47 CFR § 5.309; *Promoting Expanded Opportunities for Radio Experimentation and Market Trials under Part 5 of the Commission's Rules and Streamlining Other Related Rules*, ET Docket 10-236, Report and Order, FCC 13-15, 28 FCC Rcd 758, 790 ¶¶ 84 (2013). The waiting period between notification and when operation can actually begin is intended to provide potentially affected spectrum users an opportunity to provide comment or voice concerns. In such instances, experimental operation cannot begin until coordination is completed, which could take longer than the notification period and could also require operational adjustments, such as altering operational frequency bands or reducing power levels to be used during experimentation.

¹⁴ The PAWR Project Office will coordinate with non-federal licensees as appropriate as well as establish coordination procedures with potentially affected federal spectrum users and coordinate appropriately via the National Science Foundation (NSF) spectrum management office for federal frequency usage. As indicated below, with respect to the Northeastern University Innovation Zone, operations in certain frequency ranges must be coordinated with the Haystack Observatory in Westford, MA.

¹⁵ The New York City and Salt Lake Innovation Zones expire five years from the date of the *Innovation Zone Public Notice*, on September 18, 2024

A program licensee will be required to indicate its call sign and identify the Innovation Zone(s) in which it intends to operate. A program licensee must operate within the parameters established for the Innovation Zone within which it intends to operate. It will provide specific technical data, a description of the experiment, and a stop buzzer contact person for posting on the appropriate Innovation Zone web page(s). Parties will use OET's Experiments System webpage to submit this information.¹⁶

Program licensees must register on OET's Experiments System webpage under the respective Innovation Zone webpage at: <https://www.fcc.gov/els> prior to operation. The online registration process will provide a record of program licensees that indicate an intent to operate in each Innovation Zone. This registration process along with the required coordination process through the PAWR program office will provide an opportunity for incumbent licensees and federal spectrum users to be an integral part of any necessary compatibility evaluation. The website will further be useful to alert other program licensees and experimental licensees of nearby operations.

Innovation Zone Frequency Coordination

In addition to requesting to operate in an Innovation Zone, a Program Licensee must also coordinate its operations prior to commencing its tests.¹⁷ The PAWR Project Office will serve as the frequency/operations coordinator for the Innovation Zones established and/or modified herein (as well as the Salt Lake City Innovation Zone). In this role, the PAWR Project Office will offer non-discriminatory service to all interested Program Licensees to coordinate specific times and locations for each Program Licensee's operations to avoid interference to other spectrum users and between Program Licensees' tests. The frequency coordinator may act as a central clearinghouse to obtain consent from other potentially affected Commission licensees and/or federal spectrum users for Innovation Zone operations. Alternatively, Program Licensees may coordinate their own arrangements with these authorized spectrum users. In such cases, Program Licensees must still coordinate specific operations through the PAWR Project Office. Note that designating PAWR as the Innovation Zone frequency coordinator does not confer operating authority on PAWR nor does it confer sole authority for PAWR to permit operations as Program Licensees must also register on OET's Innovation Zone Registration Webpage.¹⁸ Additionally, current Commission rules do not allow airborne use in certain bands including active as well as passive receive-only bands (e.g., 2495-2690 MHz and 3450-4000 MHz); therefore, Program Licensees that plan to engage in experimental operations involving airborne transmissions in any Innovation Zone must take extra care to coordinate such operations (potentially over distances much greater than that necessary for terrestrial experimental operations) to ensure that authorized users will not experience harmful interference.

Interested Program Licensees may contact Mari Silbey, PAWR Program Director, at mari.silbey@us-ignite.org.

¹⁶ Further information and detailed filing instructions can be found at <https://www.fcc.gov/els>.

¹⁷ We note that some of the bands being designated for use within the various Innovation Zones contain or are adjacent to important incumbent uses, including safety-of-life applications. The PAWR project office will take these uses by non-federal and federal spectrum users into consideration when coordinating Program Licensees' specific operations for each area.

¹⁸ The FAA has authority over matters of aviation safety, and is specifically tasked by statute with developing regulations and standards to integrate unmanned aerial systems into the National Airspace System and licensees may also be required to coordinate with and get approval from the Federal Aviation Administration for any airborne operations, including for unmanned aerial system use within any Innovation Zone.

FCC Contact

Program licensees interested in operating in the Innovation Zones referenced herein may contact Ira Keltz at 202-418-0616 or ira.keltz@fcc.gov or Anthony Serafini at 202-418-2456 or anthony.serafini@fcc.gov with questions regarding this public notice.

