IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

NO. 20-1190

(consolidated with Nos. 20-1216, 20-1272, 20-1274, 20-1281, and 20-1284)

AT&T SERVICES, INC., ET AL.,

PETITIONERS,

V.

FEDERAL COMMUNICATIONS COMMISSION
AND UNITED STATES OF AMERICA,

RESPONDENTS.

ON PETITIONS FOR REVIEW OF AN ORDER OF THE
FEDERAL COMMUNICATIONS COMMISSION

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

1. Parties.

Petitioners are (1) AT&T Services, Inc. (No. 20-1190) (AT&T), (2) Edison Electric Institute (No. 20-1216), (3) Association of Public-Safety Communications Officials International, Inc. (No. 20-1272), (4) National Association of Broadcasters (No. 20-1274), (5) Utilities Technology Council, National Rural Electric Cooperative Association, and American Public Power Association (No. 20-1281); and (6) CenturyLink, Inc. (No. 20-1284). Respondents are the Federal Communications Commission and the United States of America. The intervenors in support of respondents are (1) Apple Inc., Broadcom Inc., Cisco Systems, Inc., Google LLC, Hewlett Packard Enterprise Co., Intel Corporation, Microsoft Corporation (Apple, Broadcom et al.); (2) Wi-Fi Alliance; and (3) NCTA-The Internet and Television Association. Southern Company is an *amicus* in support of petitioners. CableLabs is an *amicus* in support of respondents.

2. Ruling under review.

The ruling at issue is *Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 35 FCC Rcd 3852, 2020 WL 2013310 (2020) (*Order*) (JA___).

3. Related cases.

AT&T was the first to file a petition for review (No. 20-1190). The Court subsequently consolidated the other five petitions (Nos. 20-1216, 20-1272, 20-1274, 20-1281, and 20-1284) on its own motion. Respondents are not aware of any other related cases pending in this Court or any other court.

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GLOSSARY

APCO	Association of Public-Safety Communications Officials International, Inc.
CII	Critical Infrastructure Industry
dB	Decibel
dBm	Decibel milliwatts
EIRP	Effective isotropic radiated power
FCC	Federal Communications Commission
GHz	Gigahertz
MHz	Megahertz
NAB	National Association of Broadcasters
Notice of Inquiry	*Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 32 FCC Rcd 6373 (2017)
NPRM	*Unlicensed Use of the 6 GHz Band*, 33 FCC Rcd 10496 (2018)
Order	*Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 35 FCC Rcd 3852, 2020 WL 2013310 (2020)
Stay Denial Order	*Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 & 24 GHz*, 35 FCC Rcd 8739, 2020 WL 4734883 (OET 2020)

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BRIEF FOR RESPONDENTS

INTRODUCTION

Every day, Americans depend on wireless broadband connections to the Internet in their work, school, and personal lives. The demand for wireless broadband has exploded in the past few years, most recently amidst the COVID-19 pandemic, in which classes, work meetings, doctors' appointments, religious services, and more have been conducted remotely.

In 2018, Congress directed the Federal Communications Commission (FCC) to make additional spectrum available for unlicensed use. The

Commission responded to Congress' mandate and the growing demand for wireless broadband by making 1,200 megahertz (MHz) of spectrum in the 6 gigahertz (GHz) band available for unlicensed use by wireless devices. *Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 35 FCC Rcd 3852, 2020 WL 2013310 (2020) (*Order*) (JA___). The FCC concluded that its action would ease congestion, usher in a new generation of faster, better-performing devices, and advance the agency's goal of making broadband connectivity available to all Americans, especially those in rural and underserved areas.

The Commission's decision was made after careful consideration of the evidence presented by both proponents and opponents of unlicensed operations. Over the course of a nearly three-year rulemaking, the agency reviewed a voluminous and highly technical record that included roughly 100 studies and thousands of filings from interested parties. Throughout the proceeding, the Commission recognized that in expanding unlicensed use in the 6 GHz band, it should protect existing licensed operations from harmful interference. The Commission accordingly adopted a set of restrictions on unlicensed operations that it reasonably determined would ensure that the risk of harmful interference to licensed operations would be insignificant.

Petitioners claim that the Commission "ignored" relevant evidence as well as arguments by incumbent licensees. *See, e.g.*, Petitioners' Brief (Pet. Br.) 1, 13, 15, 16, 25, 31. To the contrary, the record shows that the Commission grappled at length with these issues and addressed the concerns raised by petitioners and others in the *Order*. Ultimately, however, the agency reasonably disagreed with petitioners' contentions.

Petitioners also raise a number of challenges to the Commission's technical analysis of various radiofrequency propagation issues in the *Order*. But it is settled that the agency's "technical judgment" regarding issues of spectrum management is accorded "the greatest deference" by this Court, and is to be upheld so long as it is "supported 'with even a modicum of reasoned analysis, absent highly persuasive evidence to the contrary.'" *See NTCH, Inc. v. FCC*, 950 F.3d 871, 880 (D.C. Cir. 2020). As we explain, the FCC's reasoned decision in this case, based on ample evidence in the record, provides more than enough justification for its actions. The petitions for review should be denied.

JURISDICTION

The *Order* was released on April 24, 2020 and published in the Federal Register on May 26, 2020. All petitioners timely filed petitions for review of

the *Order*. This Court's jurisdiction rests on 47 U.S.C. § 402(a) and 28 U.S.C. § 2342(1).

QUESTIONS PRESENTED

1. Whether the Commission reasonably determined that expanding unlicensed use in the 6 GHz band under specific conditions would pose no significant risk of harmful interference to licensed incumbents in the band;

2. Whether, in allowing unlicensed devices to operate indoors at low power using a contention-based protocol but not under the control of an automated frequency coordination system, the Commission properly accounted for (a) signal attenuation by reason of indoor operation (building loss), (b) signal attenuation by reason of outdoor environmental obstructions (clutter loss), (c) the proportion of time unlicensed devices would likely be in operation (their activity factor), and (d) the accumulated interference risks of numerous devices;

3. Whether the Commission reasonably determined that its restrictions on low-power indoor devices will be effective;

4. Whether the Commission adequately considered public safety;

5. Whether the Commission reasonably explained why it rejected interference studies submitted by electric power utilities;

6. Whether the Commission's rules adequately protect broadcasters' mobile microwave operations from harmful interference; and

7. Whether, in the unlikely event that harmful interference issues arise in the 6 GHz band, the Commission has the capability to resolve those issues promptly.

COUNTERSTATEMENT

Over three decades ago, the Commission made two bands of spectrum (at 2.4 GHz and 5 GHz) available for unlicensed use. *Unlicensed Use of the 6 GHz Band*, 33 FCC Rcd 10496, 10497 ¶ 3 (2018) (*NPRM*) (JA___). At the time, "few could have anticipated the explosion of innovation that followed." *Id*. Today, wireless devices using those spectrum bands provide many American consumers with their primary gateway to the Internet. *Id*. ¶ 5 (JA___).[1] "The demand for wireless broadband continues to grow at a phenomenal pace," with mobile data traffic projected to more than double between now and 2022. *Order* ¶ 2 (JA___).

To meet this "insatiable" demand (*NPRM* ¶ 4 (JA___)), the Commission "continuously evaluates spectrum use" with a goal "to enable

[1] Such devices are often referred to as "Wi-Fi" devices, which is a trademarked name for devices using a particular wireless data transfer protocol.

more efficient usage." *Order* ¶ 6 (JA___). In 2017, the Commission began to examine whether to expand unlicensed use in the 6 GHz band. *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 32 FCC Rcd 6373 (2017) (*Notice of Inquiry*) (JA ___). The 6 GHz band is host to incumbent fixed services, mobile services, and fixed satellite services across four sub-bands. *Order* ¶ 7 (JA__). Fixed microwave service licensees like the petitioners "operate point-to point microwave links" that support operations by utilities, commercial and private entities, and public safety agencies. *Id*. In addition, broadcasters (including members of petitioner NAB (the National Association of Broadcasters)) are licensed to use the 6 GHz band for mobile microwave operations "to transmit programming material" such as "electronic news gathering." *Id*. ¶ 8 (JA___). Select unlicensed users have long operated in the 6 GHz band at low-power levels. *NPRM* ¶ 13 (JA__).

In 2018, Congress directed the agency to "develop a national plan for making additional radio frequency bands available" for unlicensed use. RAY BAUM's Act, Pub. L. No. 115-141, § 618, 132 Stat. 348, 1112 (2018) (codified at 47 U.S.C. § 1508). The Act requires the Commission to "identify a total of at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use," at least 100 MHz of which must

be for unlicensed use, by no later than December 31, 2022. 47 U.S.C. § 1502(a)(1).

The Commission is authorized to allow unlicensed operations in bands occupied by licensed users provided that those operations do not "transmit[] enough energy to have a significant potential for causing harmful interference." *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 234 (D.C. Cir. 2008). The Commission has long defined "harmful interference" as operation that "endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service." 47 C.F.R. § 15.3(m).

A. Notice of Proposed Rulemaking

Consistent with Congress' mandate, the Commission in October 2018 "sought comment on how best to provide new opportunities for unlicensed use in the [6 GHz] band while also ensuring that licensed services that operate in the band continue to thrive." *Order* ¶ 11 (JA__). The 6 GHz band is particularly attractive for unlicensed operations because it allows those devices to operate with wider channel bandwidths, higher data rates, and increased flexibility. *Notice of Inquiry* ¶ 26 (JA___). In proposing to expand unlicensed operations in the band, the agency emphasized its "commitment to

preserve and protect the important base of incumbent users in these frequency bands." *NPRM* ¶ 2 (JA___).

The Commission proposed dividing the 6 GHz band into four sub-bands: U-NII-5, U-NII-6, U-NII7, and U-NII-8. *Id.* ¶ 20 (JA__). Two types of unlicensed operations—standard-power and low-power—would be permitted in these four sub-bands. *Id.* Unlicensed operations would be comprised of (1) "access points," like common household wireless routers, which connect devices in homes and businesses to the Internet; and (2) "client devices," like smartphones, tablets, and laptops, which are under the control of an access point. *Order* ¶¶ 3, 12 (JA__, __). Within each of these four sub-bands, the Commission "proposed to tailor unlicensed operation" to protect existing licensed operations. *Id.* ¶ 12 (JA__).

1. **Unlicensed standard-power operations**

For standard-power access points operating in the 6 GHz band, the Commission proposed permitting access to the spectrum under the control of an "[automated] frequency coordination" system, which, by establishing exclusion zones, would help ensure that "new unlicensed devices do not cause harmful interference to fixed service incumbents." *NPRM* ¶ 23 (JA__). Under this system, a standard-power access point would be required—prior to transmitting—to obtain from an online database a list of permissible

frequencies on which it can transmit. *Id*. In this way, the system would serve as a "traffic cop" to ensure that there are no conflicts with fixed microwave users, as well as a tracing mechanism to identify unlicensed users that cause harmful interference to licensed operations and to direct those users to cease their interference-causing transmissions. *Order* ¶ 28 (JA__).

The Commission sought broad comment on the framework, design, and operation of the automated frequency coordination system as well as the appropriate interference protection parameters that such a system would use to protect incumbent fixed services from harmful interference. *NPRM* ¶¶ 25-36, 50-52 (JA____-___, ___-___).

2. **Unlicensed low-power operations**

The Commission proposed that low-power access points be permitted to operate in two sub-bands without an automated frequency coordination system, subject to two conditions. First, they would be "restricted to indoor operation"; second, they would be "limited to lower power levels" than standard-power access points. *Id.* ¶ 59 (JA___). The Commission explained that the lower power signals transmitted by these unlicensed devices while indoors would be significantly reduced, or attenuated, when passing through building walls (building loss) and when passing through hills, vegetation, and trees (clutter loss). *Id*. ¶ 61 (JA__). In this way, these restrictions would

minimize considerably the risk of harmful interference to licensed operations from unlicensed devices. *Id*.

To ensure that the agency struck "the right balance" between "operational flexibility for unlicensed devices and protection of incumbent operations," *id*., the Commission "encourage[d] parties to employ statistical models to evaluate the risk of harmful interference" when unlicensed devices share the band with incumbent services. *Id*. ¶ 62 (JA__).

The Commission also sought comment on whether it should permit low-power access points in the other two sub-bands without an automated frequency coordination requirement, "thereby permitting indoor operations across the entire 6 GHz band." *Id.* ¶ 73 (JA__); *Order* ¶ 13 (JA__). Recognizing the importance of protecting incumbent operations, the Commission asked whether there were any "operational requirements, rules, or mitigation techniques" that could minimize the risk of harmful interference to these operations. *NPRM* ¶ 73 (JA___).

In addition, the agency proposed that unlicensed low-power client devices like smartphones and laptops be allowed to operate in all four sub-bands while "under the control of either a standard-power access point or a low-power access point." *Id*. ¶ 20 (JA__). Under the proposal, client devices

would have "lower power levels than the respective access points." *Order* ¶ 12 (JA__).

B. The *Order* on Review

After reviewing an extensive record that included comments from over 150 parties and nearly 100 technical studies submitted by proponents and opponents of unlicensed operations in the 6 GHz band, the Commission unanimously adopted an order opening the 6 GHz band for more expansive unlicensed use. *Order* ¶¶ 14-16 (JA___). The Commission explained that this additional spectrum for unlicensed use will ease congestion "so that businesses and consumers can take advantage of new data intensive applications (*id*. ¶ 2 (JA___)), and will lead to new and better-performing wireless devices by making available, for the first time, larger sized wireless channels. *Id*. ¶ 98 (JA___). These new larger channels would allow market participants to "optimiz[e] the potential for deployment of next-generation Wi-Fi," *id*., and "will allow more data to be transmitted in a shorter period of time." *Id*. ¶ 120 (JA___). The Commission anticipated that these "new innovative technologies and services" will "advance [its] goal of making broadband connectivity available to all Americans, especially those in rural and underserved areas." *Id*. ¶ 1 (JA___).

