

ORAL ARGUMENT NOT YET SCHEDULED

No. 20-1190 (consolidated with Nos. 20-1216, 20-1272, 20-1274, 20-1281, 20-1284)

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

AT&T SERVICES, INC.,*Petitioner,*

v.

FEDERAL COMMUNICATIONS COMMISSION; UNITED STATES OF AMERICA,

Respondents.

APPLE INC., BROADCOM INC.; CISCO SYSTEMS INC.; GOOGLE LLC;
HEWLETT PACKARD ENTERPRISE CO.; INTEL CORP.; MICROSOFT CORPORATION;
NCTA - THE INTERNET & TELEVISION ASSOCIATION; WI-FI ALLIANCE,*Intervenors for Respondent.*

On Petitions for Review from the Federal Communications Commission

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to D.C. Circuit Rule 28(a)(1), Petitioners submit this certificate as to parties, rulings, and related cases.

A. Parties and Amici. Because these consolidated cases involve direct review of a final agency action, the requirement to furnish a list of parties, intervenors, and *amici* that appeared below is inapplicable. These consolidated cases involve the following parties:

- (i) **Petitioners:** AT&T Services, Inc. (No. 20-1190); Edison Electric Institute (No. 20-1216); Association of Public-Safety Communications Officials International, Inc. (No. 20-1272); National Association of Broadcasters (No. 20-1274); Utilities Technology Council, National Rural Electric Cooperative Association, and American Public Power Association (No. 20-1281); CenturyLink, Inc. (No. 20-1284).
- (ii) **Respondents:** Federal Communications Commission and the United States of America.
- (iii) **Intervenors and Amici:** Apple Inc., Broadcom Inc., Cisco Systems, Inc., Google LLC, Hewlett Packard Enterprise Co., Intel Corporation, Microsoft Corporation, Wi-Fi Alliance, and NCTA –

The Internet & Television Association are intervenors for respondent.

B. Ruling Under Review. The final agency action under review is the FCC's Report and Order and Further Notice of Proposed Rulemaking, *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, FCC No. 20-51, ET Docket No. 18-295, GN Docket No. 17-183, published in the Federal Register on May 26, 2020 (JA__-__). See 85 Fed. Reg. 31390.

C. Related Cases. This case has not previously been before this Court or any other court. Petitioners are not aware of other cases arising from the same FCC order challenged here other than these consolidated cases.

CORPORATE DISCLOSURE STATEMENTS

Pursuant to Federal Rule of Appellate Procedure 26.1 and D.C. Circuit Rule 26.1, each petitioner respectfully submits the following corporate disclosure statements.

AT&T: AT&T Services, Inc. states that it performs a variety of centralized administrative support services, including legal advocacy, in support of AT&T Inc. and its subsidiaries and affiliates. AT&T Services, Inc. is wholly owned by AT&T Inc. AT&T Inc. is a publicly traded corporation that has no parent company, and no publicly held company owns 10 percent or more of its stock.

Edison Electric Institute *et al.* (electric utility petitioners): Edison Electric Institute (“Edison”) states that it is a national association of investor-owned electric utility companies. It has no parent company, subsidiaries or affiliates. Edison has no outstanding shares or debt securities in the hands of the public, and no publicly-owned company has a 10% or greater ownership interest in Edison.

The Utilities Technology Council (“UTC”) states that it is a national association whose members include investor-owned, cooperatively-organized and governmentally owned electric utility companies and other critical infrastructure industries. UTC advocates before Congress, the Federal Communications Commission (FCC) and other various federal agencies as well as state public utility

commissions and legislatures on matters affecting the telecommunications and information technology interests of its members. UTC states that it has no parent company, subsidiaries or affiliates. UTC has no outstanding shares or debt securities in the hands of the public, and no publicly-owned company has a 10% or greater ownership interest in UTC.

The National Rural Electric Cooperative Association (“NRECA”) states that it is the nonprofit national trade association for electric cooperatives. On behalf of its members, NRECA participates in administrative and judicial proceedings involving or affecting its members’ interests. NRECA has no parent company. No publicly held company has a ten percent (10%) or greater ownership interest in NRECA. NRECA is an incorporated entity.

The American Public Power Association (“APPA”) states that it is a trade association for the not-for-profit, community-owned utilities that power 2,000 towns and cities nationwide. APPA represents public power before the federal government to protect the interests of the more than 49 million people that public power utilities serve, and the 93,000 people they employ. Approximately 70 percent of APPA’s members serve communities with less than 10,000 residents. In accordance with Circuit Rule 26.1, APPA states that it has no parent company, subsidiaries or affiliates. APPA has no outstanding shares or debt securities in the

hands of the public, and no publicly owned company has a 10% or greater ownership interest in APPA.

APCO: The Association of Public-Safety Communications Officials International, Inc. (“APCO International”) states that it is a non-profit association whose members manage and operate public safety communications systems—including 9-1-1 emergency communications centers, emergency operations centers, radio networks, and information technology—for law enforcement, fire, emergency medical, and other public safety agencies. It has no parent company. APCO International has no outstanding shares or debt securities in the hands of the public, and no publicly-owned company has a 10% or greater ownership interest in APCO International.

NAB: The National Association of Broadcasters (“NAB”) states as follows. NAB is a nonprofit, incorporated association of radio and television stations. It has no parent company, and has not issued any shares or debt securities to the public; thus no publicly held company owns ten percent or more of its stock. As a continuing association of numerous organizations operated for the purpose of promoting the interests of its membership, the coalition is a trade association for purposes of D.C. Circuit Rule 26.1.

CenturyLink: CenturyLink states that it is a publicly traded corporation that, through its wholly owned affiliates, provides voice, broadband, video and

communications services to consumers and businesses. Either itself or via affiliates, CenturyLink provides some form of service in all fifty states, the District of Columbia, Puerto Rico, and the Virgin Islands. CenturyLink does not have a parent company, and there is no one person or group that owns 10 percent or more of CenturyLink's stock.

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GLOSSARY

APCO	Association of Public-Safety Communications Officials
dB	Decibels
dBm	Decibel milliwatts
<i>Draft Order</i>	[Draft] Report and Order and Further Notice of Proposed Rulemaking, <i>Unlicensed Use of the 6 GHz Band</i> , FCC-CIRC2004-01, ET Docket No. 18-295 (rel. Apr. 2, 2020)
FCC	Federal Communications Commission
FCC Stay Opp.	FCC Opp. to Stay Mot. of APCO and Edison (D.C. Cir. Sept. 14, 2020), Doc. No. 1861340
GHz	Gigahertz (billion cycles per second)
MHz	Megahertz (million cycles per second)
NAB	National Association of Broadcasters
<i>Notice</i>	Notice of Proposed Rulemaking, <i>Unlicensed Use of the 6 GHz Band</i> , FCC 18-147, ET Docket No. 18-295 (rel. Oct. 24, 2018)
<i>Order</i>	Report and Order and Further Notice of Proposed Rulemaking, <i>Unlicensed Use of the 6 GHz Band</i> , FCC 20-51, ET Docket No. 18-295 (rel. Apr. 24, 2020)
<i>Stay Denial Order</i>	Order Denying Petitions for Stay, <i>Unlicensed Use of the 6 GHz Band</i> , DA 20-879, 2020 WL 4734883 (Off. of Eng. & Tech. Aug. 13, 2020)

JURISDICTION

The *Order* under review, Report and Order, *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295, FCC 20-51 (Joint Appendix (“JA”) __-__) (“*Order*”), was released on April 24, 2020 and published in the Federal Register on May 26, 2020. The FCC’s regulatory jurisdiction rests on the Communications Act of 1934, 47 U.S.C. §151 *et seq.* This Court’s jurisdiction rests on 28 U.S.C. §§2342(1) and 2344.