North Carolina State University Innovation Zone

Location

The NC State Innovation Zone will encompass two separate areas and program licensees will be permitted to use either or both areas.

The first area encompasses approximately 10.5 square miles for testing over the NC State University campus, a suburban residential area and a rural research farm. This area is defined as the area roughly between the Western Boulevard at the northern boundary, south of the Lake Wheeler Agricultural Research Station at the southern boundary, Gorman Street on the western boundary and South Saunders Street on the eastern boundary. The boundary for this area is within the polygon defined by the following coordinates:

35° 46' 23.4" N,	78° 39' 12.7" W
35° 47' 06.3" N,	78° 41' 13.0" W
35° 45' 03.3" N,	78° 42' 42.2" W
35° 43' 21.1" N,	78° 42' 11.9" W
35° 42' 59.5" N,	78° 41' 16.8" W
35° 43' 01.5" N,	78° 40' 08.1" W

To minimize the risk of harmful interference to incumbent operations and avoid areas where airborne operations may be restricted, PAWR states that their primary area for airborne transmissions within the larger Innovation Zone will be over approximately 3 square miles in the Lake Wheeler area in the southern portion of the Innovation Zone. This area is defined by the following coordinates:

35° 44' 29.9" N	78° 40' 20.0" W
35° 44' 38.7" N	78° 41' 32.3" W
35° 43' 58.3" N	78° 42' 22.0" W
35° 43' 23.5" N	78° 42' 12.3" W
35° 42' 59.5" N	78° 41' 16.8" W
35° 43' 01.5" N	78° 40' 08.1" W

The second area of NC State Innovation Zone will extend into the Town of Cary, North Carolina and cover approximately 3 square miles. This area is anticipated to support four fixed towers with permanent wireless transceivers. The tower locations are yet to be determined, but will be restricted to ensure all testing is confined within the Innovation Zone as defined by the following coordinates:

35° 48' 32.49" N,	78° 47' 39.64" W
35° 48' 30.14" N,	78° 45' 53.70" W
35° 46' 16.16" N,	78° 45' 51.17" W
35° 46' 19.55" N,	78° 47' 47.80" W

Technical Limits and Band Information:

Frequency Band	Type of operation	Allocation	Fixed Station Maximum EIRP (dBm)	Mobile Station Maximum EIRP (dBm)
617-634.5 MHz (DL)	Fixed	Non-federal	65	-
663-698 MHz (UL)	Mobile	Non-federal	-	20
907.5-912.5 MHz	Fixed & Mobile	Shared	65	20
1755-1760 MHz (UL)	Mobile	Shared	-	20
2155-2160 MHz (DL)	Fixed	Non-federal	65	-
2390-2483.5 MHz	Fixed & Mobile	Shared	65	20
2500-2690 MHz ^{1,2}	Fixed & Mobile	Non-federal	65	20
3550-3700 MHz ^{1,2,3}	Fixed & Mobile	Shared	65	20
3700-3980 MHz ^{1,2}	Mobile	Non-federal	-	20
5850-5925 MHz	Fixed & Mobile	Shared	65	20
5925-7125 MHz ²	Fixed & Mobile	Non-Federal	65	20
27.5-28.35 GHz	Fixed & Mobile	Non-federal	65	20
38.6-40.0 GHz	Fixed & Mobile	Non-federal	65	20

¹ Commission rules do not permit airborne use on all or portions of these bands.

² Any experimental use must be coordinated with authorized users and registered receive-only fixed satellite earth stations.

³ Operations must be coordinated with a spectrum access system administrator

Northeastern University Innovation Zone

Location

The Northeastern Innovation Zone will encompass two separate areas and program licensees will be permitted to use either or both areas.