1. Allowing unlicensed standard-power operations

The Commission largely adopted the proposals for standard-power operations for which it had sought comment, and permitted these devices to operate both indoors and outdoors in the U-NII-5 and U-NII-7 bands. *Id.* ¶ 17 (JA___). As the Commission had proposed, standard-power operations would be under the control of an automated frequency coordination system, which would "protect incumbent fixed microwave operations" by preventing unlicensed standard-power access points from operating where they could cause harmful interference. *Id.* ¶ 22 (JA___).

2. Allowing unlicensed low-power indoor operations

In addition, the Commission permitted unlicensed low-power devices to operate in all four sub-bands of the 6 GHz band without requiring an automated frequency coordination system. *Id.* ¶ 98 (JA___). In so doing, the agency "create[d] new unlicensed use opportunities in these bands" while adopting a number of restrictions to "protect[] the various incumbent licensed services in the band, including fixed microwave services." *Id.*

In reaching this conclusion, the Commission relied in part on a "Monte Carlo" simulation by CableLabs that modeled the interference potential of low-power unlicensed devices to licensed operations and concluded that expanding unlicensed operations in the 6 GHz band would not cause harmful

interference. *Id.* ¶¶ 116, 120 (JA___).[2] The agency also relied on a study by petitioner AT&T. *Id.* ¶ 112 (JA__). After substituting "more realistic technical parameters" for the ones used by AT&T, the Commission found that the AT&T study confirmed CableLabs' findings that the risk of harmful interference to fixed service licensees was insignificant. *Id.* ¶ 130 (JA___).

To further allay concerns from incumbent licensees about the potential for harmful interference to their services, the Commission adopted three restrictions to low-power operations. *Id.* ¶ 99 (JA___).

First, the Commission required that low-power access points operating in the 6 GHz band "must operate only indoors." *Id.* ¶ 100 (JA___). To buttress that requirement, the agency directed that such devices: (1) could not be "weather resistant," (2) must have antennas that are physically integrated with the device, (3) must lack the ability to "connect[] other antennas to the

[2] A "Monte Carlo" simulation is named after the well-known gambling destination in Monaco, since random outcomes are central to the modeling technique (much as they are to games such as dice, roulette, and slot machines). A Monte Carlo simulation treats many of its inputs as statistical quantities, as opposed to a single value. The simulation is then run hundreds or thousands of times using values drawn from each input's statistical distribution. In this way, the model creates a range of outcomes that predicts the likelihood of an event occurring—in this case, the likelihood of harmful interference to incumbent operations. *Order* n.274 (JA__).

devices," and (4) are prohibited from operating solely "on battery power." *Id.* ¶ 107 (JA___).[3]

Second, the Commission required indoor low-power access points and their associated client devices to use a "contention-based protocol," which "allows multiple users to share spectrum by providing a reasonable opportunity for the different users to transmit." *Id.* ¶ 101 (JA___). Because of the sharing requirement, low-power devices are necessarily limited in the amount of time they can transmit, thereby minimizing when harmful interference could potentially occur. *Id.* ¶ 102 (JA___).

Third, the Commission adopted a reduced power spectral density of 5 dBm/MHz effective isotropic radiated power, or EIRP, for low-power access points. *Id.*[4] This was significantly lower than the 17 dBm/MHz EIRP limit proposed in the *Notice of Proposed Rulemaking* (*NPRM* ¶ 78 (JA__), *Order*

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[3] Low-power indoor access points may use battery backup only in limited instances in which there is a power outage. Knowledge Database, Part 15 Subpart E U-NII 6 GHz General Guidance Bands 5, 6, 7, 8 at 4 (OET Feb. 4, 2021), *available at* https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=277034&switch=P.

[4] Power spectral density is a measure of the amount of power within a given bandwidth. When expressed as dBm/MHz, the power spectral density is a measure of the total power (in decibels) of all signals within any specified megahertz of spectrum. Effective isotropic radiated power or EIRP refers to the total radiated power due to the transmitter conducted power and gain of its associated antenna.

¶ 13, Table 2 (JA__)), and the 8 dBm/MHz EIRP limit that the unlicensed proponents had advocated before the agency. *Order* ¶ 132 (JA___). "At this power limit and with the other constraints imposed on these operations," the Commission found the risk of harmful interference to incumbent operations to be "insignificant." *Id.* ¶ 110 (JA__).

As for low-power client devices like smartphones and tablets, the Commission determined that the appropriate maximum power density was -1 dBm/MHz EIRP (*id.* ¶ 111 (JA___)), which was also significantly lower than the 5 dBm/MHz EIRP limit that the agency had proposed. *See NPRM* ¶ 78 (JA___).

C. The Stay Denial Order

Petitioners Edison Electric Institute (Edison) and Association of Public-Safety Communications Officials International, Inc. (APCO) asked the Commission to stay the *Order*. Among other things, they alleged that the *Order* "conflicts with the Communications Act" by not requiring the use of an automated frequency coordination system for unlicensed devices, will result in harmful interference to licensed operations by permitting unlicensed users in the 6 GHz band, and failed to adequately address the impact on public safety operations. *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 & 24 GHz*, 35 FCC Rcd

8739, 2020 WL 4734883 ¶ 6-7 (OET 2020) (*Stay Denial Order*). The agency's Office of Engineering and Technology denied the petitions, finding that the arguments raised had been "fully considered and ruled upon in the *Order*." *Id*. ¶ 1.

APCO and Edison, joined by the other petitioner Utilities,[5] filed motions for a judicial stay of the Commission's rules with respect to low-power indoor operations. This Court denied the motions, finding that the "[m]ovants have not satisfied the stringent requirements for a stay pending court review." Order, No. 20-1190 (Oct. 1, 2020). The Court also denied APCO's alternative request for an expedited briefing schedule. *Id*.

SUMMARY OF ARGUMENT

After reviewing an enormous and highly complex record, the Commission determined that the technical and operational limits it imposed on unlicensed devices would ensure that there would be no significant risk of harmful interference to licensed operations. This judgment, grounded in the Commission's experience and radiofrequency engineering expertise, is entitled to the "greatest deference." *NTCH*, 950 F.3d at 880.

[5] The Utilities Technology Council, the National Rural Electric Cooperative Association, and the American Public Power Association.

I. In determining that there would no significant risk of harmful interference to incumbent licensed operations in the 6 GHz band, the Commission did not find that its rules would "prevent harmful interference under all circumstances." 47 C.F.R. § 15.15(c). As the *Order* explained, attempting to meet that impossible standard "would rule out virtually all services and unlicensed operations, given that there is virtually no type of [radiofrequency]-emitting device that does not have the potential for causing such interference if used incorrectly." *Order* ¶ 146 (JA__). Instead, the Commission found that the risk of such harmful interference would be insignificant. And in the unlikely event that harmful interference were to occur, the interfering unlicensed devices would be required to cease operations under the FCC's rules.

II. Petitioners raise a host of technical objections to the *Order*. The Commission addressed and reasonably rejected each of them.

A. Building Loss. The Commission reasonably analyzed building loss, which measures the strength an indoor device's signal will lose when it passes through building walls or windows. The agency found that the simulation employed by the CableLabs study appropriately used a statistical distribution for building loss, rather than a single number such as an average value. Petitioners criticize the Commission for not focusing on highly

unlikely instances in which there is "little or no building loss." Pet. Br. 27. But the agency reasonably declined to place significant weight on very unusual cases in analyzing the building loss that was reasonably likely to result from indoor operation.

B. Clutter Loss. The Commission also reasonably analyzed clutter loss, which refers to environmental obstruction (trees, hills, etc.) that can potentially weaken a signal before it reaches the receiver. As with building loss, the agency found that the examples that had been presented represented worst-case scenarios that exaggerated the risk of interference to licensed operations.

C. Activity Factor. The Commission reasonably rejected criticisms of the CableLabs study's determination of the percentage of time unlicensed wireless devices were like to be actively transmitting ("the activity factor"). Among other things, CableLabs used data taken from 500,000 Wi-Fi access points, whereas other studies projected activity factors that were not based on actual measurements.

D. Accumulating Risks. The agency reasonably addressed the accumulated risks of unlicensed operations in the 6 GHz band. As the *Order* noted, numerous studies in the record were based on the assumption that there would be a large number of unlicensed devices transmitting in the band and

nevertheless found that there would be very little risk of harmful interference to incumbent licensees.

III. Contrary to petitioners' assertions, the CableLabs study upon which the Commission relied was not an opaque "black box." Pet. Br. 40. On the contrary, the record contained an explanation of CableLabs' key inputs and variables. Petitioners' contention that CableLabs should have submitted all of its underlying data is at odds with this Court's precedent. *See, e.g.*, *Coal. of Battery Recyclers Ass'n v. EPA*, 604 F.3d 613, 622-23 (D.C. Cir. 2010); *Am. Trucking Ass'ns v. EPA*, 283 F.3d 355, 372 (D.C. Cir. 2002). In any event, AT&T and other interested parties understood the CableLabs study well enough to critique it at length and in detail before the Commission.

IV. The Commission reasonably determined that a combination of restrictions on low-power indoor devices would be effective in protecting licensed incumbents from harmful interference.

A. Indoor Operations. The agency reasonably determined that the requirements it imposed—including prohibiting them from being weather-resistant, mandating an integrated antenna, and forbidding operation solely on battery power—would deter outdoor use. The Commission also found that the reduced power levels for client devices such as smartphones and tablets

were sufficiently low that those devices were unlikely to cause harmful interference to fixed microwave receivers, even if taken outside.

B. Contention-Based Protocol. The agency also reasonably determined that requiring a contention-based protocol for low-power devices would reduce the possibility of harmful interference to incumbent licensed operations. Such a protocol is designed to prohibit a device from transmitting while another device is transmitting. And by limiting the amount of time a station can transmit, it generally reduces the risk of harmful interference to adjacent operations.

C. Reduced Power Limit. Lastly, the Commission reasonably set a 5 dBm/MHz EIRP power limit on low-power access points. That limit was significantly lower than the limit the Commission had originally proposed and the limit advocated by proponents of unlicensed devices. The agency opted to take a cautious approach to help further reduce the risk of harmful interference to licensed operations. The Court has long afforded the agency considerable discretion when it engages in such line-drawing, especially on a technical matter involving spectrum management, and should do so here.

V. The Commission also reasonably responded to the objections of specific petitioners.

A. Public Safety. The Commission reasonably considered the impact of its rules on public safety. The rules are reasonably designed to prevent harmful interference to all incumbent microwave links, including those used by public safety agencies.

B. Southern/CII Studies. The Commission reasonably rejected the interference studies submitted by the Southern Company and the Critical Infrastructure Industry. As the agency explained, the Southern study was unreliable because it used static inputs rather than a probabilistic statistical analysis. *Order* ¶ 135 (JA___). And the Commission reasonably concluded that the Critical Infrastructure Industry study was "fundamentally flawed" because it made some questionable assumptions. *Id.* ¶ 138 (JA___).

C. Broadcaster Operations. The Commission reasonably found that requiring low-power devices to use a contention-based protocol would adequately protect broadcasters' indoor mobile operations from harmful interference. *Id.* ¶ 168 (JA___). The record contained substantial evidence that "such a protocol will allow unlicensed devices to sense the energy from nearby indoor licensed operations and avoid using that channel." *Id.* After determining that the risk of harmful interference to broadcasters' mobile operations was negligible, the Commission reasonably declined to reserve a portion of the 6 GHz band for broadcasters' exclusive use.

VI. Finally, the Commission reasonably determined that it has the necessary tools to identify and address any harmful interference issues that may arise in the 6 GHz band. The Commission explained that its Enforcement Bureau has the ability to investigate reports of interference caused by low-power unlicensed devices "and take appropriate enforcement action as necessary." *Id.* ¶ 149 (JA___). As the Commission noted, unlicensed wireless "devices have been deployed … in abundance" in the 2.4 GHz and 5 GHz bands "for well over 20 years," and the agency has "effectively identified and addressed" harmful interference issues in those bands. *Id.* ¶ 147 (JA___).

The Commission also took reasonable steps to ensure that it can identify and address harmful interference from standard-power devices. The *Order* requires each standard-power access point to provide automated frequency coordination systems with information that the FCC can use to identify the source of any harmful interference and to resolve any such issue. *Id.* ¶ 83 (JA___). In addition, automated frequency coordination systems must "have the capacity to deny spectrum access to a particular registered standard-power access point upon request by the Commission, in the event of harmful interference caused by a particular device or type of device." *Id.*

In sum, the *Order* rests on a reasonable resolution of radiofrequency engineering issues, following an exhaustive examination of a voluminous record. These issues lie at the heart of the Commission's experience and expertise. The petitions for review should be denied.

STANDARD OF REVIEW

Petitioners bear a heavy burden to establish that the *Order* on review is "arbitrary, capricious [or] an abuse of discretion." 5 U.S.C. § 706(2)(A). Under this "highly deferential" standard, the *Order* is entitled to a presumption of validity. *Cellco P'ship v. FCC*, 357 F.3d 88, 93 (D.C. Cir. 2004).

"[W]hen the Commission acts to foster innovative methods of exploiting the spectrum," as it did in the *Order*, "it functions as a policymaker to which [the Court] accord[s] the greatest deference." *NTCH*, 950 F.3d at 879-80 (internal quotation marks omitted). The Court "will accept the Commission's technical judgment[s] when supported with even a modicum of reasoned analysis, absent highly persuasive evidence to the contrary." *Id.* at 880 (internal quotation marks omitted); *see also Am. Radio Relay League*, 524 F.3d at 233 ("[w]here a highly technical question is involved, courts necessarily must show considerable deference to an agency's expertise"). The Commission's "predictive judgments within [its] field of discretion and

expertise are entitled to particularly deferential review, as long as they are reasonable." *NTCH*, 950 F.3d at 880 (internal quotation marks omitted).