STATUTES AND REGULATIONS

Relevant statutes and regulations are reprinted in the Addendum to this brief.

STATEMENT OF THE ISSUE

Whether, in dismissing the interference risks posed by unlicensed 6 GHz devices, the FCC ignored record evidence, disregarded material issues, committed basic logic errors, or otherwise acted arbitrarily and capriciously, in violation of the Administrative Procedure Act, 5 U.S.C. §706(2)(A) (“APA”), and the Communications Act of 1934, 47 U.S.C. §151 *et seq.*

PRELIMINARY STATEMENT

The *Order* authorizes a new generation of unlicensed Wi-Fi routers and other mass market devices that will transmit signals using the 6 GHz band of radiofrequency spectrum. Petitioners or their members hold licenses to transmit in

the same band to support public safety and provide other critical services.

Petitioners do not oppose the deployment of new unlicensed devices in the 6 GHz band under appropriate conditions. But they urged the FCC to adopt certain necessary safeguards against potentially life-threatening radiofrequency interference with their operations.

The FCC refused. It did not conclude that the requested safeguards would be infeasible or costly. Nor did it dispute that governing law prohibits opening the floodgates to hundreds of millions of unlicensed 6 GHz devices if there is a significant risk that at least *some* of them will interfere with *some* of petitioners' licensed operations. Instead, the FCC simply asserted that there is no significant risk of such interference even without the requested safeguards. *Order* ¶¶146-147 (JA__-__). That conclusion is unsupported and insupportable, and the FCC reached it only by unlawfully ignoring evidence and committing blatant statistical errors. The *Order* should be vacated and the case remanded for the FCC to adopt the requested safeguards.

STATEMENT OF THE CASE

1. Section 1 of the Communications Act directs the FCC to “promot[e] safety of life and property through the use of wire and radio communications.” 47 U.S.C. §151. In addition, section 301 prohibits any person from “us[ing] or operat[ing] any apparatus for the transmission of energy or communications or

signal by radio ... except under and in accordance with this [Act] and with a license in that behalf granted under the provisions of this [Act].” 47 U.S.C. §301. The FCC implements these provisions by issuing exclusive licenses to transmit at particular frequencies, at particular power levels, and in particular locations.

Petitioners hold licenses in the 6 GHz band to operate “point-to-point microwave links that support a variety of critical services.” *Order* ¶7 (JA__).¹ These include emergency 911 dispatch and other public safety operations, monitoring and emergency management of electric grids, television studio transmitter and relay links, “coordination of railroad train movements, control of natural gas and oil pipelines, ... and long-distance telephone service.” *Id.* ¶¶7-8 (JA__). All petitioners here operate (or represent operators of) such fixed-microwave links. Petitioner NAB also represents broadcasters that use 6 GHz spectrum on a *mobile* basis “to transmit programming from special events or remote locations” and to support “portable cameras, wireless microphones, cues, and backstage communications.” *Id.* ¶8 (JA__); *see* Argument §IV.C, *infra*.

In a typical fixed-microwave system, a transmitter on one tower beams 6 GHz signals to a receiver on another tower within its line of sight, and a transmitter on the second tower beams signals back to the first tower. Such

¹ The “6 GHz band” consists of frequencies between 5.925 GHz (“gigahertz,” meaning billion oscillations per second) and 7.125 GHz. *See Order* ¶11, tbl. 1 (JA__). It is a subset of “microwave” spectrum.

individual links are often arranged into broader networks. Nearly 100,000 fixed microwave links are distributed across the 50 states:



AT&T Comments 8-9 (JA__-__). Given the critical roles they play in the nation's telecommunications infrastructure, "most 6 GHz microwave links are engineered to have extremely high levels of availability, *i.e.*, uptimes that are 99.999%, which translate to outages on the order of less than 30 seconds per month." *Id.* at 7-8 (JA__-__); *see also* Argument §IV.A, *infra* (noting even stricter requirements for certain public-safety links).

2. The FCC’s rules permit unlicensed operation of certain radio transmission devices—such as garage-door openers and Wi-Fi routers—so long as they do not cause “harmful interference” to licensed operations. *See* 47 C.F.R. §15.5(c). The FCC defines “harmful interference” as any device operation “that [1] endangers the functioning of a radio navigation service or of other safety services or [2] seriously degrades, obstructs or repeatedly interrupts a radiocommunications service.” *Id.* §15.3(m).

The rules thus preclude unlicensed uses that “endanger”—*i.e.*, risk interrupting—public safety services. It is undisputed that most of the fixed microwave links at issue here support 911 calls, first-responder communications, and other critical safety services. *See* Argument §I.A, *infra*. It is also undisputed that even a short burst of radiofrequency energy from unlicensed devices can interrupt such links for a quarter hour or more, as microwave networks must resynchronize before resuming communications. *See, e.g.*, AT&T Comments 10 (JA__); APCO Comments 4 (JA__); *see also* Argument §IV.C, *infra* (noting interference concerns for mobile newsgathering operations).

3. This case involves the unlicensed use of spectrum for Wi-Fi and similar technologies. In a typical Wi-Fi arrangement, a router, also known as an “access point,” serves as a two-way intermediary between the internet and “client

devices,” such as laptops, tablets, and smartphones. Each device transmits in all directions at once.

The FCC launched this proceeding because unlicensed device manufacturers and cable companies sought additional spectrum for Wi-Fi and similar technologies previously limited to other bands. In October 2018, the FCC issued a Notice of Proposed Rulemaking that proposed extending such unlicensed operations to the 6 GHz band. *See* JA__-__.

The Commission’s initial proposal was more measured than the approach ultimately adopted in the *Order*. The *Notice* first divided the 6 GHz band into two sets of sub-bands: those that are used by the great majority of fixed-microwave 6 GHz links (5.925-6.425 and 6.525-6.875 GHz) and those that are not (6.425-6.525 and 6.875-7.125 GHz). *See Notice* ¶2 (JA__); *see also Order* ¶¶7-13 (JA__-__). The *Notice* proposed to avoid harmful interference with fixed-microwave operations by requiring all unlicensed devices using the first set of sub-bands to incorporate an interference-avoidance functionality known as Automated Frequency Coordination, which the FCC described as “simple” and “easy to implement.” *Notice* ¶25 (JA__). So equipped, the devices would automatically consult an online database to identify the frequencies used by fixed-microwave operations nearby and avoid transmitting signals on the same frequencies.