The first area is on Northeastern University's main campus in Boston, MA and will cover a triangular tract of approximately 0.8 square miles. This area is defined as the area roughly between 361 Huntington Avenue as the northern vertex, Carter Playground as the eastern vertex, and 860 Columbus avenue as the southern boundary. The coordinates for this area are:

Northwest: 42° 20' 24.00" N, 71° 05' 25.00" W
 Southwest: 42° 20' 12.12" N, 71° 05' 16.22" W
 Northeast: 42° 20' 20.33" N, 71° 05' 2.90" W

The second area of the Northeastern Innovation Zone is on Northeastern University's satellite campus in Burlington, MA and will cover a polygon of approximately 0.9 square miles. This area is defined as the area west of Cambridge Street in Burlington MA and bordering Mary Cummings Park. The coordinates for this area are:

Northwest: 42° 28' 44.54" N, 71° 11' 37.43" W
 Northeast: 42° 28' 45.59" N, 71° 11' 20.62" W
 Northeast: 42° 28' 41.88" N, 71° 11' 22.2" W
 South: 42° 28' 37.67" N, 71° 11' 32.64" W
 Southwest: 42° 28' 38.89" N, 71° 11' 38.83" W

Technical Limits and Band Information:

Frequency Band	Type of operation	Allocation	Fixed Station Maximum EIRP (dBm)	Mobile Station Maximum EIRP (dBm)
746-787 MHz	Fixed and Mobile	Non-federal	10 W	100mW
880-960 MHz ^{1,2}	Fixed and Mobile	Non-federal	10 W	100mW
1920-2170 MHz	Fixed and Mobile	Non-federal	10 W	100mW
2305-2360 MHz ^{1,2,4}	Mobile	Non-federal	-	100mW
2500-2690 MHz ^{1,2}	Fixed and Mobile	Non-federal	10 W	100mW
3000-3100 MHz	Fixed and Mobile	Shared	10 W	100mW
3300-3600 MHz ^{1,2,3,4}	Fixed and Mobile	Federal	10 W	100mW
3700-3980 MHz ^{1,2}	Fixed and Mobile	Non-federal	1 W	100mW
4620-4990 MHz ^{1,2,4}	Fixed and Mobile	Shared	1 W	100mW
27-30 GHz	Fixed and Mobile	Non-federal	10 W	100mW
37-40 GHz ^{1,2,5}	Fixed and Mobile	Shared	10 W	100mW
71-86 GHz ^{4,5}	Fixed and Mobile	Shared	10 W	100mW
122.5-140 GHz ⁴	Fixed and Mobile	Shared	1 W	100mW
209-225 GHz ⁴	Fixed and Mobile	Shared	1 W	100mW
232-235 GHz	Fixed and Mobile	Shared	1 W	100mW
238-250 GHz ⁴	Fixed and Mobile	Shared	1 W	100mW
1-1.05 THz	Fixed	Shared	100 mW	-

¹ Commission rules do not permit airborne use on all or portions of these bands.

² Any experimental use must be coordinated with authorized users and registered receive-only fixed satellite earth stations.

- ³ Operations in the 3550-3600 MHz band must be coordinated with a spectrum access system administrator.
- ⁴ Note that this band includes frequency ranges covered by footnote US342; all practicable steps should be taken to protect radio astronomy operation, including sites near the Innovation Zone.
- ⁵ Operations in the 37-40 GHz band and in the 80-86 GHz band must be coordinated with the Haystack Observatory in Westford, MA.

New York City Innovation Zone

Location:

The New York City Innovation Zone is being modified¹⁹ to cover the three Columbia University and City College of New York campus areas and will be defined as the area contained within:

- W 116 St from the Hudson River to Morningside Avenue (Through Riverside and Morningside Parks and The Columbia University Campus).
- Morningside Ave from W 116 St to W 124 St.
- W 124 from Morningside Ave to St Nicholas Ave
- St Nicholas Ave from W 124 St to W 138 St
- W 138 from St. Nicholas Ave to Broadway (through St. Nicholas park and the CCNY campus)
- Broadway from W 138 St to W 133 St
- W 133 St from Broadway to the Hudson River (through the park).
- Hudson River from W 133 to W 116

Technical Limits and Band Information:

Frequency Band	Type of operation	Allocation	Maximum EIRP (dBm)
2500-2690 MHz	Fixed	Non-federal	20
3700-4200 MHz ¹	Mobile	Non-federal	20
5850-5925 MHz	Mobile	Shared	20
5925-7125 MHz	Fixed & Mobile	Non-federal	20
27.5-28.35 GHz	Fixed	Non-federal	40 ²
38.6-40.0 GHz	Fixed	Non-federal	40 ²

¹ Commission rules do not permit airborne use in this band. Any experimental use must be coordinated with authorized users and registered receive-only fixed satellite earth stations.

² These power limits are an increase from the previously permitted 20 dBm limit.

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¹⁹ The previously approved New York City Innovation Zone was bounded by W 123rd Street on the south, Amsterdam Avenue to the east, W 134th Street to the north and Broadway to the west.