The Court must "accept the Commission's findings of fact so long as they are supported by substantial evidence on the record as a whole." *PSSI Global Servs., LLC v. FCC*, 983 F.3d 1, 7 (D.C. Cir. 2020) (quoting *Neustar, Inc. v. FCC*, 857 F.3d 886, 896 (D.C. Cir. 2017)). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Schoenbohm v. FCC*, 204 F.3d 243, 246 (D.C. Cir. 2000) (internal quotation marks omitted).

ARGUMENT

I. THE COMMISSION REASONABLY DETERMINED THAT EXPANDING UNLICENSED USE IN THE 6 GHZ BAND WOULD NOT CREATE A SIGNIFICANT RISK OF HARMFUL INTERFERENCE TO INCUMBENT OPERATIONS.

The FCC was established by Congress to "make available, so far as possible . . . a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges." 47 U.S.C. § 151. The Commission's action in this proceeding was reasonably designed to advance this critical objective. In expanding unlicensed use in the 6 GHz band, the Commission acted to make available additional spectrum to relieve "existing and anticipated congestion so that businesses and

consumers can take advantage of new data intensive applications," and to provide "opportunit[ies] for innovators to provide new and advanced services." *Order* ¶¶ 1, 2 (JA___). At the same time, the Commission adopted requirements to "ensur[e] that licensed incumbent operations in the band are protected from harmful interference and continue to deliver the high value services on which Americans rely." *Id.* ¶ 1 (JA___). "By making this spectrum available for unlicensed use," the FCC thus took steps to "satisfy[] the American public's need for additional network capacity while safeguarding the licensed systems that will continue to use the 6 GHz band." *Id.* ¶ 4 (JA___).

As this Court has recognized, "when the Commission acts to foster 'innovative methods of exploiting the spectrum,' it 'functions as a policymaker' to which [courts] afford 'the greatest deference.'" *NTCH*, 950 F.3d at 879-880. The *Order* under review is based on a comprehensive evaluation of a voluminous and highly complex record, involving technical issues of radiofrequency engineering and risks of harmful interference that lie at the heart of the Commission's mission and expertise. The FCC's technical and predictive judgments should be accepted so long as they are "supported 'with even a modicum of reasoned analysis, absent highly persuasive evidence to the contrary.'" *Id.* at 880 (quoting *Mobile Relay Assocs. v. FCC*,

457 F.3d 1, 8 (D.C. Cir. 2006)).[6] Lastly, the *Order* is founded on ample evidence in the record before the agency—more than enough for a reasonable mind to accept the agency's conclusions. *Schoenbohm*, 204 F.3d at 246.

The *Order* authorizes "two different types of unlicensed operations—standard-power and indoor low-power operations." *Order* ¶ 3 (JA___). Standard-power access points, which must use an automated frequency coordination system, "can be deployed anywhere as part of hotspot networks, rural broadband deployments, or network capacity upgrades where needed." *Id*. Low-power access points, which are permitted to operate without an automated frequency coordination system (but only indoors and only at low-power levels), "will be ideal for connecting devices in homes and businesses such [as] smartphones, tablet devices, [and] laptops." *Id*. Such low-power indoor access points "will also play a role in the growth of the [Internet of Things], connecting appliances, machines, meters, wearables, and other consumer electronics as well as industrial sensors for manufacturing." *Id*.

[6] *See also Am. Radio Relay League*, 524 F.3d at 233 (Commission's "highly technical" judgment involving likely risks for harmful interference is given "considerable deference"); *Earthlink, Inc. v. FCC*, 462 F.3d 1, 12 (D.C. Cir. 2006) (FCC's "predictive judgments about areas … within the agency's field of discretion and expertise are entitled to *particularly deferential* review").

Examining the extensive record before it, and weighing "the various technical studies presented by proponents of unlicensed operations as well as representatives of incumbent services," the Commission explained how its rules "will enable unlicensed operations . . . in the 6 GHz band and protect the various incumbent services that operate in the band." *Order* ¶ 19 (JA___).

For standard-power access points, the Commission "protect[ed] fixed microwave operations from harmful interference by using an [automated frequency coordination] system that established location and frequency-based exclusion zones for standard-power unlicensed devices around fixed microwave receivers operating in the U-NII-5 and U-NII-7 bands." *Id.* ¶ 60 (JA___). Relying on information residing in the Commission's Universal Licensing System, *id.* ¶ 30 JA___), each standard-power access point will "remotely access[] an [automated frequency coordination system] to obtain a list of available frequency ranges in which it is permitted to operate and the maximum permissible power in each frequency range." *Id.* ¶ 27 (JA___). The Commission set the interference protection criterion to be employed by

the automated frequency coordination system at -6 dB I/N.[7] *Id.* ¶ 71 (JA___). In doing so, the Commission took an admittedly "conservative approach . . . to ensure that the potential for harmful interference is minimized and important fixed microwave services in the 6 GHz band are protected." *Id.*

By contrast, the Commission permitted unlicensed indoor operations "without the need for [automated frequency coordination]-controlled access." *Id.* ¶ 98 (JA___). Instead, the Commission "adopt[ed] three restrictions designed to prevent harmful interference." *Id.* ¶ 99 (JA ___). First, the devices would be "limited to indoor operation." *Id.* Second, they would be required to use a "contention-based protocol." *Id.* Third, they would be limited to "low-power operation." *Id.*

Indoor operation ensures that "the signals transmitted by these unlicensed devices will be significantly attenuated when passing through the walls of buildings." *Id.* ¶ 100 (JA___). A contention-based protocol "allows multiple users to share spectrum by providing a reasonable opportunity for

[7] For standard-power operations, the Commission adopted a -6 dB interference/noise (I/N) threshold to be used by the automatic frequency coordination system when specifying exclusion zones that would protect incumbent licensees and minimize the risk of harmful interference from unlicensed operations. Because -6 dB is a "conservative" threshold, the Commission noted that it was "not making a determination that any signal received with an I/N greater than -6 dB would constitute harmful interference." *Order* n.299 (JA__).

the different users to transmit." *Id.* ¶ 101 (JA___). "Before initiating any packet delivery, a station listens to the wireless medium and if the medium is idle, the station may transmit; otherwise the station must wait until the current transmission is complete before transmitting." *Id.* The reduced power levels further ensure that indoor devices will "protect[] the licensed services in the 6 GHz band from harmful interference." *Id.* ¶ 103 (JA___). The Commission concluded that at the power spectral density limit it specified (5 dBm/MHz EIRP) for indoor devices, "and with the other constraints imposed on [their] operations," "the risk of harmful interference to incumbent operations" would be "insignificant." *Id.* ¶ 110 (JA___).[8]

The Commission's conclusion that fixed microwave receivers will be protected from harmful interference was based in part "on the examination of two representative technical studies." *Id.* ¶ 112 (JA___). The first, which provided a "strong basis" for the Commission's conclusions, was submitted by CableLabs, and "model[ed] the interference potential of low-power indoor unlicensed devices to microwave receivers," using, among other things, "data taken from over 500,000 access points." *Id.* ¶117 (JA___). The second,

[8] Finding that client devices do not need the same power as access points, the Commission provided further protection to licensed incumbents by setting the maximum power for client devices at 6 dB lower than that for low power indoor access points, or -1 dBm/MHz EIRP. *Id.* ¶ 111 (JA___).

submitted by AT&T, focused on six unusual scenarios that were "challenging from an interference perspective," but nevertheless "illustrate[d] that interference is not likely to occur with the adopted power levels when realistic assumptions are made regarding propagation losses and taking into account the probabilistic nature of unlicensed transmissions." *Id.* ¶ 112 (JA___). After examining these and other studies in the record, *see id.* ¶¶ 133-140 (JA___), the Commission determined that "the technical and operational limits" imposed on unlicensed devices "ensure" that such devices "will not have a significant potential for causing harmful interference to the users authorized to operate in the 6 GHz band." *Id.* ¶ 145 (JA___). And "in the unlikely event that harmful interference does occur," the Commission explained, its rules "require that such operations cease, and the Commission's Enforcement Bureau has the ability to investigate reports of such interference and take appropriate enforcement action as necessary." *Id.* ¶ 149 (JA___).

II. CHALLENGES TO THE COMMISSION'S DETERMINATION WITH REGARD TO LOW-POWER INDOOR DEVICES ARE UNAVAILING.

A. The Agency Found No Significant Risk of Harmful Interference—Not That There Is No Possible Risk of Such Interference.

Petitioners challenge the Commission's conclusion (*Order* ¶ 146 (JA___)) that the protections the agency adopted for low-power indoor

devices "eliminate[] any significant risk of causing harmful interference" to licensed incumbents. Pet. Br. 18-24. According to petitioners, that conclusion is "subject to only one interpretation"—that the Commission concluded that the "rules eliminate any 'significant risk' that *any* . . . unlicensed 6 GHz device[] will cause harmful interference to *any* . . . licensed microwave link[], at *any* point in the foreseeable future." *Id*. at 21 (emphasis in original). But petitioners' proffered reading is not what the *Order* held. Instead, the Commission repeatedly concluded that its rules will ensure that there will be no "significant risk" of harmful interference, not that there will be no risk from any device at all. *See, e.g.*, *Order* ¶ 110 (JA___) ("we find the risk of harmful interference to incumbent operations to be insignificant"); *id*. ¶ 145 (JA___) ("the technical and operational limits we are adopting in this proceeding ensure that unlicensed devices will not have a significant potential for causing harmful interference to the users authorized to operate in the 6 GHz band"); *id*. ¶ 146 (JA__) ("the restrictions and requirements that

we are establishing for indoor use of low power access points eliminate[ ] any significant risk of causing harmful interference").[9]

As the Commission explained, it is "not required to refrain from authorizing services or unlicensed operations whenever there is any possibility of harmful interference." *Id.* Attempting to meet that impossible standard, the Commission explained, "would rule out virtually all services and unlicensed operations, given that there is virtually no type of [radiofrequency]-emitting device that does not have the potential for causing such interference if used incorrectly." *Id*.

The FCC's rules for unlicensed devices "will not prevent harmful interference under all circumstances." 47 C.F.R. § 15.15(c). Instead, "in the unlikely event that harmful interference does occur," the Commission's rules

[9] Contrary to petitioners' assertions (Pet. Br. 21), the statements in the Commission's consolidated opposition to the unsuccessful stay motions in this case say nothing different. By highlighting that the Commission's rules would protect *all* fixed microwave links from harmful interference, the opposition simply restated the Commission's determination that the chance of harmful interference to incumbent licensed operations, given the protections of the *Order,* is insignificant. FCC Consolidated Opposition to Emergency Motions for a Stay Pending Review at 22, 23 (Sept. 14, 2020). Likewise, the stay opposition's statement that "not even one" low-power indoor device "carr[ies] any significant likelihood of causing harmful interference under the Commission's rules," *id*. at 26—which petitioners selectively quote—is entirely consistent with the Commission's conclusion that the chances of harmful interference are insignificant, not nonexistent.

"require that such operations cease." *Order* ¶ 149 (JA___) (citing 47 C.F.R. § 15.5(b)-(c)). Moreover, the Commission emphasized, the agency's "Enforcement Bureau has the ability to investigate reports of such interference and take appropriate enforcement action as necessary." *Id*. The Commission's discussion of its ability to protect against harmful interference by low-power indoor devices (in the unlikely event it occurs) belies petitioners' contention that the Commission proceeded on the factual premise that no such circumstance could ever arise.

The Commission's rules define harmful interference to mean any radio emission that "endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service." 47 C.F.R. § 15.3(m). The Commission's longstanding precedent interprets the Communications Act to allow operation of an unlicensed device that "does not transmit enough energy to have a significant potential for causing harmful interference." *Am. Radio Relay League*, 524 F.3d at 234. In identifying whether devices can give rise to a significant risk of such harmful interference, the Commission reasonably "focus[es] on identifying and protecting against actual use cases." *Order* ¶ 150 (JA___). As the Commission explained, were the agency "to act on every unrealistic or contrived situation that purports to show the potential for

harmful interference, our rules would allow for few or no opportunities for sharing between unlicensed devices and licensed services," even though such sharing has permitted unlicensed wireless devices to prosper in licensed bands. *Id*. As this Court recognized in *Center for Auto Safety v. Peck*, 751 F.2d 1336 (D.C. Cir. 1985), requiring an agency to craft its rules "with an eye toward [preventing] any conceivable" harm, "no matter how insignificant," *id*. at 1345, "would turn many areas of regulation into unending pursuit of the trivial." *Id*. at 1344 n.5.

B. The Commission Reasonably Analyzed Building Loss.

One of the important protections the Commission adopted against harmful interference to licensed incumbent users of the 6 GHz band was that low-power unlicensed devices must operate indoors. *Order* ¶ 100 (JA___). As the Commission explained, requiring indoor operation ensures that signals will experience "building loss": "[t]he signals transmitted by these unlicensed devices will be significantly attenuated when passing through the walls of buildings." *Id*. For example, the Commission noted, "[t]he median signal loss from a traditionally constructed building is 17 dB, and newer, highly efficient buildings provide even higher signal attenuation." *Id*. *See* Pet. Br. 26 (agreeing that "building loss is greater in a modern, thermally insulated brick house than in an older frame house"). The Commission found

that a "mix of 70% traditional and 30% thermally efficient building types is appropriate to use when determining a statistical probability of building entry loss" and was consistent with technical studies and reports submitted by petitioners NAB and AT&T. *Order* n.297 (JA___).