The *Notice* proposed a different approach for the other set of sub-bands—those *not* used by most fixed microwave links. These sub-bands are used for, among other things, mobile microwave operations, such as remote television reporting. *Id.* ¶20 (JA__). The FCC did not propose any Automated Frequency Coordination requirement for these sub-bands because “the locations of incumbent receivers” in mobile microwave operations “are not necessarily known or cannot be easily determined from existing databases,” making such a requirement “impractical” as a means of protecting them. *Id.* The *Notice* thus proposed a “two-class approach” (*id.*) to interference protection. That approach would have (1) relied on Automated Frequency Coordination to protect most *fixed*-microwave links (those using the first set of sub-bands) and (2) protected *mobile* microwave links (those using the second set) with what the FCC viewed as the next-best interference safeguard: restriction to low-power indoor use. *Id.*

Petitioner APCO and other commenters expressed significant concerns even about this initial proposal. In addition to seeking stronger protections under the Automated Frequency Coordination framework, they argued that the FCC should not rely solely on spectrum-sharing techniques in the 6 GHz band, where public safety operates, unless those techniques undergo substantial testing and are proven in advance. *E.g.*, APCO Comments 18-20 (JA__-__). These commenters also argued that, to protect public safety links, the FCC must create mechanisms for

promptly detecting, identifying, and eliminating sources of interference to licensed users. *Id.* at 2, 6 (JA___, ___).

In contrast, device manufacturers and cable companies advocated eliminating even the core interference protections proposed in the *Notice*. They urged the FCC to eliminate any Automated Frequency Coordination requirement for unlicensed consumer devices operating in *all* sub-bands, including those used by most fixed-microwave 6 GHz links. In particular, they asked the FCC to authorize not only (1) a class of “standard” (*i.e.*, high) power devices that must operate with Automated Frequency Coordination, but also (2) a class of ostensibly “indoor” and comparatively “low-power” devices that would operate *without* Automated Frequency Coordination throughout the *entire* 6 GHz band.

Petitioners opposed these proposals because, under a variety of conditions, the proposed power limits would not keep these devices, even if used indoors, from interfering with nearby fixed-microwave receivers using the same frequencies at the same time. *See* Argument §I, *infra*. Petitioners further noted that proposed measures intended to keep such devices from operating outdoors would often be ineffective, thus compounding the interference risks. *See* Argument §II, *infra*. And they noted that device proponents had identified no after-the-fact mechanisms to remedy disruptions to public-safety communications and other critical licensed

operations, whether caused by “standard-” or “low-” power devices. *See* Argument §V, *infra*.

4. Under current practice, the FCC issues an order in draft form first, prompts an extra round of public input, and considers additional changes before finalizing the order.² This additional opportunity for public scrutiny is critical when a draft order differs materially from the originally proposed rules. That was the case here: the FCC’s *Draft Order*, issued on April 2, 2020, abandoned the “two-class approach” described in the *Notice* and proposed instead to adopt the less-interference-protective regime proposed by the device manufacturers. *See Draft Order* ¶¶3-19 (JA__-__). Petitioners promptly filed objections to the *Draft Order*, explaining that it arbitrarily dismissed or ignored arguments they had previously made and that critical passages rested on basic legal, logical, or statistical errors.³

Rather than taking time to fix these problems, the FCC issued the final *Order* in a matter of weeks, replicating the *Draft Order* mostly verbatim. Departing from the *Notice*, the *Order* authorizes consumers to operate not only

² *See Draft Order* n.* (JA__) (noting that “the Commission’s ultimate resolutions of [these] issues remain under consideration and subject to change” and inviting parties to comment on the *Draft Order* under the FCC’s “‘permit-but-disclose’ *ex parte* rules”).

³ *See, e.g.*, AT&T 4/16/2020 Letter (JA__-__); APCO 4/10/2020 Letter (JA__-__); Edison 4/15/2020 Letter (JA__-__); NAB 4/15/20 Letter (JA__-__).

Automated Frequency Coordination-controlled “standard-power” devices, but also hundreds of millions of unlicensed devices *not* controlled by Automated Frequency Coordination “across the *entire* 6 GHz band,” including the sub-bands used by most fixed-microwave links. *Order* ¶3 (JA__) (emphasis added).⁴

The FCC adopted three restrictions on these devices that it claimed would, in combination, shield licensed operations from any significant risk of harmful interference even in the absence of Automated Frequency Coordination. *Order* ¶¶99-104 (JA__-__). First, it imposed a lower power limit for them than for standard-power devices, although it did not explain why it chose the limit that it did—5 dBm/MHz—rather than, say, 1 or 3 dBm/MHz. *Id.* ¶103 (JA__); *see* Argument §1.D, *infra*.⁵ Second, it specified several device restrictions to deter, but

⁴ “Hundreds of millions” is a conservative estimate. The FCC projects that unlicensed 6 GHz devices “will become a part of most peoples’ everyday lives,” *Order* ¶3 (JA__), and their proponents have estimated that unlicensed 6 GHz access points may number nearly a *billion*, a figure that does not even include countless connected client devices. *See* Apple *et al.* 1/26/2018 Letter, Attachment at 12 (projecting 958,062,017 access points) (JA__).

⁵ Decibels (“dB”) are units for measuring transmission power ratios on a logarithmic scale; specifically, the ratio of one power (P_1) to another (P_2) is given by $1 \text{ dB} = 10 \times \log_{10}(P_1/P_2)$. *See generally* https://www.rohde-schwarz.com/us/applications/db-or-not-db-educational-note_230850-15534.html. Because the scale is logarithmic, even a modest dB increase can signify an immense change in power. For example, 20 dB represents a 100-fold power increase ($10 \times \log_{10}(100/1) = 10 \times 2 = 20$), 10 dB represents a tenfold increase, and 3 dB represents approximately a doubling of power. A negative dB signifies a *decrease* in power; the greater the negative number, the tinier a new power level will be in comparison to the prior one. Whereas dBs are relative units of measurement, a “dBm” is an absolute measure—the ratio of a transmitter’s power

not fully prevent, consumers from using 6 GHz routers and other “access points” outside—and no such restrictions at all on the connected laptops, phones, and other “client devices” consumers routinely use outdoors. *Id.* ¶107 (JA__); *see* Argument §II, *infra*. Third, it required unlicensed 6 GHz devices to employ a “contention-based protocol,” *Order* ¶101 (JA__), although that mechanism can keep them from interfering only with each other rather than with fixed microwave links. *See* Argument §III, *infra*.

Despite the absence of any actual device testing, the FCC expressed confidence that these restrictions would “prevent harmful interference.” *Order* ¶99 (JA__). For support, the FCC relied almost entirely on an interference simulation by CableLabs, which lobbied on behalf of the cable industry for fewer interference safeguards. Although the FCC described the so-called “CableLabs study” as “the best evidence in the record,” *id.* ¶120 (JA__), it had no basis for making that judgment because CableLabs had not disclosed critical data and assumptions. *See* Argument §I.C.1, *infra*. And what little has been disclosed about CableLabs’ assumptions revealed obvious errors that the FCC itself acknowledged but could not fix. *See* Argument §I.C.2, *infra*. In contrast, the *Order* dismissed petitioners’ own studies, including those that, unlike the CableLabs study, rested on fully

to one milliwatt, also measured on a logarithmic scale. A “dBm/MHz,” a measurement of “power spectral density,” is the overall power of a transmission divided by the width of the frequency range it occupies, measured in megahertz.

disclosed inputs concerning real-world interference scenarios. *See, e.g.*, Argument §I.B, *infra*.⁶

5. All petitioners here challenge the FCC's rules governing these ostensibly "low-power" devices. *See* Argument §§I-III, IV.B, IV.C, V, *infra*. Petitioner APCO further challenges the rules governing *standard*-power devices and the FCC's failure to require mechanisms, even in the presence of Automated Frequency Coordination, to detect, identify, and eliminate interference to public safety communications from both classes of new unlicensed devices. *See* Argument §IV.A, *infra*.