Petitioners challenge the Commission's analysis of building loss because, in their view, it "assumed that *all* buildings . . . would exhibit *average* building loss." Pet. Br. 29 (emphasis added). But the agency's analysis, which relied on a study submitted by CableLabs simulating the potential for harmful interference to fixed microwave links in the New York City area, was far more nuanced. The CableLabs study analyzed building loss using "attenuation values drawn from a probability distribution for each access point in the simulation." *Id.* ¶ 118 (JA___). As the agency specifically found, the Cable Labs approach "more accurately models the variability of the building loss" than using "a single number for building loss such as the median or average." *Id.*

Petitioners contend that the agency should have focused on highly unusual situations where "there is little or no building loss—meaning that the device might as well be transmitting outside." Pet. Br. 27. In this regard, petitioners complain that it was error for the Commission to have relied on CableLabs' analysis when it did not use "the full statistical distribution" of

building loss values, which would have included "atypical . . . cases where building walls do not significantly weaken a device's signals at all." *Id.* at 45. But the Commission explained that its "analysis suggests that the building attenuation range used in the CableLabs study was not different enough from the [full] statistical distribution to materially alter the likelihood of harmful interference occurring." *Order* ¶ 122 (JA___).[10] And even if the dataset was "less than perfect," imperfection alone does not amount to arbitrary decision-making." *Am. Hosp. Ass'n v. Azar*, 983 F.3d 528, 539 (D.C. Cir. 2020) (quoting *Dist. Hosp. Partners, LP v. Burwell*, 786 F.3d 46,

[10] The results in the CableLabs study were also similar to results in other technical studies that had used a larger statistical distribution for building loss. *See* Apple, Broadcom et al. 4/16/2020 Letter 4 ("the CableLabs results are consistent with the results of the RKF report that included the full [building entry loss] distribution.") (JA___).

61 (D.C. Cir. 2015)). *See also* 5 U.S.C. § 706(2) (when courts review agency action, "due account shall be taken of the rule of prejudicial error").[11]

In the end, the agency reasonably refused to give significant weight to highly unrepresentative cases in analyzing the building loss that was reasonably likely to result from indoor operation. As the Commission explained, "[t]here are many probabilistic factors that must be considered when assessing the risk of harmful interference and several, if not all, of these factors must all tend towards worst-case situations for an actual harmful interference event to occur." *Order* n.317 (JA___). Thus, even if the analysis were conducted assuming the "full statistical range" of building loss

[11] Petitioners argue that the Commission's use of an average value for building loss to adjust for the scenarios in the AT&T study contradicts the agency's "own past precedent" from 50 years ago. Pet. Br. 31 (citing *Amendment of Part 15 of the Commission's Rules, To Provide for the Operation of Radio Door Controls*, 28 FCC 2d 198 (1971)). But the Commission reasonably explained that failing to do so would "exaggerate the likelihood of interference." *Order* ¶ 127 (JA__). And in cases far more recent, the Commission used average values for building loss when assessing the risk of harmful interference. *See, e.g.*, *Use of the 5.850-5.925 GHz Band*, 35 FCC Rcd 13440, 13471 ¶ 74 (2020) (in considering factors such as building loss and clutter loss, the Commission used "a median or average value"); *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, 17 FCC Rcd. 7435, Table 1 (2002) (table showing "Average Building Attenuation Losses" as part of an analysis calculating maximum signal levels permitted for unlicensed ultra-wideband devices operating indoors).

scenarios, "it is unlikely that each of the other parameters that could affect the potential for harmful interference would also all tend towards their worst case." *Id*. In short, focusing on a hypothetical "worst case . . . overstates the potential for harmful interference." *Id.* ¶ 124 (JA___).

As this Court has explained, an "agency need not address every conceivable issue or alternative, no matter how remote or insignificant." *Ctr. for Auto Safety*, 751 F.2d at 1355 n.15; *see also Farmers Union Cent. Exch. v. FERC*, 734 F.2d 1486, 1511 n.54 (D.C. Cir. 1984) (agency action "cannot be found wanting simply because the agency failed to include every alternative … conceivable by the mind of man . . . regardless of how uncommon or unknown that alternative may have been") (quoting *Vt. Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551 (1978)). The Commission, too, has made clear that as a "general principle," it "support[s] models and scenarios that consider a statistical probability of interference based on deployment, propagation and usage scenarios as opposed to a worse case approach." *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, 32 FCC Rcd 10988, 11072 ¶ 258 (2017); *see also Accessibility of User Interfaces, and Video Programming Guides and Menus*, 28 FCC Rcd 17330, 17344 n.69 (2013) (declining to adopt rules that would apply to a

"rare" subset of "corner cases").[12] The Commission's evaluation of the real-world probabilities associated with building loss was entirely reasonable.[13]

C. The Commission Reasonably Analyzed Clutter Loss.

Clutter loss refers to trees, vegetation, hills, and other obstructions that can potentially weaken a signal before it can reach the receiver. The lower the clutter loss, the higher the risk of harmful interference. Conversely, if clutter loss is high, the likelihood of harmful interference is low.

Petitioners claim that in fashioning its rules for indoor devices, the Commission "ignored scenarios with little or no clutter loss." Pet. Br. 33. AT&T's study purported to present several scenarios in which "clutter loss approached zero and the risk of harmful interference was accordingly very high." *Id*. In these scenarios, the house where the 6 GHz device was located

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[12] In engineering, a corner case refers to a highly improbable scenario in which multiple unlikely conditions are simultaneously present.

[13] In recent years, the Commission's Technical Advisory Council—comprised of leading experts that work on interference risk analysis—has urged the agency to shift its focus away from "worst case" scenarios when analyzing the potential risk of harmful interference to licensed operations from unlicensed devices. As the Council explained, "[i]ncumbent services fearing harm from new entrants often emphasize the catastrophic consequence of extreme interference events, but not their low likelihood." The Spectrum and Receiver Performance Working Group of the FCC's Technology Advisory Council, *A Quick Introduction to Risk-Informed Assessment* at 1 (Apr. 1, 2015), *available at* https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting4115/Intro-to-RIA-v100.pdf.

was in close proximity to the microwave receiver, "with no clutter in the middle that could substantially weaken the signals before it hits the receiver." *Id*. at 33-34. Petitioners claim that the *Order* "inexplicably" assumed that clutter loss in both scenarios would be significant and that "fictitious hills or other imaginary objects" would significantly cut the signal's strength before reaching the fixed receiver. *Id*. at 34. That is incorrect.

The Commission engaged in a detailed analysis of the scenarios put forth by AT&T and found that the assumed clutter loss values of zero were not realistic. *Order* ¶ 129 & Table 5 (JA___). Five of the six examples presented by AT&T featured relatively long distances between the unlicensed device and the microwave receiver, ranging between 174 and 4938 meters, AT&T 11/12/2019 Letter, Slides 13, 16, 19, 22, 25 (JA__, __, __, __, __), as to which the Commission had reasonably determined that a "free space pathloss model" is not appropriate. *Order* ¶¶ 64-65 (JA___). As the Commission explained, "[w]hile a free space model is appropriate for short distances, based on our experience it drastically underpredicts path loss for longer distances because, as a practical matter, there is almost always interaction with the environment that reduces the signal level below the free space level." *Id.* ¶ 67 (JA___). The remaining example, which had a distance of 50 meters between the unlicensed device and microwave receiver, AT&T

11/12/2019 Letter, Slide 27 (JA__), also fell outside the Commission's 30-meter cutoff for assuming no clutter loss. *See Order* ¶ 64 (JA___).

In any event, the Commission explained, "because these examples represent cases where the unlicensed devices are close to the microwave receivers or have terrain features that place the unlicensed device squarely in the main beam," they represent "worst-case" scenarios. *Id.* ¶ 130 (JA___). As such, they "do not serve to rebut the persuasive showing by CableLabs," which was "based on a reliable probabilistic assessment derived from measurements associated with hundreds of thousands of actual Wi-Fi [access points]." *Id.*[14]

Petitioners also claim that the *Order* erred in dismissing petitioner NAB's study, which—like AT&T's study—used a free space model. Pet. Br. 35. The Commission credited the NAB study with "provid[ing] some valuable information about the potential risk of harmful interference to electronic news gathering receive sites." *Order* ¶ 154 (JA___). However, it disagreed with NAB's use of a free space model "for all paths based on a

[14] The Commission similarly discounted CTIA's study, which like AT&T's, focused on a handful of scenarios in which frame houses were in direct line of sight with microwave receivers. *Order* ¶ 133 (JA___). The Commission concluded that once it employed a "more realistic" analysis and parameters, "the potential of harmful interference to incumbent operations" turned out also to be "insignificant." *Id.*

predicted percentage of area that is line-of sight when in fact unlicensed devices will be randomly located and could very well be in areas of buildings without line-of-sight to the electronic news gathering receiver." *Id.*

The Commission also pointed out that Apple, Broadcom et al., using the same data set as NAB and analyzing the same scenarios, concluded that "a clear line-of-sight is rare, even in places where NAB claimed that as much as 90 to 100% of the population would have line-of-sight." *Id.* ¶ 155 (JA___). The Commission accordingly found that an "average propagation loss is best approximated by an appropriate urban propagation model," which would result in significantly greater propagation loss due to "clutter, multipath effects, and other sources of attenuation." *Id.*

D. The CableLabs Study's Activity Factor Was Reasonable.

An activity factor measures the percentage of time that a device transmits signals. The higher the activity factor, the more often a device transmits and if the device is sufficiently close to a microwave receiver, the greater the likelihood of interference. The lower the activity factor, the less likely the device will cause interference. The CableLabs simulation used Wi-Fi activity data that had an average activity factor of 0.4%, which petitioners characterize as a "strikingly low figure." Pet. Br. 42. Not so.

The CableLabs study used "a distribution of airtime utilization based on data taken from 500,000 Wi-Fi access points to model how often each access point in the simulation transmits." *Order* ¶ 117 (JA __). By comparison, "[a]ll of the other submitted studies" used activity factors based on assumptions "such as number of access points per person, the population density, and amount of data per person rather than actual Wi-Fi measurements." *Id*. ¶ 121 (JA___). CableLabs further explained that the data it used was a distribution that "include[d] activity factors all the way up to 100%." CableLabs 2/14/2020 Letter 2 (JA__). The average activity factor of 0.4% is low due to the "bursty nature of Wi-Fi activity" – such devices transmit intermittently and when called upon. *Id*. Nonetheless, the study also took into account "occurrences of very high activity factors" and concluded that the risk of harmful interference to fixed-service links was insignificant. *Id*.

Petitioners also criticize the CableLabs study for using data that reflected only residential usage. Pet. Br. 43 n.24. But a study submitted by Hewlett Packard Enterprises suggested that "office traffic volume is 25% of consumer traffic volume." *Order* ¶ 121 (JA__). In any event, in raising this objection, parties "cite[d] no other study or source" to support their claim that

the CableLabs data was not representative of broader Wi-Fi use, nor did they suggest "what activity factor assumptions would be appropriate." *Id*.

E. The Commission Reasonably Addressed Accumulating Risks.

Next, petitioners argue that the CableLabs study "failed to assess accumulating risks over time" and that the *Order* did not "coherently respond to that concern." Pet. Br. 47-48. But the Commission acknowledged the views of fixed microwave incumbents, including petitioner AT&T, that "even if a single access point is unlikely to cause interference," the cumulative impact of "hundreds of millions of access points" will mean that a significant number of microwave links will receive interference. *Order* ¶ 114 (JA___); *see id*. n.373 (citing AT&T letter that the "potential of up to one billion potentially interfering devices raises the probability of interference") (JA___).

The Commission, however, was unconvinced by these arguments. As it pointed out, various simulations in the record had assumed a large number of devices transmitting in the 6 GHz band and nevertheless found there was very little risk of harmful interference to fixed-service licensees. *Order* n.373 (JA___). For example, the RKF report assumed "1 billion 6 GHz capable unlicensed devices" in analyzing "deployments in the U.S.," while another report assumed "768 million devices" deployed across the European Union.

Id. And the CableLabs study "reflect[ed] a speculative density of 1,000 Wi-Fi access locations per square mile, using data taken from 500,000 such access points," which, "given the land mass of the United States . . . took into account the potential for billions of devices to be deployed in the 6 GHz band." *Stay Denial Order* ¶ 31. All of these studies showed that "under realistic deployment scenarios … large numbers of 6 GHz-capable devices do not alter [the Commission's] conclusion regarding the risk of interference to 6 GHz links." *Order* n.373 (JA___).[15]

III. THE CABLELABS STUDY WAS NOT A "BLACK BOX."

Petitioners contend that the CableLabs study was a "black box" because "its underlying analysis" was not part of the record. Pet. Br. 40. Petitioners claim that CableLabs was required to submit "spreadsheets,

[15] Petitioners complain that the agency did not conduct "field tests of these [unlicensed] devices to substantiate its premise that any risk of harmful interference is 'insignificant.'" Pet. Br. 23. The Commission was not obligated to conduct field tests to supplement the already voluminous record in this proceeding. Nor does the agency seek to prejudge the nature of future operations when it decides to expand use within a spectrum band. The Commission's approach was consistent with prior decisions in which it declined to mandate pre-deployment testing when adopting rules for unlicensed devices in other spectrum bands. *See, e.g.*, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, 31 FCC Rcd 8014, 8062-65 ¶¶ 125-130 (2016); *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, 29 FCC Rcd 4127, 4133-41 ¶¶ 22-46 (2014).

formulas, detailed datasets, and transparent explanations of how those datasets were obtained" so that the FCC and interested parties could "vet CableLabs' conclusions." *Id*. at 41.

That argument flies in the face of this Court's precedent. In *Coalition of Battery Recyclers Ass'n v. EPA*, 604 F.3d at 622-23, this Court rejected arguments that the EPA acted arbitrarily and capriciously when it relied on a study "without first obtaining and making public the underlying data for the study." Similarly, in *American Trucking Ass'ns v. EPA*, 283 F.3d at 372, the Court found that "requiring agencies to obtain and publicize the data underlying all studies on which they rely would be impractical and unnecessary." Instead, the court explained, it was reasonable for the agency to "rely on published studies" without having to independently analyze the "enormous volume of raw data" often involved in these studies. *Id*.