SUMMARY OF ARGUMENT

I. The *Order* opens the floodgates to mass market devices that will transmit on the same frequencies used by nearby microwave links for critical and life-saving communications. This mass authorization of unlicensed devices violates the Communications Act and the FCC's implementing regulations if it will result in harmful interference to *some* links, whether or not *most* links will remain free from interference. The *Order* does not dispute that legal proposition. Instead, it rests entirely on the unsupported premise that none of these hundreds of millions

⁶ Petitioners APCO and Edison *et al.* moved to stay the *Order*; FCC staff denied an administrative stay on August 13, 2020, *see* JA__-__, and this Court denied a judicial stay without opinion on October 1, 2020.

of devices will pose any “significant risk” of harmful interference to any microwave link. That premise is implausible for reasons that petitioners explained but the Commission largely ignored.

The *Order* engages in two big-picture sleights of hand to obscure these interference risks. *First*, in key passages, it ignores tail risks by assuming away real-world scenarios that are less common than the norm but nonetheless highly relevant. Consider the FCC’s treatment of “building loss,” a modeling input that measures the extent to which building walls surrounding an “indoor” 6 GHz device will absorb its signals and weaken them before they can interfere with microwave links outside. In analyzing petitioners’ interference scenarios, the FCC assumed that such devices will always be situated away from windows and surrounded by substantial walls. But *some* devices will operate near windows or behind thin walls that will do little or nothing to protect nearby microwave links. Indeed, there will be millions of such devices even if they constitute only 1% of the total, yet the FCC selectively ignored them.

Second, the *Order* assumes away *accumulating* interference risks over time—*i.e.*, the risk that *some* devices will cause harmful interference at *some* point during the coming years even if the risk is small that any given device will cause harmful interference at any particular moment. The clearest illustration of this problem lies in the FCC’s singular reliance on the “CableLabs Study.” As a

threshold matter, that “study” is a black box, and the FCC could not lawfully rely on it for that reason alone. In all events, the FCC’s inferences from the study’s conclusions founder on a basic statistical fallacy. In a Monte Carlo simulation, CableLabs purported to model 1500 different permutations of many different interference-related variables to determine whether, at any of 1500 modeled points in time, conditions would line up to cause harmful interference in specified circumstances. But there is no reason to assume, and every reason to doubt, that these 1500 snapshots in time are sufficient to permit statistically significant conclusions about the likelihood that *some* episodes of harmful interference will arise across the nation over a multi-year time span.

Only in passing did the FCC acknowledge that “the presence of” tens of thousands of potentially victimized microwave links “across the U.S. would suggest that some number” of “worst case[]” interference scenarios “would occur” if hundreds of millions of 6 GHz devices were allowed to transmit at the power level assumed by the CableLabs’ study. *Order* ¶132 (JA__). But the FCC did not assess how many “worst cases” would arise over any relevant period or otherwise examine the extent of the problem. Nor did it consider the Automated Frequency Coordination remedy proposed in the *Notice*. *Notice* ¶25 (JA__). Instead, it plucked from thin air a somewhat lower power limit than the one CableLabs assumed. But the FCC identified no reason to conclude that this arbitrary figure

will protect the nation's microwave infrastructure and eliminate the "worst case" scenarios that the FCC itself suggested "would occur" at the somewhat higher power level.

II. The *Order* would violate the APA for the reasons stated even if the FCC's device restrictions could ensure that all nominally "low-power" 6 GHz devices will always be operated indoors. But those indoor-only restrictions will in fact be ineffective, again for reasons that petitioners explained but the Commission ignored. As to access points (*e.g.*, Wi-Fi routers), the FCC made outdoor usage only somewhat inconvenient, not impossible. Consumers can and will take these devices outside, where the absence of signal-attenuating walls will present a severe threat to microwave receivers. And whether a given access point operates indoors or outdoors, the FCC did nothing to keep associated client devices (*e.g.*, laptops and phones) from transmitting outside.

III. The *Order* also required "low-power" 6 GHz devices to employ a "contention-based protocol" rather than Automated Frequency Coordination. That requirement is useless for protecting licensed microwave links. A contention-based protocol can enable Wi-Fi and similar devices to avoid interfering *with each other* by "listening for" one another's omnidirectional transmissions before using the same frequencies. But such devices cannot even "hear" the narrow point-to-

point beams transmitted between outdoor microwave towers, as petitioners explained in vain.

IV. Section IV below contains arguments raised by specific petitioners. Petitioner APCO argues that (1) the FCC failed to consider the threat to public safety, as required by law and circuit precedent, and (2) the Automated Frequency Coordination requirement imposed for standard-power devices will be insufficient to prevent harmful interference. Petitioners Edison *et al.* argue that the FCC arbitrarily ignored the technical interference studies submitted by electric power entities. And petitioner NAB argues that the FCC arbitrarily rejected interference concerns specific to *mobile* licensed operations and, without reasoned explanation, rejected NAB's proposal to preserve a sliver of spectrum for exclusive use by mobile operations.

V. In part because the FCC wrongly concluded that its rules would eliminate any "significant risk" of harmful interference, it made no serious effort to create effective mechanisms for identifying and remedying such interference when it does arise. Indeed, it likely *could not* have adopted such mechanisms for "low-power" devices without Automated Frequency Coordination because, among other things, it will be nearly impossible to determine promptly which of thousands of nearby devices is responsible for the interference. Although petitioners made these points below, the FCC arbitrarily ignored them. Petitioner APCO further argues

that, as to both “low-power” and standard-power devices, the FCC violated its substantive legal obligation to ensure effective mechanisms for promptly detecting, identifying, and eliminating interference to public safety operations.

STANDING

Petitioners participated in the FCC proceedings and either hold licenses to operate 6 GHz microwave links subject to interference or represent entities that do.

ARGUMENT

All petitioners challenge the FCC rules applicable to nominally “low-power” unlicensed devices, which will not use Automated Frequency Coordination. The FCC adopted three “restrictions” on these devices that it says will, in combination, protect nearby microwave links against any significant risk of harmful interference: the devices must be (1) “subject to low-power operation”; (2) “limited to indoor operation”; and (3) “required to use a contention-based protocol.” *Order* ¶¶99 (JA__). The FCC did not claim that any one (or two) of these requirements standing alone would be sufficient to eliminate a significant risk of harmful interference. The validity of the FCC’s rules for “low-power” devices thus depends on the independent efficacy of each requirement; if any fails, the *Order* is invalid. *See, e.g., Casino Airlines, Inc. v. NTSB*, 439 F.3d 715, 717-18 (D.C. Cir. 2006).