Here, CableLabs presented the results of its study by describing the sample size, simulation parameters, methodology, and results. CableLabs New York Study (Dec. 20, 2019) (JA___). That approach is typical in FCC proceedings; parties rarely present raw data. Indeed, *none* of the parties that submitted technical studies involving large data sets—including petitioner NAB and the petitioner Utilities—submitted the underlying raw data into the record. This is hardly surprising. In large empirical studies, the raw data

does not easily lend itself to comment. Instead, it is the explanation of the key inputs and variables used in the study that allows parties to meaningfully comment.

In any event, petitioners' claim that the CableLabs study could not be "vet[ted]" by interested parties (Pet. Br. 41) is contradicted by a submission made by AT&T that took issue with numerous aspects of the study. Three months before the *Order*'s adoption, AT&T filed a letter purporting to identify "Fatal Flaws in CableLabs' Submissions." AT&T 1/23/2020 Letter 9 (JA___). Over the course of four pages, AT&T criticized, among other things: CableLabs' utilization of a "15-minute measurement interval" and a low activity factor for unlicensed operations (*id.*), the use of a weighted activity factor of 0.4% (*id.* at 10 (JA___)), CableLabs' alleged "double dip[ping] when discussing duty cycles" (*id.* at 11 (JA___)), "the use of diversity antennas [to] overcome fade and handle [unlicensed access point] interference events" (*id.*), CableLabs' use of "unrealistic and unsupported" power limits (*id.*), and "CableLabs' use of the WINNER II propagation model" (*id.* at 11-12 (JA___-___)). AT&T clearly understood enough about the CableLabs study to critique it at length. *See Chamber of Commerce v. SEC*, 443 F.3d 890, 900 (D.C. Cir. 2006) (Administrative Procedure Act is satisfied where "most critical factual material" used to support agency's

position on review has been made public and is "exposed to refutation"). The remaining petitioners did not even raise concerns about the CableLabs study before the agency, and their belated criticisms before this Court ring hollow.

Not only did AT&T comment in detail on CableLabs' study before the Commission, but CableLabs filed an 8-page letter in which it directly responded to AT&T's concerns. CableLabs 2/14/2020 Letter (JA___). Among other things, CableLabs addressed AT&T's criticisms about the activity factor used in the study (*id*. at 1-2 (JA__ - __)), the claims that CableLabs was "double dipping" when applying the activity factor (*id*. at 3 (JA___)), the EIRP distribution (*id*. at 4 (JA___)), propagation model (*id*. at 4-5 (JA___)), power limits (*id*. at 5 (JA___)), the use of Wi-Fi data (*id*. (JA___)), and the study's methodology (*id*. at 5-8 (JA__ - __)). Even assuming AT&T did not initially understand certain aspects of the study, CableLabs' detailed letter went far in addressing AT&T's questions and undermines any contention that the study was a "black box." Pet. Br. 40.

Petitioners further assert that the "opacity of the CableLabs study makes this case indistinguishable" from this Court's decision in *American Radio Relay League*. *Id*. at 44. That claim does not withstand scrutiny. In that case, the Court faulted the agency for relying on a study in which "parts of individual pages" had been redacted before the study was placed in the

rulemaking record for public review. 524 F.3d. at 237. The redacted pages consisted of "staff-prepared scientific data" that the Court found to be "critical factual material," given the agency's reliance on the information. *Id*. at 239.

Here, in contrast, the CableLabs studies upon which the agency relied were available to the public several months prior to the adoption of the *Order*. CableLabs New York Study (Dec. 20, 2019) (JA___); CableLabs Link Study (Jan. 17, 2020) (JA___). The Commission's thorough discussion of the CableLabs study in the *Order* relied entirely on information that was fully available in the public record. Not only did petitioners have ample opportunity to review the studies and offer comment, but CableLabs addressed concerns raised by petitioners and other interested parties about its study in subsequent filings. CableLabs 1/23/2020 Letter (JA___) (addressing AT&T's criticisms); CableLabs 3/13/2020 Letter (JA___) (addressing commenter CTIA's criticisms).

Finally, petitioners claim that it was "impossible to determine what methodology CableLabs used for estimating interference probabilities" because CableLabs ran over "1500 iterations of its model to identify the likelihood of interference" but did not define the term "iteration." Pet. Br. 43. Because petitioners did not raise this argument before the agency, they are

precluded from raising it on appeal. 47 U.S.C. § 405(a) (precluding judicial review of arguments on which the Commission has not had an "opportunity to pass"); *see Nat'l Lifeline Ass'n v. FCC*, 983 F.3d 498, 509 (D.C. Cir. 2020).

If the Court nevertheless reaches the merits, petitioners' arguments are unfounded. Petitioners contend that there is "no reason to believe that 1500 snapshots in time provides a sample sufficient for drawing a statistically sound conclusion that harmful interference will *never* occur." Pet. Br. 47 (emphasis in original). As we have explained, *see* pp. 31-34 *supra*, that is not the standard. The restrictions the Commission establishes when crafting technical and operational rules for unlicensed devices in various spectrum bands "will not prevent harmful interference under all circumstances." 47 C.F.R. § 15.15(c). Rather, the agency strives to "authorize operations in a manner that reduces the possibility of harmful interference to the minimum that the public interest requires." *Order* ¶ 146 (JA___).

As relevant here, an iteration is when values for the inputs in a Monte Carlo simulation are randomly chosen according to the appropriate probability distribution. The CableLabs study simulated the potential interference to two fixed links in New York City, using 1000 access points per square kilometer distributed indoors across the city. *Order* n.295

(JA___); CableLabs New York Study, Slides 17, 19 (Dec. 20, 2019) (JA__, __). Each iteration involved a different set of access point locations, which in turn resulted in different values for building loss, power distribution and channel distribution. *Order* ¶¶ 118-19 (JA___).

Because each iteration is a snapshot in time, the statistical significance of the CableLabs study depends on the number of iterations of the simulation conducted, not the length of the time interval represented by each iteration as petitioners claim. Petitioners provide no basis for concluding that 1500 iterations is insufficient, nor do they suggest how many iterations would, in their view, be necessary. And it was surely reasonable for the Commission to rely on a study that explored 1500 scenarios, rather than AT&T's study, which hand-picked six highly unusual cases.

IV. THE COMMISSION REASONABLY DETERMINED THAT THE RESTRICTIONS ON LOW-POWER INDOOR DEVICES WILL PROTECT LICENSED INCUMBENTS FROM HARMFUL INTERFERENCE.

The Commission imposed three restrictions on low-power access points to help protect incumbent licensees from harmful interference. Low-power access points must be (1) restricted to indoor locations; (2) subject to a contention-based protocol; and (3) subject to limited permissible power levels. *Id.* ¶ 99 (JA___). The agency reasonably concluded that these

restrictions, in combination, would be sufficient to protect incumbent licensees from a significant risk of harmful interference.

A. The Commission Established Reasonable Measures To Assure That Low-Power Devices Would Be Operated Only Indoors.

In order to achieve the benefits of signal attenuation from building loss, the *Order* provides that low-power access points "must operate only indoors." *Id.* ¶ 100 (JA__). To assure indoor operation, the agency required that they not be "weather resistant," that they have integrated antennas and no ability to connect other antennas to the devices, and that they be prohibited from solely "operating on battery power." *Id.* ¶ 107 (JA__). The Commission also required that every low-power device have a label specifying that it was "for indoor use only," and that the products be marketed solely for this purpose. *Id*. Taken together, the agency found that these requirements "will make outdoor operations impractical and unsuitable." *Id.* ¶ 108 (JA__).

Petitioners acknowledge that these measures could "discourage outdoor use of 6 GHz access points" but insist that they "cannot possibly prevent it." Pet. Br. 52. They argue that these requirements will not deter consumers from taking their Wi-Fi routers outside to "conduct Zoom calls from their laptops on porches, balconies, and decks," where they can be plugged into "outdoor electrical outlets." *Id.* at 52-53.

Petitioners' arguments are misplaced. The Commission has previously restricted certain unlicensed devices in other bands to indoor operation without reports of harmful interference. *Id.* ¶ 148 (JA___).[16] Petitioners have not alleged that these prior measures were ineffective, and there is nothing to suggest that users of 6 GHz low-power devices would be unwilling or unable to comply with a similar restriction.

In addition, because low-power access points are not permitted to be weather resistant, their outdoor use risks rendering them inoperable because of exposure to the elements. And, as the record shows, weatherproofing an indoor router is not a simple task; it often "requires power and network backhaul through weather protected conduit," "fans or heaters for temperature control," and "external antennas to be mounted outside the box, with specialized [cables] that must be specially weatherproofed." Apple,

[16] *See Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, 12 FCC Rcd 1576, 1615 ¶ 95 (1997) (limiting unlicensed devices in 5.15-5.25 GHz to indoor use); *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, 17 FCC Rcd at 7460 ¶¶ 65-66 (establishing a category of ultrawideband unlicensed devices that will not operate if removed from the indoor environment).

Broadcom et al. 3/18/2020 Letter 4 (JA___).[17] The fact that indoor access points may not be operated solely on battery power provides an additional disincentive to outdoor operation. *Order* ¶ 107 (JA___).

Petitioners contend that, whatever deterrence the rules provide to outdoor operation of low power access points, it would be "impossible to prevent consumers" from taking portable client devices (such as "smartphones, laptops and tablets") outside, where these devices will pose their own risks of harmful interference. Pet. Br. 54-55.

But as petitioners acknowledge (*id*. at 55), the agency protected against harmful interference by adopting much lower permissible power levels for low-power client devices than for low-power access points. The Commission determined that the appropriate maximum Effective Isotropic Radiated Power (EIRP) for low-power indoor client devices is 6 dB below the limit for low-power access points, or -1 dBm/MHz EIRP. *Order* ¶¶ 103, 111 (JA___). The Commission reasonably concluded that this "additional margin of 6 dB

[17] Commenters also explained that many access points are installed in such a way that it would be impractical to move them. *See* Apple, Broadcom et al. 3/18/2020 Letter 5 (JA___) (in high-rise buildings, "the broadband connection is brought into a unit along an interior wall" near the television, and moving the access point would require "extending the broadband connection, which either exposes a long run of unsightly cable or requires labor to run the wire through the wall to a new location").

will provide protection to incumbents as client devices operate in the vicinity of access points." *Id.* ¶ 111 (JA___).

The low permissible power levels for smartphones, tablets, and other client devices make it unlikely that they will cause harmful interference to fixed microwave receivers, even if they are taken outside. As a practical matter, smartphones, tablets, and laptops work best when in close proximity to their access point, which generally is when both the access point and client device are inside the same building. As anyone who has tried making a call in the backyard using a Wi-Fi connection can attest, coverage outside the home, even nearby, is often spotty, if not poor.

Furthermore, even if these devices are taken outside and are operational, they will be subject to signal loss due to signal obstruction for proximity to the head, hand, and other parts of the body, thereby decreasing the risk of harmful interference. *See Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37*, 30 FCC Rcd 9551, 9599 ¶ 125 (2015) (assuming 3 dB body loss for "portable devices that are typically held in the hand or carried on a person"); *Service Rules for Advanced Wireless Services H Block*, 28 FCC Rcd 9483, 9539 ¶ 147 (2013) (accepting values of 8 dB and 10 dB for head

and body loss proposed by commenters as "within the range of reasonableness").

B. The Contention-Based Protocol Requirement Is Reasonable.

The Commission also required that indoor low-power devices, "both access points and their associated client devices," use a "contention-based protocol." *Order* ¶ 101 (JA___). A station using a contention-based protocol must listen to the wireless medium before transmitting. *Id*. If the medium is idle, the station may transmit; if not, the station must wait until the current transmission is complete before transmitting. *Id*. Because low-power devices must share the spectrum with other users, being subject to a contention-based protocol significantly limits the amount of time they can transmit. *Id.* ¶ 102 (JA___). This in turn minimizes the risk of harmful interference to licensed operations. *Id*.

Petitioners contend that a contention-based protocol will not be able to protect microwave links from harmful interference because low-power indoor devices like Wi-Fi routers "will be able to 'hear' only other such devices" and "will not be able to detect" the microwave receivers outside. Pet. Br. 56-57. To be sure, contention-based protocols have most typically been used to avoid interference between similar devices operating in proximity. However, the sensing mechanism they incorporate is designed to sense a signal and

avoid transmitting on frequencies when the detected signal is above a prescribed level, regardless of the signal's source. *Order* ¶ 168 (JA___).[18] And even if low-power indoor devices "may not always be able to detect the presence of microwave signals," the requirement that low-power indoor devices employ a contention-based protocol "will still help prevent interference by ensuring that unlicensed devices do not transmit continuously." *Id.* n.374. (JA___).