As discussed in Sections I-III below, all three of these requirements will be *ineffective* for their intended purposes, for reasons that the FCC heard from petitioners but ignored. Section IV addresses issues specific to particular petitioners, including APCO's challenge to the rules adopted for standard-power devices. Finally, Section V addresses the inefficacy of the FCC's after-the-fact "remedies" for harmful interference.

I. THE FCC PROVIDED NO REASONED BASIS FOR CONCLUDING THAT NOMINALLY "LOW-POWER" DEVICES WILL AVOID HARMFUL INTERFERENCE EVEN IF KEPT INDOORS.

Even if we assume *arguendo* that the FCC's rules will successfully keep all consumers from taking their "indoor" devices outdoors—an invalid assumption we revisit in Section II below—the FCC acted unreasonably in concluding that these devices pose no significant risk of harmful interference.

A. The *Order* Rests On The Erroneous Premise That *No* Unlicensed Device Will Present A Significant Risk Of Harmful Interference To *Any* Licensed Microwave Link.

This case is properly framed by focusing on common ground—threshold arguments that petitioners made to the FCC and that the *Order* does not dispute.

First, petitioners explained that the Communications Act and its implementing regulations categorically prohibit the FCC from allowing any unlicensed use of spectrum that will "endanger[] the functioning of ... safety services," which rely on microwave links, or that otherwise cause harmful

interference to licensed operations. 47 C.F.R. §15.3(m); *see* 47 U.S.C. §§151, 301; *see also* §IV.A, *infra* (discussing *Mozilla Corp. v. FCC*, 940 F.3d 1 (D.C. Cir. 2019) (per curiam)). Petitioners thus argued that the FCC may not lawfully unleash hundreds of millions of these devices throughout America if, given their sheer numbers, *some* of them will predictably cause harmful interference even if most will not. *See, e.g.*, AT&T 3/26/2020 Letter 1-5 (JA__-__).

Second, petitioners argued that, in light of that legal prohibition, the FCC may not “balance” the harms of unpredictable disruptions to microwave links against the asserted benefits of unlicensed operations. *E.g. id.* at 4-5 (JA__-__).

Third, incumbent licensees added that even if such policy balancing *were* permissible, the balance would tip decisively against permitting unlicensed devices to operate if they create any significant risk of harmful interference. In particular, incumbent licensees argued that (1) interference causing *any* fixed microwave link to go down could endanger lives and the integrity of critical utility infrastructure, whereas (2) the Commission could significantly reduce interference risks and still achieve the potential consumer benefits of opening this spectrum to unlicensed uses by requiring manufacturers to equip all “low-power” 6 GHz devices with an

effective form of Automated Frequency Coordination protection. *See, e.g.*, CTIA 4/16/2020 Letter 3-5 (JA__-__); Edison 1/24/2020 Letter 2 (JA__).⁷

The *Order* does not dispute any of those propositions. It does not claim that the FCC could lawfully allow hundreds of millions of unlicensed devices to proliferate if some of them can be expected to cause harmful interference to some licensed microwave operations. The *Order* likewise does not argue that such interference would be lawful if it knocked out only a small number of microwave links rather than many of them. Nor does it dispute that interference with any given link could endanger public safety and critical infrastructure.

Because the governing law forbids it, the *Order* also conducts no cost-benefit analysis to justify sacrificing *some* licensed microwave links as a reasonable price to pay for allowing unlicensed devices to proliferate without, at a minimum, Automated Frequency Coordination, which the FCC has described as “simple” and “easy to implement.” *Notice* ¶25 (JA__). Although the FCC cannot lawfully rely on countervailing public policy to tolerate harmful interference to licensed operations, it is telling that the *Order* does not even calculate the marginal

⁷ Although all petitioners agree that adding an effective Automated Frequency Coordination mechanism to the rules for “low-power” devices is a *necessary* basis for protecting fixed 6 GHz microwave links, they have divergent views on whether such a mechanism would be *sufficient* for that purpose. *See* §V, *infra* (stating APCO’s view that, regardless of Automated Frequency Coordination, the FCC failed to adopt necessary measures to detect, identify, and remedy interference that occurs).

cost of equipping “low-power” devices with an Automated Frequency Coordination functionality that would, at a minimum, substantially reduce the likelihood of interference and thus protect lives and critical infrastructure.⁸

Rather than confronting these legal and policy issues, the *Order* predicates its mass device authorization on a single factual premise: that “the risk of harmful interference to incumbent operations [is] insignificant.” *Order* ¶110 (JA__).

Variations on this “no significant risk” language appear throughout the *Order*.⁹ All these passages are subject to only one interpretation—that, in the FCC’s view, its rules eliminate any “significant risk” that *any* of the hundreds of millions of unlicensed 6 GHz devices will cause harmful interference to *any* of the nation’s nearly 100,000 licensed microwave links, at *any* point in the foreseeable future. *See id.* ¶132 (JA__) (acknowledging need to protect “every fixed [microwave]

⁸ In contrast, the FCC did conduct a cost-benefit analysis when assessing the *Order*’s impact on other *unlicensed* uses of 6 GHz spectrum (*e.g.*, “ultra-wideband”). *Order* ¶230 (JA__).

⁹ *See, e.g.*, *Order* ¶112 (JA__) (“interference is not likely to occur”); ¶122 n.317 (JA__) (“the likelihood of harmful interference occurring remains insignificant”); ¶130 (JA__) (“insignificant risk of harmful interference”); ¶132 (JA__) (same); ¶141 (JA__) (“fixed microwave links will have an insignificant chance of experiencing harmful interference”); ¶143 (JA__) (“the likelihood of harmful interference ... is insignificant”); ¶145 (JA__) (“harmful interference is unlikely to occur”); ¶146 (JA__) (FCC rules “eliminate[] any significant risk of ... harmful interference”); *id.* (“the restrictions and requirements that we are establishing for indoor use of low power access points eliminates [sic] any significant risk of causing harmful interference”).

station and each of their associated link paths” “across the U.S.” from harmful interference). The FCC has doubled down on that proposition in this Court, defending “the Commission’s conclusion that *all* fixed microwave links are protected from harmful interference.” FCC Stay Opp. 23 (emphasis in original); *see also id.* at 22 (FCC rules will “protect against harmful interference to all licensed users of the band, which include public safety users”); *id.* at 26 (not “even one [unlicensed] device” will interfere with any fixed microwave link).¹⁰

This factual premise—that *none* of the hundreds of millions of newly deployed 6 GHz devices will present a “significant risk” of harmful interference to *any* licensed microwave link—is highly aggressive and, as shown below, untenable. The FCC adopted that premise anyway because it was the sole basis on which the Commission could attempt to justify authorizing these devices.

Yet the very aggressiveness of this premise, with its enormous stakes for public safety and critical infrastructure, also underscores the FCC’s obligation to substantiate it and square it with the record evidence. “When the government

¹⁰ The *Order* notes that the FCC “is not required to refrain from authorizing ... unlicensed operations whenever there is any possibility of harmful interference.” *Order* ¶146 (JA__). That point, if true, is irrelevant. Petitioners are not arguing that the *Order* would be unlawful if it posed only an insignificant aggregate risk that there will ever be harmful interference anywhere. Instead, petitioners argue that there is (at a bare minimum) a “significant risk” that *some* of these hundreds of millions of devices will cause harmful interference at yet-unknown places and times.

regulates in a way that [imperils its citizens'] safety, it owes them reasonable candor. If it provides that, the affected citizens at least know that the government has faced up to the meaning of its choice. The requirement of reasoned decisionmaking ensures this result and prevents officials from cowering behind bureaucratic mumbo-jumbo.” *Competitive Enter. Inst. v. NHTSA*, 956 F.2d 321, 327 (D.C. Cir. 1992).

Here, the FCC did not “face up to the meaning of its choice.” It conducted no field tests of these devices to substantiate its premise that any risk of harmful interference is “insignificant.” Instead, it relied for that assurance on a single advocate’s black-box “simulation” that ultimately proves nothing, and it played statistical shell games with petitioners’ own interference studies (*see* §I.B & C, *infra*). In short, the FCC appeared happy to take immediate political credit for creating new “free” spectrum while deferring until later any accountability for microwave link failures that will be difficult to trace to particular devices and thus to this *Order* (*see* §V, *infra*).

The *Order*’s analysis begins with the unremarkable proposition that, under typical conditions and at any instant in time, any given 6 GHz device chosen at random is unlikely to be operating in a way that could cause harmful interference to any nearby microwave receiver. That may be true. There will be billions of potential interactions between these hundreds of millions of 6 GHz consumer

devices and the nation's nearly 100,000 fixed microwave links. Perhaps it will be unusual for all the factors conducive to interference to line up and harm licensed operations. But *some* of the time, those risk factors *will* all line up, resulting in the “worst-case scenarios” that the *Order* tries to sweep under the rug (*Order* ¶104 (JA__)).

The *Order* performs two sleights of hand to avoid facing up to that reality, discussed in Sections I.B and I.C, respectively. First, the *Order* selectively assumes that critical variables driving the interference analysis will *always* cluster around the mean even when it is undisputed that they exhibit substantial deviations from the mean.¹¹ Second, the *Order* assumes that hundreds of millions of 6 GHz devices will pose no significant interference risk over long stretches of time if any given device is unlikely to cause interference *at any given moment*. These two fallacies—which we call “assuming away departures from the mean” and “assuming away accumulated risks”—pervade the FCC’s treatment of the major interference studies in this record.

¹¹ The variables discussed in this brief include (1) the likelihood that a given device will be transmitting rather than dormant at a particular moment (its *activity factor*, sometimes called *utilization factor* or *duty cycle*); (2) whether its transmissions will overlap in frequency with the frequencies used by the receiver (*co-channel operation*); (3) differences in the thickness of, and materials used in, the walls of the building that surrounds the device (relevant to *building loss*); and (4) whether hills, structures, or other intervening outside objects will weaken the signal before it can reach the receiver (relevant to *clutter loss*).

B. The FCC Irrationally Assumed Away Departures From The Mean.

The *Order*'s disregard of departures from the mean is most obvious in its treatment of two critical interference-related variables: “building loss” and “clutter loss.”

1. The FCC Ignored Scenarios With Little or No Building Loss.

The “building loss” variable addresses how much strength an indoor device’s signal will lose as it passes through building walls or windows; the more strength it loses, the lower the risk of harmful interference to outdoor microwave receivers. *See Order* ¶118 (JA__). The *Order* placed enormous significance on this variable. It defined an entire class of “indoor” devices, and freed them from any Automated Frequency Coordination requirement, because it assumed that they will always operate within buildings, away from windows, and behind walls sufficient to weaken the devices’ signals before they can reach microwave receivers outside. In fact, the FCC assumed that, on average, building walls would reduce the strength of those signals to *one one-hundredth* of the levels a microwave receiver would perceive if the walls were suddenly removed—*i.e.*, if the same device continued transmitting in the same place but outside rather than inside. *See* note 15, *infra* (discussing FCC’s assumption).

Whatever the correct figure might be for *average* building loss, the critical point is that there are substantial deviations from that mean among the hundreds of

millions of structures dispersed throughout the United States and, within those buildings, the nearly infinite variations in Wi-Fi router placement. Building loss decreases—and thus interference risks increase—the closer a device is to windows and the less dense the surrounding walls are. For example, building loss is greater in a modern, thermally insulated brick house than in an older frame house. And there will be many situations with such minimal building loss that unlicensed devices will pose severe risks to microwave links.

By industry consensus, measurements of building loss across a large sample of buildings form the following distribution curves:¹²



¹² This chart, *see* AT&T 11/12/2019 Letter 6 (JA___), is based on widely accepted International Telecommunications Union data (ITU-R P.2019) and shows two curves corresponding to “traditional” and “thermally-efficient” buildings. Both curves show cases where the *maximum* expected building loss approaches zero. *Id.*

The values on the bottom left consist of cases where there is little or no building loss—meaning that the device might as well be transmitting outside. This phenomenon will be familiar to anyone who has placed a Wi-Fi router (or extender) near a window to ensure strong signals on a terrace, porch, or lawn—as the record shows that many consumers do. *See, e.g.*, AT&T 11/12/2019 Letter 5-6 (JA__-__); CTIA 4/14/2020 Letter 15-16 (JA__-__). The number of such cases is non-trivial, and it takes only one to cause a potentially catastrophic loss of public safety or critical-infrastructure services.

The FCC, however, irrationally assumed these cases away. To illustrate them, AT&T presented the FCC with several representative case studies showing buildings in close proximity to, or in direct line-of-sight of, various microwave towers. AT&T 11/12/2019 Letter 4-8 & Exh. A (JA__-__, __-__). In one example, AT&T showed that such devices will be operated in buildings such as the “Home” and “Shed” below, right across the street from a microwave receiver (“Tower”):¹³

¹³ *Id.*, Exh. A, at 27 (JA__). The second of these photos shows the Shed in front of the Home.



This scenario—a microwave receiver adjacent to a residential neighborhood—is common, as transmission paths often terminate in populous areas where connections to high-speed wired infrastructure can be made. *See id.* at 3 (JA__) (this and other examples “were readily identified after reviewing the specifics of only a few dozen (out of thousands) of licensed facilities”); CTIA 1/24/2020 Letter 1 & Attach. at 7, 11, 13 (JA__, __, __, __) (illustrating similar examples).

In the example pictured above, AT&T showed that the 6 GHz signals reaching the microwave receiver from the clapboard “Home” would dangerously exceed the FCC’s designated “interference protection benchmark.”¹⁴ The same result would follow *a fortiori* for a device operated in (or directed from a window towards) the “Shed.” See AT&T 11/12/2019 Letter 8 (JA__). The FCC did not deny that 6 GHz devices may be operated in such structures or those in AT&T’s other representative case studies. Instead, it manipulated the building loss and other inputs in AT&T’s interference studies to push down the projected outputs—*i.e.*, the predicted interference levels felt at a proximate microwave receiver.