Finally, the requirement that indoor devices employ a contention-based protocol is only one among several requirements the *Order* adopted to minimize the risk of harmful interference to incumbent licensees from unlicensed operations. *Id.* ¶ 99 (JA___). In this regard, the contention-based protocol requirement is an additional safeguard to prevent harmful

[18] Contrary to petitioners' claim, whether unlicensed 6 GHz devices will be able to detect a microwave signal is not determined by whether the unlicensed devices "radiate energy in all directions" or whether the microwave links use "narrow point-to-point beams." Pet. Br. 57. Rather, it is determined by whether the amount of energy the unlicensed device receives from the microwave signals is greater than the detection threshold of the "listen-before-talk" mechanism. *Order* ¶ 168 (JA___).

interference to licensed operations beyond the protection that will already be provided by the indoor restriction and lower power levels.[19]

C. The Commission Reasonably Imposed A 5 dBm/MHz EIRP Power Spectral Density Limit.

The third limitation the Commission placed on low-power indoor access points was that they would be subject to significantly lower power limits than standard-power access points. The agency declined to adopt the significantly higher 17 dBm/MHz EIRP power spectral density limit for low-power access points it had proposed in the *NPRM*. *See NPRM* ¶ 75 (JA___). It also rejected the 8 dBm/MHz EIRP power spectral density limit that several proponents of unlicensed devices had advocated. *Order* ¶ 132 (JA___). Instead, after "consideration of all of the studies and their varied assumptions," as well as "the protection needs of incumbents in all of the 6 GHz U-NII bands," the Commission adopted a power spectral density level of 5 dBm/MHz EIRP. *Id.* ¶ 110 (JA___). "Based on [its] experience with

[19] Petitioners contend that the agency should have limited all low-power devices to the 0.4% activity factor assumed in the CableLabs study. Pet. Br. 59. But the Commission declined to limit the activity factor because it reasonably concluded that requiring unlicensed devices to use a contention-based protocol would prevent the devices from transmitting at "extremely high duty cycles." *Order* ¶ 120 (JA___). The Commission also noted that the use of wider bandwidth channels "will lead to access points being on the air for shorter periods of time." *Id.* ¶ 121 (JA__).

unlicensed operations and interference analyses as well as [its] engineering judgment," the Commission found that a "5 dBm/MHz [power spectral density] will both adequately protect all incumbents in the band from harmful interference as well as offer enough power to unlicensed devices . . . to sustain meaningful applications especially when using wider bandwidths." *Id*.

In making this determination, the Commission took a cautious approach. It rejected proposals to allow unlicensed indoor devices to operate using a power spectral density level of "8 dBm/MHz EIRP," finding that the interference/noise power levels for some of AT&T's worst-case scenarios "would create a higher risk of harmful interference (although still very low)." *Id.*¶ 132 (JA___). The Commission accordingly chose the more "conservative" 5 dBm/Mhz EIRP limit to ensure that there would be "insignificant risk of harmful interference." *Id*. *See id.* ¶¶ 244-245 (JA___).

Petitioners claim that the Commission's decision was "arbitrary," because the agency "simply plucked the number 5 out of thin air" and failed to "cite evidence suggesting that pegging the power level to 5, rather than (say) 3 or 1, would eliminate the interference risks that the FCC deemed too great at 8." Pet. Br. 50-51. This argument ignores the Commission's "wide discretion in determining where to draw administrative lines." *AT&T Corp.*

v. FCC, 220 F.3d 607, 627 (D.C. Cir. 2000). This Court is "generally unwilling to review line-drawing performed by the Commission unless a petitioner can demonstrate that lines drawn … are patently unreasonable, having no relationship to the underlying regulatory problem." *Cassell v. FCC*, 154 F.3d 478, 485 (D.C. Cir. 1998) (internal quotation marks omitted). The pertinent question is "whether the agency's number are within a 'zone of reasonableness,' not whether its numbers are precisely right." *WorldCom, Inc. v. FCC*, 238 F.3d 449, 462 (D.C. Cir. 2001) (internal quotation marks omitted). The wide discretion the Court affords agencies in drawing administrative lines is particularly appropriate in this case, where the Commission resolved the highly technical issue of the appropriate power limits based on its experience and engineering expertise. *Order* ¶ 110 (JA___); *see NTCH*, 950 F.3d at 880.

The Commission provided a "reasonable explanation" for the line it drew and "that line's relationship to the underlying regulatory problem." *Cassell*, 154 F.3d at 485. It chose a restrained approach that balanced the objective of allowing unlicensed operations in the 6 GHz band—consistent with Congress' directive to provide more spectrum for unlicensed use—with the need to protect incumbent licensed operations from a significant risk of harmful interference. The Administrative Procedure Act requires no more.

V. THE ADDITIONAL CLAIMS RAISED BY INDIVIDUAL PETITIONERS ARE INSUBSTANTIAL.

A. The Commission Adequately Considered Public Safety.

APCO contends that the FCC unlawfully failed to consider the *Order*'s effect on public safety. Pet. Br. 59-65. This argument is unfounded.

The Commission recognized that incumbent users of fixed microwave services include "public safety agencies," which use "point-to-point microwave links" to support their services in the 6 GHz band. *Order* ¶ 7 (JA___). The Commission also understood "the importance of maintaining high link reliability" for "public safety organizations." *Id.* ¶ 115 (JA___) (citing APCO Comments at 4 (JA___)). It addressed this issue by adopting rules that "protect incumbent fixed microwave operations" in the 6 GHz band "from the potential of harmful interference" by standard-power devices, *id.* ¶ 23 (JA___), and "prevent harmful interference" from low-power devices, *id.* ¶ 99 (JA___). *See generally id.* ¶¶ 23-86, 112-150 (JA___-___, ___-___). By protecting *all* incumbent fixed microwave operations in the 6 GHz band from harmful interference, the FCC's rules ensure that public safety services using that band will not be disrupted.

APCO notes that "certain 6 GHz public safety systems have heightened reliability requirements of 99.9999% availability." Pet. Br. 60. Such requirements, however, are not unique to public safety agencies. The record

reflected that "fixed microwave links are typically designed to achieve 99.999% or 99.9999% reliability." *Order* ¶ 114 (JA___). Because public safety fixed microwave links are "typical[]" of other fixed microwave links, *see id*., the FCC's extensive findings regarding the protection of fixed microwave links from harmful interference "apply with equal force to public safety operations in the 6 GHz band." *Stay Denial Order* ¶ 21.

Where (as here) the Commission provides adequate safeguards for all incumbent services, it need not treat public safety agencies differently from other incumbents. The Court's decision in *Association of Public-Safety Communications Officials-Int'l v. FCC*, 76 F.3d 395 (D.C. Cir. 1996), illustrates this point. That case involved the mandatory relocation of incumbent fixed microwave licensees from the 1850-2200 MHz bands to clear the spectrum for use by emerging technologies. Although the FCC initially exempted public safety licensees from this relocation requirement, it later revoked the exemption. *Id*. at 396-98. This Court rejected APCO's claim that the agency's elimination of the exemption "significantly injured" public safety agencies. *Id*. at 399. The Court noted that under the Commission's rules, public safety licensees "enjoy the same safeguards available" to all incumbents subject to mandatory relocation. *Id.* at 397. Those "ample safeguards" guaranteed that "no incumbent will be required to

move until" a new licensee in the 1850-2200 MHz bands "builds, tests, and assumes all costs for fully comparable facilities for the incumbent." *Id.* at 399. Similarly, in this case, the protections afforded by the FCC's rules to all incumbents will prevent any interruption of public safety services.

Moreover, in crafting the 6 GHz rules, the Commission adopted numerous measures that APCO endorsed. Consistent with APCO's comments, the Commission required (1) use of the FCC's Universal Licensing System to establish exclusion zones for standard-power devices, *Order* ¶ 30 (JA___-___) (citing APCO Comments at 10 (JA___)); (2) geo-location capabilities for standard-power devices, *id.* ¶¶ 39-40 (JA___-___) (citing APCO Comments at 14 (JA___)); (3) standard-power device contact with an automated frequency coordination system at least once per day, *id.* ¶ 46 (JA___-___) (citing APCO Comments at 7 (JA___)); (4) standard-power registration with an automated frequency coordination system when requesting a list of available operating frequencies and power levels, *id.* ¶¶ 81-82 (JA___-___) (citing APCO Comments at 6 (JA___)); and (5) the capacity to deny spectrum access to a registered standard-power access point upon request by the Commission, in the event of harmful interference caused by a device, *id.* ¶ 83 (JA___) (citing APCO Comments at 10 (JA___)). In addition, at APCO's request, *see* APCO Comments at 17-18 (JA___-___), the

Commission declined to permit higher power limits in rural areas. *Order* ¶¶ 187-188 (JA___-___).

To be sure, the Commission did not adopt all of APCO's proposals. *See* Pet. Br. 63-64 & n.32. Nonetheless, given that the rules incorporate many of APCO's suggestions, its assertion that the agency ignored public safety concerns rings hollow.

In support of its argument that the Commission did not adequately consider public safety, APCO relies heavily on *Mozilla Corp. v. FCC*, 940 F.3d 1 (D.C. Cir. 2019). *See* Pet. Br. 60-63. But that case is plainly distinguishable. In *Mozilla*, the Court largely upheld the FCC's decision to end "utility-style regulation" of the Internet by reinstating "a market-based, 'light-touch' policy." *Mozilla*, 940 F.3d at 17. Public safety officials argued that this market-based approach "could imperil the ability of first responders … and members of the public to communicate during a crisis" by "allowing broadband providers to prioritize Internet traffic as they see fit, or to demand payment for top-rate speed." *Id*. at 60. The Court held that the Commission failed to consider how its decision to restore a market-based approach to Internet regulation would affect public safety. *Id*. at 61–62.

In this case, unlike *Mozilla*, the Commission considered how its rules would affect public safety. It affirmatively adopted rules to prevent harmful

interference with public safety services, *see Order* ¶¶ 23-86, 112-150 (JA___-___, ___-___), including requirements that APCO and other public safety organizations supported, *see id.* ¶¶ 30, 39-40, 46, 81-83 (JA___-___, ___-___, ___-___, ___-___). While APCO may disagree with the Commission's reasoning and policy judgment, the *Order* addresses the substance of the public safety concerns regarding the potential for harmful interference. For that reason, there is no basis for APCO to claim that the Commission's response to APCO's public safety argument in this case is a "*post hoc* rationalization." Pet. Br. 62 (quoting *Mozilla*, 940 F.3d at 62).

APCO also argues that "the new rules effectively strip public safety agencies of protection from harmful interference while operating microwave links under emergency special temporary authority," Pet. Br. 62, because "the locations of such links will not be known to [a]utomated [f]requency [c]oordination mechanisms," *id.* at 65. That is incorrect. If the FCC approves a telephonic request for emergency special temporary authority, the entity obtaining such approval must file "a properly signed application" shortly thereafter using FCC Form 601. 47 C.F.R. § 1.931(b)(5). The information on Form 601—including the location of the applicant's operations—is entered into the Universal Licensing System. *See* FCC, Wireless Telecommunications Bureau, Applying for Special Temporary

Authority, *available at* https://www.fcc.gov/applying-special-temporary-authority. Thus, automated frequency coordination operators will have the information they need to protect public safety links operating under special temporary authority.

Finally, APCO maintains that the *Order* does not adequately guard against harmful interference because it "does not set an accuracy requirement" governing the location estimates for standard-power access points that must be reported to automated frequency coordination systems. Pet. Br. 64-65. That contention lacks merit.

APCO is essentially arguing for a level of precision that cannot be attained. The automated frequency coordination process is subject to the inherent uncertainties of geo-location methodologies. Acknowledging the uncertainty inherent in determining "a device's geo-location capability," the Commission required that the estimated location of standard-power access points "be determined, in meters, with 95% confidence level." *Order* ¶ 41 (JA___). Automated frequency coordination systems "will use this information to determine the minimum required separation distances from fixed service receivers." *Id*. Based on its "experience with" the rules for white space devices, which impose a similar requirement, the FCC reasonably concluded that requiring a 95% confidence level for the location

estimates of standard-power access points "reliably ensures protection against harmful interference." *Id.*[20]

B. The Commission Reasonably Explained Why It Rejected Interference Studies Submitted By Electric Power Utilities.

The petitioner Utilities contend that the FCC arbitrarily dismissed interference studies submitted by Southern Company and the Critical Infrastructure Industry (CII). Pet. Br. 65-68; *see also* Southern Amicus Br. 15-26. That argument lacks merit. The Commission reasonably explained why it found the Southern and CII studies unpersuasive. *See Order* ¶¶ 135, 138 (JA___, ___).

In the Commission's judgment, the Southern study was unreliable because it failed to employ a probabilistic analysis such as a Monte Carlo

[20] It was reasonable for the FCC to draw on its previous regulatory experience when deciding how to design the rules in this proceeding. *See FCC v. Nat'l Citizens Comm. for Broad.*, 436 U.S. 775, 797 (1978) ("the Commission was entitled to rely on its judgment, based on experience," that diversification of media ownership would best promote viewpoint diversity); *United States Telecom Ass'n v. FCC*, 825 F.3d 674, 732 (D.C. Cir. 2016) (the FCC's "experience in using a 'light touch' regulatory program for mobile voice" services informed its decision to forbear from applying certain statutory provisions to Internet service providers); *Alvin Lou Media, Inc. v. FCC*, 571 F.3d 1, 11 (D.C. Cir. 2009) ("[g]iven its experience with up-front technical review" under a previous regulatory regime, "the Commission could reasonably conclude" that technical review should be deferred until after the auction of a broadcast license).

simulation. For purposes of assessing "the aggregate effect of multiple unlicensed devices," the study simply "assume[d] that all of the unlicensed devices are on the same side of the building facing the microwave receivers and transmitting at the same time." *Id.* ¶ 135 (JA___). The Commission reasonably rejected this approach. It concluded that the most effective way "[t]o evaluate the spectrum sharing potential" in the 6 GHz band was to "take a statistical approach such as in Monte Carlo simulations so as to probabilistically account for many intertwined phenomena." *Id.*

The petitioner Utilities maintain that "a Monte Carlo analysis was irrelevant to, and would not have changed," the Southern study's finding that a single unlicensed device could cause harmful interference. Pet. Br. 67 (citing Southern 4/9/2020 Letter 3-4 (JA___-___)). The Commission disagreed. It explained that studies based on static inputs "neglect the effects of the sporadic nature of most unlicensed transmissions (activity factor) and the probability of co-channel operation of the unlicensed device and the licensed service." *Order* ¶ 116 (JA___). Studies "based on Monte Carlo-type simulations … more accurately capture" these factors, which "reduce the probability of interference to the licensed service." *Id.* (JA___-___). Because the Southern study's "static link budget analysis" failed to take

account of these "significant statistical factors," *id*. n.345 (JA___), it was reasonable for the Commission to discount the study.[21]

The Commission also had good reason to reject the CII study, which analyzed the potential for interference in the Houston area. *See id.* ¶ 136 (JA___). That study "made certain assumptions" that rendered its conclusions "fundamentally flawed and unreliable." *Id*. ¶ 138 (JA___). For example, it significantly underestimated "building entry loss" by assuming that "all buildings" in the Houston area "are of traditional construction," ignoring buildings of "thermally efficient construction." *Id*.[22] The CII study also made the unwarranted assumption that "there is an access point for

[21] In an amicus brief, Southern argues that recent "field testing" shows that the FCC's 6 GHz rules "will cause harmful interference." Southern Amicus Br. 26-30. That argument is not properly before the Court for two reasons. First, no petitioner made the argument. *See MetLife, Inc. v. Fin. Stability Oversight Council*, 865 F.3d 661, 666 n.4 (D.C. Cir. 2017) (amici may not "expand an appeal's scope to sweep in issues" not raised by parties). Second, the field testing was conducted in the fall of 2020, long after the *Order* was issued. Southern Amicus Br. 28. It is well settled that the reasonableness of a Commission decision must be assessed "on the basis of the record then before" the agency. *See Fresno Mobile Radio, Inc. v. FCC*, 165 F.3d 965, 971 (D.C. Cir. 1999) (declining to consider an argument that the FCC's predictive judgment "appears *ex post* to have been mistaken").