Of particular relevance here, the FCC assumed that *all* buildings—including the old house in this example, the other structures illustrated in AT&T’s submission, and other buildings like them across the country—would exhibit *average* building loss, which the FCC found would weaken signals to less than one-one-hundredth of the levels felt outside if the walls were removed.¹⁵ But half

¹⁴ *Order* ¶130 (JA__) (identifying -6 dB interference/noise as appropriate benchmark). The FCC described its benchmark as “conservative,” but it made no effort to justify any other benchmark, and it explicitly disavowed the need for further study “to establish the appropriate metric on this issue.” *Id.* ¶71 (JA__). The *Order*’s validity thus depends on whether the FCC had a reasonable basis for concluding that 6 GHz devices would never subject microwave receivers to signals exceeding that -6 dB interference/noise threshold.

¹⁵ The FCC assumed that, on average, building loss reduces signal strength by more than 20 dB, and it applied that average value to all of AT&T’s scenarios. See *Order* ¶129, tbl. 5 (JA__) (fourth-to-last row, setting building loss for all case studies at “50th percentile” and above 20 dB). Minus 20 dB is

of U.S. structures exhibit building loss below the average, and sometimes signals from 6 GHz devices will encounter little or no building loss at all—for example, when the devices are operated by a window in the “Home.” *See* Edison 3/20/2020 Letter 15-16 (JA__-__); Edison 4/15/2020 Letter 6-7 (JA__-__). These are the departures from the mean reflected in the industry-consensus distribution curve, and they will cause *some* microwave receivers in *some* locations to fail at *some* points in time. And the FCC simply assumed them away.

The FCC’s misuse of the building-loss variable is particularly objectionable for several reasons. First, petitioners stressed the need to account for departures from the mean throughout this proceeding and reiterated that imperative once the FCC released the *Draft Order*, which showed that the FCC was poised to dismiss their analysis by illogically assuming an average value for building loss in all scenarios. AT&T 4/16/2020 Letter 9-10 (__-__); Edison 4/15/2020 Letter 6-7 (JA__-__). Yet the FCC nowhere acknowledged that objection in the *Order* and made no substantive change to the discussion that had appeared in the *Draft Order*. It thus violated every agency’s core duty “‘to respond meaningfully’ to objections raised by a party” to an agency’s proposed course of action. *PPL Wallingford Energy LLC v. FERC*, 419 F.3d 1194, 1198 (D.C. Cir. 2005).

equivalent to 1/100; minus 24 dB (which the FCC used for the scenario illustrated here) is 1/250. *See* note 5, *supra* (discussing dB metric).

Second, the FCC's use of an average value in this context contradicts the FCC's own past precedent involving essentially the same issue. Before approving unlicensed garage door openers in the 1970s, the FCC deemed it necessary to consider a range of deviations from the mean, not simply the mean itself, in determining how much a car body would weaken the signals of those devices and thus prevent interference to licensed operations.¹⁶ AT&T drew the FCC's attention to this precedent both before and after the *Draft Order* was released. Here, too, the FCC simply ignored AT&T's objection, thus violating two basic APA duties—not only to respond to objections in the record, but also to justify deviations from past precedent. *See, e.g., Int'l Longshore & Warehouse Union v. NLRB*, 971 F.3d 356, 360 (D.C. Cir. 2020).

Third, the FCC's disregard of departures from the building-loss mean contradicts not only the agency's past precedent, but also a different passage in this very *Order*. Although the FCC relied heavily on the CableLabs Study, it criticized CableLabs for excluding significant departures from the mean when plugging building loss inputs into its simulation. *Order* ¶122 (JA__). As the Commission explained, “it would be more appropriate for CableLabs to have used the full statistical distribution” shown above, with its atypical but nonetheless highly

¹⁶ *See* AT&T 4/16/2020 Letter 10 (JA__) (discussing *Amendment of Part 15 of the Commission's Rules, To Provide for the Operation of Radio Door Controls*, 28 FCC 2d 198 (1971)).

relevant cases on the left side of the curve. *Id.* That input mistake was one of several reasons why the FCC should have abandoned reliance on the CableLabs submission, as discussed below. Our point here is that the FCC committed the same statistical error, with regard to the same building-loss input, when trying to rationalize away the interference implications of AT&T's case studies. That unexplained self-contradiction also violates the APA. *See, e.g., Bus. Roundtable v. SEC*, 647 F.3d 1144, 1153 (D.C. Cir. 2011).

Fourth, *even after* assuming away departures from the mean for these and other variables, the FCC's own calculations showed that the signals emitted from within the "Home" in the example above would still far exceed the FCC's "interference benchmark," jeopardizing the microwave link across the street.¹⁷ To close the gap, the FCC had to resort to its other major sleight of hand: it asserted that, at *any given point in time*, any given 6 GHz device would probably be idle or, if active, would probably be using frequencies different from those used by nearby microwave systems. *See Order* ¶131 (JA__) (citing a "low activity factor" and "low probability of co-channel operation").

As discussed in Section I.C below, that logic ignores the *accumulating* risks posed by many devices operating over time. Here we simply note a logical point:

¹⁷ *See Order* ¶129, Tbl. 5 (JA__) (last row, last column, showing -1.06 dB I/N, which denotes an interference potential far exceeding the FCC's -6 dB interference/noise benchmark).

the FCC could force down this scenario's predicted interference levels below the Commission's designated benchmark only by engaging in *both* sleights of hand—assuming away both departures from the mean *and* accumulated risks. Thus, even if the FCC could somehow justify one of those sleights of hand, its dismissal of AT&T's analysis would still be arbitrary and capricious.

2. *The FCC Ignored Scenarios With Little Or No Clutter Loss.*

Building loss is not the only important variable for which the *Order* unreasonably assumes away departures from the mean to dismiss concerns about likely interference. Another example is “clutter loss,” which measures how much a signal leaving one building will be weakened as it encounters other buildings, hilly terrain, and other obstacles *en route* to a microwave receiver. The lower the clutter loss, the greater the odds of harmful interference to the receiver. The FCC irrationally rejected two separate interference studies because they properly accounted for scenarios with low clutter loss rather than erroneously assuming that all scenarios will have average clutter loss.

First, AT&T presented several illustrative real-world scenarios where clutter loss approached zero and the risk of harmful interference was accordingly very high. In each of these scenarios, a real-world microwave receiver is visible from the real-world house where the hypothetical 6 GHz device would be located, with no clutter in the middle that could substantially weaken the signal before it hits the

receiver. *See* AT&T 11/12/2019 Letter 5 (JA__); AT&T 4/16/2020 Letter 9 & Att. 1 at 3-6 (JA__, __-__).