[22] As we noted earlier, *see* p. 35 *supra*, the Commission found that "a mix of 70% traditional and 30% thermally efficient building types" was "appropriate to use when determining a statistical probability of building entry loss." *Order* n.297 (JA___). This ratio was "consistent with" submissions by petitioners NAB and AT&T. *Id*.

every man, woman, and child living in the Houston area, each watching a 4K video streaming service." *Id*. The Commission reasonably determined that these flawed assumptions would "lead to substantial errors on the order of tens of decibels." *Id*.

The petitioner Utilities contend that the Commission "ignored Edison's detailed responses" to the agency's critique of the CII study in a letter submitted in April 2020, near the end of the rulemaking. Pet. Br. 67-68 (citing Edison 4/15/2020 Letter 2-8 (JA___-___)). That letter, however, merely repeated arguments Edison had made in "technical submissions" that were previously placed in the record. *See* Edison 4/15/2020 Letter 2 (JA___). For instance, in March 2020, Edison submitted "additional material" to try "to justify [the CII study's] assumptions." *See Order* n.364 (JA___). Edison's April 2020 letter relied heavily on this earlier submission. *See* Edison 4/15/2020 Letter 3-4 (JA___-___) (citing Edison 3/20/20 Letter (JA___-___)). The Commission reasonably concluded that Edison's March 2020 submission did "not substantively address [the agency's] concerns or [its] conclusions" about the many dubious assumptions underlying the CII study. *Order* n.364 (JA___).

C. The Commission Protected Broadcasters' Mobile Operations From Harmful Interference In The 6 GHz Band.

NAB claims that the FCC "largely ignored" the "unique" interference risks faced by broadcasters' licensed mobile operations in the 6 GHz band. Pet. Br. 70. To the contrary, the Commission took reasonable steps to protect mobile operations from harmful interference.

NAB notes that "because mobile 6 GHz facilities often operate indoors, they will frequently be close to Wi-Fi access points and client devices without intervening obstructions to alleviate the interference risk." *Id*. at 70. The FCC addressed this concern by "requiring 6 GHz unlicensed devices to use a contention-based protocol." *Order* ¶ 168 (JA___). The Commission found that "such a protocol will allow unlicensed devices to sense the energy from nearby indoor licensed operations and avoid using that channel." *Id*.

The record supported the Commission's conclusion that "energy sensing could be used to mitigate interference" to broadcasters' indoor mobile operations. *Id*. A study by Apple, Broadcom et al. "simulated the receive power level from electronic news gathering transmitters at 20 unlicensed access points operating within the US House of Representatives chamber." *Id*. This simulation showed that "even at the lowest electronic news gathering transmit level, all unlicensed access points would detect the

electronic news gathering signal at greater than -62 dBm and therefore not transmit" on the same channel as a news gathering transmitter. *Id.*; *see* Apple, Broadcom et al. 4/20/2020 Letter 13 (JA___).[23] Based on the results of this simulation, the Commission reasonably concluded that "the risk of harmful interference to indoor electronic news gathering receivers from indoor unlicensed devices is insignificant." *Order* ¶ 168 (JA___).

NAB asserts that the FCC ignored "evidence" that "a contention-based protocol has failed to protect licensed users" in the 2.4 GHz band. Pet. Br. 70. Although NAB filed letters alleging interference problems in that spectrum band, it based those allegations on comments filed by a group of broadcast engineers. Those engineers complained of "chronic interference" in the 2.4 GHz band; but their only specific evidence of such interference was limited to outdoor receivers in the Phoenix area. *See* Comments of EIBASS (Engineers for the Integrity of Broadcast Auxiliary Services Spectrum) at 8-9 (JA___-___). Moreover, the engineers acknowledged that the frequency coordinator in Phoenix was able to "cure the problem" by instructing the

[23] Under the engineering protocol governing local area networks, Wi-Fi devices are designed "to sense the energy" in any channel in use, and they will "not transmit if they detect energy at a level greater than -62 dBm." *Order* ¶ 168 (JA___) (citing Apple, Broadcom et al. 2/28/20 Letter 11 (JA___)).

operators of unlicensed devices "to cease and desist their interference-causing operations." *Id*. at 8 (JA___). This evidence was consistent with the Commission's conclusion that "instances of harmful interference have been effectively identified and addressed" in the 2.4 GHz band. *Order* ¶ 147 (JA___).[24]

Because unlicensed devices will be able to avoid interference by employing a contention-based protocol that "sense[s] the energy from nearby indoor licensed operations," *id.* ¶ 168 (JA___), the protection of indoor mobile operations does not depend on the ability of automated frequency coordination systems to "keep track of" where mobile operations are located. Pet. Br. 71.

As for outdoor mobile operations, the Commission determined that the risk of harmful interference to "electronic news gathering central receive sites" was "negligible." *Order* ¶ 160 (JA___). Consequently, the FCC rejected NAB's request that a portion of the 6 GHz band be reserved for the exclusive use of electronic news gathering operations. The Commission

[24] In any event, instances of interference in the 2.4 GHz band do not provide a useful basis for comparison. Unlike the rules for the 6 GHz band, the rules governing the 2.4 GHz band do not restrict unlicensed devices to indoor operation or require the use of a contention-based protocol. *See* 47 C.F.R. § 15.247.

reasonably found that such a set-aside was unnecessary because "low-power indoor operations" in the 6 GHz band "will have little potential of causing harmful interference to [electronic news gathering] operations." *Order* ¶ 158 (JA___).

The Commission further observed that NAB's proposal to bar unlicensed devices from using part of the 6 GHz band "could have the unintended effect of actually increasing the potential interference to other users" because "more unlicensed devices would have access to fewer channels." *Id.* NAB argues that "[t]his rationale is untenable," Pet. Br. 71, because it reveals "the extreme sensitivity" of the FCC's finding of no significant risk of interference "to even minor variations in assumptions about the number and intensity of unlicensed device transmissions," *id*. at 73.

At the outset, this claim "has been forfeited" because it "was never raised with the Commission." *Nat'l Lifeline Ass'n*, 983 F.3d at 509; *see* 47 U.S.C. § 405(a). In any event, this argument is unavailing. It rests on the mistaken premise that the Commission said that a "minor reduction" in the spectrum available for unlicensed devices "could *significantly* increase the potential for interference." Pet. Br. 71 (emphasis added). The Commission said no such thing. It simply made the unremarkable observation that the potential for interference could increase if unlicensed devices had "access to

fewer channels" in the 6 GHz band. *Order* ¶ 158 (JA___). Even if the exclusion of unlicensed devices from a portion of the band might increase the potential for interference only slightly, the Commission saw no reason to take that risk. In the agency's assessment, reservation of a segment of the band for broadcasters' exclusive use was unwarranted because the FCC's rules adequately protect broadcasters' mobile operations from harmful interference. The Commission's expert "technical judgment" concerning this question of spectrum allocation is accorded "the greatest deference" by a reviewing court. *NTCH*, 950 F.3d at 880.

VI. IN THE UNLIKELY EVENT THAT INTERFERENCE ISSUES ARISE, THE COMMISSION IS FULLY CAPABLE OF ADDRESSING THEM.

Finally, petitioners argue that the FCC lacks adequate mechanisms to address any harmful interference that might occur in the 6 GHz band. Pet. Br. 73-77. That claim is baseless.

The Commission reasonably concluded that the regulatory framework it adopted "eliminates any significant risk of" unlicensed low-power devices "causing harmful interference." *Order* ¶ 146 (JA___). Nonetheless, in the unlikely event that a low-power device causes harmful interference, the Commission explained that it possesses the necessary tools to remedy the problem. The "Commission's Enforcement Bureau has the ability to

investigate reports of such interference and take appropriate enforcement action as necessary." *Id.* ¶ 149 (JA___). "Enforcement Bureau field agents use fixed, vehicular-mounted, and portable commercial and specialized spectrum monitoring equipment to conduct investigations and carry out interference resolution and enforcement activities." *Id.* n.397 (JA___). The Bureau also "works with entities at the federal, state, county, and local levels of government to resolve interference." *Id.*

Once the Bureau identifies the source of the interference, FCC rules require the user of the interference-causing device "to cease operating" the device "until the condition causing the harmful interference has been corrected." *Id.* ¶ 149 (JA___); *see* 47 C.F.R. § 15.5(c).

Petitioners contend that the proliferation and portability of low-power devices in the 6 GHz band will impair the FCC's ability to identify any specific device causing harmful interference. Pet. Br. 74-76. The agency's experience with other spectrum bands belies this claim. Unlicensed "Wi-Fi devices have been deployed … in abundance" in the 2.4 GHz and 5 GHz bands "for well over 20 years," and "instances of harmful interference" in those bands "have been effectively identified and addressed." *Order* ¶ 147 (JA___). The Commission expects that "the number and type" of low-power devices in the 6 GHz band "will resemble the deployment of devices" in the

2.4 GHz and 5 GHz bands. *Id*. Given its past success in resolving interference in those other bands, the Commission reasonably concluded that it could effectively identify and address any interference issues that might arise in the 6 GHz band.[25]

Contrary to APCO's assertion (Pet. Br. 76-77), the FCC also took reasonable measures to ensure that it can identify and eliminate any harmful interference from standard-power devices in the 6 GHz band. The Commission required each standard-power access point to provide an automated frequency coordination system with "the [standard-power] device's FCC identifier" and "serial number." *Order* ¶ 83 (JA___). This "information will be used for interference mitigation and enforcement purposes to identify the source if harmful interference were to occur." *Id*. The Commission required automated frequency coordination operators to

[25] To support their assertion that the FCC will be unable to resolve interference issues promptly, petitioners claim that in *Buzzer Net LLC*, 35 FCC Rcd 3693 (Enf. Bur. 2020), "the FCC's Enforcement Bureau spent *weeks* attempting to mitigate harmful interference caused by unlicensed devices to FAA radars." Pet. Br. 76. That is incorrect. In *Buzzer Net*, the FCC received an interference complaint from the FAA on May 30, 2019. 35 FCC Rcd at 3694 ¶ 5. Enforcement Bureau personnel identified the source of the interference on June 4, 2019. *Id*. at 3694 ¶¶ 6-7. Later that day, after Bureau personnel met with a Buzzer Net technician, the technician turned off the interference-causing devices, and the interference "appeared to cease." *Id*. at 3694-95 ¶ 8. Thus, in that case, the FCC staff identified and resolved the interference issue within a week of receiving the FAA's complaint.

"implement procedures to respond to requests from Commission personnel for [such] information" and "to comply with enforcement instructions from the Commission, including discontinuance of access point operations in designated geographic areas." *Id.* In addition, automated frequency coordination systems must "have the capacity to deny spectrum access to a particular registered standard-power access point upon request by the Commission, in the event of harmful interference caused by a particular device or type of device." *Id.* These requirements will "ensure that access points that do not comply with the [FCC's] rules are shut down in a timely manner." *Id.*

CONCLUSION

The petitions for review should be denied.

Respectfully Submitted,

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February 16, 2021

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I, Thaila K. Sundaresan, hereby certify that on February 16, 2021, I filed the foregoing Brief for Respondents with the Clerk of the Court for the United States Court of Appeals for the District of Columbia Circuit using the electronic CM/ECF system. Participants in the case who are registered CM/ECF users will be served by the CM/ECF system.

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STATUTORY ADDENDUM

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5 U.S.C. § 706
§ 706. Scope of review

To the extent necessary to decision and when presented, the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of an agency action. The reviewing court shall--

(1) compel agency action unlawfully withheld or unreasonably delayed; and

(2) hold unlawful and set aside agency action, findings, and conclusions found to be--

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;

(B) contrary to constitutional right, power, privilege, or immunity;

(C) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right;

(D) without observance of procedure required by law;

(E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or

(F) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court.

In making the foregoing determinations, the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error.

28 U.S.C. § 2342(1)
§ 2342. Jurisdiction of court of appeals

The court of appeals (other than the United States Court of Appeals for the Federal Circuit) has exclusive jurisdiction to enjoin, set aside, suspend (in whole or in part), or to determine the validity of--

> (1) all final orders of the Federal Communications Commission made reviewable by section 402(a) of title 47;

* * *

47 U.S.C. § 151
§ 151. Purposes of chapter; Federal Communications Commission created

For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is created a commission to be known as the "Federal Communications Commission", which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this chapter.

47 U.S.C. § 402(a)
§ 402. Judicial review of Commission's orders and decisions

(a) Procedure
Any proceeding to enjoin, set aside, annul, or suspend any order of the Commission under this chapter (except those appealable under subsection (b) of this section) shall be brought as provided by and in the manner prescribed in chapter 158 of Title 28.

* * *

47 U.S.C. § 405(a)

§ 405. Petition for reconsideration; procedure; disposition; time of filing; additional evidence; time for disposition of petition for reconsideration of order concluding hearing or investigation; appeal of order

(a) After an order, decision, report, or action has been made or taken in any proceeding by the Commission, or by any designated authority within the Commission pursuant to a delegation under section 155(c)(1) of this title, any party thereto, or any other person aggrieved or whose interests are adversely affected thereby, may petition for reconsideration only to the authority making or taking the order, decision, report, or action; and it shall be lawful for such authority, whether it be the Commission or other authority designated under section 155(c)(1) of this title, in its discretion, to grant such a reconsideration if sufficient reason therefor be made to appear. A petition for reconsideration must be filed within thirty days from the date upon which public notice is given of the order, decision, report, or action complained of. No such application shall excuse any person from complying with or obeying any order, decision, report, or action of the Commission, or operate in any manner to stay or postpone the enforcement thereof, without the special order of the Commission. The filing of a petition for reconsideration shall not be a condition precedent to judicial review of any such order, decision, report, or action, except where the party seeking such review (1) was not a party to the proceedings resulting in such order, decision, report, or action, or (2) relies on questions of fact or law upon which the Commission, or designated authority within the Commission, has been afforded no opportunity to pass. The Commission, or designated authority within the Commission, shall enter an order, with a concise statement of the reasons therefor, denying a petition for reconsideration or granting such petition, in whole or in part, and ordering such further proceedings as may be appropriate: *Provided,* That in any case where such petition relates to an instrument of authorization granted without a hearing, the Commission, or designated authority within the Commission, shall take such action within ninety days of the filing of such petition. Reconsiderations shall be governed by such general rules as the Commission may establish, except that no evidence other than newly discovered evidence, evidence which has become available only since the original taking of evidence, or evidence which the Commission or designated authority within the Commission believes should have been taken in the original proceeding shall be taken on any reconsideration. The time within which a petition for review must be filed in a proceeding to which section 402(a) of this title applies, or within which an appeal must be taken under section 402(b) of this title in any case, shall be computed from the date upon

which the Commission gives public notice of the order, decision, report, or action complained of.

* * *

47 U.S.C. § 1502(a)(1)
§ 1502. Identifying 255 megahertz

(a) Requirements

(1) In general
Not later than December 31, 2022, the Secretary, working through the NTIA, and the Commission shall identify a total of at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use.

47 U.S.C. § 1508
§ 1508. National plan for unlicensed spectrum

(a) Definitions
In this section:

(1) Spectrum Relocation Fund
The term "Spectrum Relocation Fund" means the Fund established under section 928 of this title.

(2) Unlicensed or licensed by rule operations
The term "unlicensed or licensed by rule operations" means the use of spectrum on a non-exclusive basis under--

(A) part 15 of title 47, Code of Federal Regulations; or

(B) licensing by rule under part 96 of title 47, Code of Federal Regulations.

(b) National plan
Not later than 18 months after March 23, 2018, the Commission, in consultation with the NTIA, shall develop a national plan for making additional radio frequency bands available for unlicensed or licensed by rule operations.

(c) Requirements

The plan developed under this section shall--

(1) identify an approach that ensures that consumers have access to additional spectrum to conduct unlicensed or licensed by rule operations in a range of radio frequencies to meet consumer demand;

(2) recommend specific actions by the Commission and the NTIA to permit unlicensed or licensed by rule operations in additional radio frequency ranges that the Commission finds--

(A) are consistent with the statement of policy under section 1507(a) of this title;

(B) will--

(i) expand opportunities for unlicensed or licensed by rule operations in a spectrum band; or

(ii) otherwise improve spectrum utilization and intensity of use of bands where unlicensed or licensed by rule operations are already permitted;

(C) will not cause harmful interference to Federal or non-Federal users of such bands; and

(D) will not significantly impact homeland security or national security communications systems; and

(3) examine additional ways, with respect to existing and planned databases or spectrum access systems designed to promote spectrum sharing and access to spectrum for unlicensed or licensed by rule operations--

(A) to improve accuracy and efficacy;

(B) to reduce burdens on consumers, manufacturers, and service providers; and

(C) to protect sensitive Government information.

(d) Spectrum Relocation Fund

To be included as an appendix as part of the plan developed under this section, the NTIA, in consultation with the Director of the Office of Management and Budget, shall share with the Commission recommendations about how to reform the Spectrum Relocation Fund--

(1) to address costs incurred by Federal entities related to sharing radio frequency bands with radio technologies conducting unlicensed or licensed by rule operations; and

(2) to ensure the Spectrum Relocation Fund has sufficient funds to cover--

(A) the costs described in paragraph (1); and

(B) other expenditures allowed of the Spectrum Relocation Fund under section 928 of this title.

(e) Report required

(1) In general
Not later than 18 months after March 23, 2018, the Commission shall submit to the appropriate committees of Congress a report that describes the plan developed under this section, including any recommendations for legislative change.

(2) Publication on Commission website
Not later than the date on which the Commission submits the report under paragraph (1), the Commission shall make the report publicly available on the website of the Commission.

(f) Rule of construction
Nothing in this section confers any additional rights on unlicensed users or users licensed by rule under part 96 of title 47, Code of Federal Regulations, to protection from harmful interference.

47 C.F.R. § 1.931
§ 1.931 Application for special temporary authority.

(a) Wireless Telecommunications Services.

(1) In circumstances requiring immediate or temporary use of station in the Wireless Telecommunications Services, carriers may request special temporary authority (STA) to operate new or modified equipment. Such requests must be filed electronically using FCC Form 601 and must contain complete details about the proposed operation and the circumstances that fully justify and necessitate the grant of STA. Such requests should be filed in time to be received by the Commission at least 10 days prior to the date of proposed operation or, where an extension is sought, 10 days prior to the expiration date of the existing STA. Requests received less than 10 days prior to the desired date of operation may be given expedited consideration only if compelling reasons are given for the delay in submitting the request. Otherwise, such late-filed requests are considered in turn, but action might not be taken prior to the desired date of operation. Requests for STA for operation of a station used in a Contraband Interdiction System, as defined in § 1.9003, will be afforded expedited consideration if filed at least one day prior to the desired date of operation. Requests for STA must be accompanied by the proper filing fee.

(2) Grant without Public Notice. STA may be granted without being listed in a Public Notice, or prior to 30 days after such listing, if:

(i) The STA is to be valid for 30 days or less and the applicant does not plan to file an application for regular authorization of the subject operation;

(ii) The STA is to be valid for 60 days or less, pending the filing of an application for regular authorization of the subject operation;

(iii) The STA is to allow interim operation to facilitate completion of authorized construction or to provide substantially the same service as previously authorized;

(iv) The STA is made upon a finding that there are extraordinary circumstances requiring operation in the public interest and that delay in the institution of such service would seriously prejudice the public interest; or

(v) The STA is for operation of a station used in a Contraband Interdiction System, as defined in § 1.9003.

(3) Limit on STA term. The Commission may grant STA for a period not to exceed 180 days under the provisions of section 309(f) of the Communications Act of 1934, as amended, (47 U.S.C. 309(f)) if extraordinary circumstances so require, and pending the filing of an application for regular operation. The Commission may grant extensions of STA for a period of 180 days, but the applicant must show that extraordinary circumstances warrant such an extension.

(b) Private Wireless Services.

(1) A licensee of, or an applicant for, a station in the Private Wireless Services may request STA not to exceed 180 days for operation of a new station or operation of a licensed station in a manner which is beyond the scope of that authorized by the existing license. See §§ 1.933(d)(6) and 1.939. Where the applicant, seeking a waiver of the 180 day limit, requests STA to operate as a private mobile radio service provider for a period exceeding 180 days, evidence of frequency coordination is required. Requests for shorter periods do not require coordination and, if granted, will be authorized on a secondary, non-interference basis.

(2) STA may be granted in the following circumstances:

(i) In emergency situations;

(ii) To permit restoration or relocation of existing facilities to continue communication service;

(iii) To conduct tests to determine necessary data for the preparation of an application for regular authorization;

(iv) For a temporary, non-recurring service where a regular authorization is not appropriate;

(v) In other situations involving circumstances which are of such extraordinary nature that delay in the institution of temporary operation would seriously prejudice the public interest.

(3) The nature of the circumstance which, in the opinion of the applicant justifies issuance of STA, must be fully described in the request. Applications for STA must be filed at least 10 days prior to the proposed

operation. Applications filed less than 10 days prior to the proposed operation date will be accepted only upon a showing of good cause.

(4) The Commission may grant extensions of STA for a period of 180 days, but the applicant must show that extraordinary circumstances warrant such an extension.

(5) In special situations defined in § 1.915(b)(1), a request for STA may be made by telephone or telegraph provided a properly signed application is filed within 10 days of such request.

(6) An applicant for an Aircraft Radio Station License may operate the radio station pending issuance of an Aircraft Radio Station License by the Commission for a period of 90 days under temporary operating authority, evidenced by a properly executed certification made on FCC Form 605.

(7) Unless the Commission otherwise prescribes, a person who has been granted an operator license of Novice, Technician, Technician Plus, General, or Advanced class and who has properly submitted to the administering VEs an application document for an operator license of a higher class, and who holds a CSCE indicating that he/she has completed the necessary examinations within the previous 365 days, is authorized to exercise the rights and privileges of the higher operator class until final disposition of the application or until 365 days following the passing of the examination, whichever comes first.

(8) An applicant for a Ship Radio station license may operate the radio station pending issuance of the ship station authorization by the Commission for a period of 90 days, under a temporary operating authority, evidenced by a properly executed certification made on FCC Form 605.

(9) An applicant for a station license in the Industrial/Business pool (other than an applicant who seeks to provide commercial mobile radio service as defined in Part 20 of this chapter) utilizing an already authorized facility may operate the station for a period of 180 days, under a temporary permit, evidenced by a properly executed certification made on FCC Form 601, after filing an application for a station license together with evidence of frequency coordination, if required, with the Commission. The temporary operation of stations, other than mobile stations, within the Canadian coordination zone will be limited to stations with a maximum of 5 watts effective radiated

power and a maximum antenna height of 20 feet (6.1 meters) above average terrain.

(10) An applicant for a radio station license under Part 90, Subpart S, of this chapter (other than an applicant who seeks to provide commercial mobile radio service as defined in part 20 of this chapter) to utilize an already existing Specialized Mobile Radio System (SMR) facility or to utilize an already licensed transmitter may operate the radio station for a period of up to 180 days, under a temporary permit. Such request must be evidenced by a properly executed certification of FCC Form 601 after the filing of an application for station license, provided that the antenna employed by the control station is a maximum of 20 feet (6.1 meters) above a man-made structure (other than an antenna tower) to which it is affixed.

(11) An applicant for an itinerant station license, an applicant for a new private land mobile radio station license in the frequency bands below 470 MHz or in the 769–775/799–805 MHz, the 806–824/851–866 MHz band, or the one-way paging 929–930 MHz band (other than a commercial mobile radio service applicant or licensee on these bands) or an applicant seeking to modify or acquire through assignment or transfer an existing station below 470 MHz or in the 769–775/799–805 MHz, the 806–824/851–866 MHz band, or the one-way paging 929–930 MHz band may operate the proposed station during the pendency of its application for a period of up to 180 days under a conditional permit. Conditional operations may commence upon the filing of a properly completed application that complies with § 90.127 if the application, when frequency coordination is required, is accompanied by evidence of frequency coordination in accordance with § 90.175 of this chapter. Operation under such a permit is evidenced by the properly executed Form 601 with certifications that satisfy the requirements of § 90.159(b).

(12) An applicant for a General Mobile Radio Service system license, sharing a multiple-licensed or cooperative shared base station used as a mobile relay station, may operate the system for a period of 180 days, under a Temporary Permit, evidenced by a properly executed certification made on FCC Form 605.

47 C.F.R. § 15.3(m)
§ 15.3 Definitions.

* * *

(m) Harmful interference. Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this chapter.

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47 C.F.R. § 15.5
§ 15.5 General conditions of operation.

(a) Persons operating intentional or unintentional radiators shall not be deemed to have any vested or recognizable right to continued use of any given frequency by virtue of prior registration or certification of equipment, or, for power line carrier systems, on the basis of prior notification of use pursuant to § 90.35(g) of this chapter.

(b) Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

(c) The operator of a radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected.

(d) Intentional radiators that produce Class B emissions (damped wave) are prohibited.

47 C.F.R. § 15.15
§ 15.15 General technical requirements.

(a) An intentional or unintentional radiator shall be constructed in accordance with good engineering design and manufacturing practice. Emanations from the device

shall be suppressed as much as practicable, but in no case shall the emanations exceed the levels specified in these rules.

(b) Except as follows, an intentional or unintentional radiator must be constructed such that the adjustments of any control that is readily accessible by or intended to be accessible to the user will not cause operation of the device in violation of the regulations. Access BPL equipment shall comply with the applicable standards at the control adjustment that is employed. The measurement report used in support of an application for Certification and the user instructions for Access BPL equipment shall clearly specify the user-or installer-control settings that are required for conformance with these regulations.

(c) Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances. Since the operators of Part 15 devices are required to cease operation should harmful interference occur to authorized users of the radio frequency spectrum, the parties responsible for equipment compliance are encouraged to employ the minimum field strength necessary for communications, to provide greater attenuation of unwanted emissions than required by these regulations, and to advise the user as to how to resolve harmful interference problems (for example, see § 15.105(b)).