Nonetheless, the *Draft Order* inexplicably assumed that clutter loss in two of these representative scenarios would be substantial—*i.e.*, that fictitious hills or other imaginary objects would cut the signal's strength to 1/70th of the power level it otherwise would have had when it reached the receiver.¹⁸ AT&T explained that this assumption was completely counterfactual. AT&T 4/16/2020 Letter 9 (JA__). The FCC simply ignored that point and retained the same inexplicably flawed approach in its final *Order*. Had the FCC instead reduced the clutter loss value to zero, where it belonged, that single correction—even if the other manipulated inputs (such as building loss) were left *uncorrected*—would have shown that the risk of harmful interference in these representative scenarios dangerously exceeds the FCC's designated "interference protection benchmark."¹⁹

¹⁸ *See Draft Order* ¶129 (JA__); AT&T 4/16/2020 Letter 9 (JA__) ("–18.4 dB of clutter loss ... is equivalent to using a transmitter power that is approximately 1/70th of the actual power").

¹⁹ Specifically, eliminating the fictitious 18.4 dB of clutter loss for AT&T's examples 2 and 3 would result in an interference potential of 3.4 dB interference/noise ($-15 + 18.4$) and 2.3 dB interference/noise ($-16.1 + 18.4$), respectively. Each is far greater than the FCC's -6 dB interference/noise benchmark. *Order* ¶129, tbl. 5 (JA__-__); *see also* note 14, *supra* (addressing FCC's benchmark).

Second, the FCC committed the same methodological error when dismissing petitioner NAB’s study concerning interference risks to its mobile microwave operations (*see* §IV.C, *infra*). NAB illustrated and modeled “free space” scenarios, where nothing stands between an unlicensed device and a victim microwave receiver. As the *Order* acknowledges, even the proponents of unlicensed devices concede that modeling “free-space propagation may be appropriate in some locations.” *Order* ¶155 (JA__). Yet the FCC rejected NAB’s study, concluding, without explanation, that any analysis of any scenario should reflect “*average* propagation loss.” *Id.* (emphasis added). Here, too, the FCC’s fixation on “average” values irrationally assumed away low-end departures from the mean even though those are precisely the scenarios in which interference concerns are greatest.

3. “*Worst Cases*” Are Real Cases.

The *Order* does not dispute that the scenarios discussed above are real; instead, it tries to downplay them on the curious ground that “they are representative of the worst cases that are likely to occur.” *Order* ¶130 (JA__); *see also id.* ¶109 (JA__) (criticizing petitioners for “assum[ing] worst case conditions”). This makes no sense. These “worst cases”—the departures from the mean—are exactly the scenarios that the FCC should focus on because they show

when 6 GHz devices are most likely to bring down microwave links, interrupting public safety communications and other critical services.

These “worst cases,” moreover, are not even uncommon. For example, commenter CTIA identified several such cases simply by “pull[ing] the first 25 entries” in a search for 6 GHz microwave licenses in the FCC’s own database. CTIA 1/24/2020 Letter 1 (JA__). That simple exercise yielded these photos of microwave receivers that are close to, and in direct line-of-sight with, ordinary frame houses:





Id., Attach. at 7, 11, 13 (JA __, __, __).

CTIA also provided an engineering analysis showing likely interference in each case. The FCC never meaningfully responded to that showing. Instead, in a single throw-away sentence, it announced that it had “conducted a similar analysis of the CTIA study as [it] did with AT&T’s study” by manipulating “a number of probabilistic parameters” in undisclosed ways and had satisfied itself that “the potential of harmful interference ... is insignificant” in each example. *Order* ¶133 (JA__). This because-we-said-so rationale is not reasoned decisionmaking. *See, e.g., United Mine Workers v. MSHA*, 626 F.3d 84, 93 (D.C. Cir. 2010).

C. The FCC Conducted No Analysis of Accumulating Risks Over Time, And Its Reliance on the CableLabs Study Cannot Fill the Gap.

The *Order* rests on two mutually antagonistic propositions. On the one hand, the *Order* finds that internet usage is “grow[ing] at a phenomenal pace”; that exploding bandwidth demand requires opening the entire 6 GHz band to

unlicensed devices transmitting on “channels as large as 160 megahertz”; and that these new devices will not only rapidly proliferate across the country, but “become a part of most peoples’ everyday lives.” *Order* ¶¶2-4 (JA__). On the other hand, the *Order* concludes that licensed microwave operations have little to fear because at any *given* moment, any *given* device (1) will probably be dormant and not transmitting any signals at all (*i.e.*, will have a low “activity factor”) and (2) even when it is active, will probably not be using frequencies overlapping with those used by a proximate microwave receiver within the same 6 GHz band.

“Combining the low probability of co-channel operation and low activity factor,” it says, shows that there is only “an insignificant chance of ... harmful interference” at any given place and time, *id.* ¶131 (JA__), even if conditions would otherwise make interference likely (*e.g.*, no building loss, no clutter loss, etc.).

The FCC cannot have it both ways. Let us assume, with the FCC, that internet usage will continue to explode, that hundreds of millions of 6 GHz devices will proliferate, and that those devices will operate on “channels as large as 160 megahertz.” *Id.* ¶4 (JA__). If so, then a significant number of such devices, out of the hundreds of millions deployed, will transmit on frequencies that *do* overlap with the channels used by proximate microwave systems and will cause those

systems to fail, with potentially catastrophic consequences.²⁰ In this respect, too, the *Order* does not meaningfully respond to petitioners' concern that these "worst case" scenarios will inevitably happen even if they are not routine.

The closest that the *Order* comes to addressing this concern appears in its reliance on the CableLabs Study, which, as noted, used a Monte Carlo simulation to model different permutations of various input values to determine the probability of harmful interference at a given place and time. *See Order* ¶¶117-122 (JA__-__). The FCC's singular reliance on the CableLabs submission in the *Draft Order* took commenters by surprise, both because it does not resemble a genuine "study" (see below) and because other parties submitted nearly a hundred "technical studies" into the record. *See id.* Appx. E (JA__-__). In response, petitioners supplemented their prior criticism of the CableLabs simulation and explained in detail why the FCC's proposed reliance on it would be unlawful. *See, e.g.,* AT&T 4/16/2020 Letter 2-8 (JA__); CTIA 4/14/2020 Letter 14-16 (JA__). In the ensuing *Order*, the FCC replicated the relevant discussion in the *Draft Order* with very few changes. *Order* ¶¶117-122 (JA__). It arbitrarily proclaimed the

²⁰ For example, the FCC estimates that a 6 GHz device using a 160 MHz channel has a 14.29% chance of co-channel operation with a given microwave receiver. *Order* ¶131, tbl. 6 (JA__). Thus, if one billion of these devices are deployed, more than *140 million* will be operating co-channel.

CableLabs Study the “best evidence in the record,” *id.* ¶120 (JA__), while sidestepping or completely ignoring petitioners’ core objections.

Each of those objections is fatal to the FCC’s reliance on the CableLabs Study to assume away the risks of harmful interference over time. In particular, (1) CableLabs did not submit its underlying analysis into the record, and the FCC therefore could not lawfully rely on CableLabs’ black-box conclusions; (2) CableLabs predicated its results on flawed assumptions, as even the FCC acknowledged (without coherently explaining how the results could nonetheless stand); and (3) neither CableLabs nor the FCC even tried to explain how the “1500 iterations” CableLabs claimed to have conducted were remotely sufficient to support inferences about the overall risk of harmful interference somewhere, sometime, during the expected lives of these devices.

1. The CableLabs Study Is An Unreliable Black Box.

It is “a fairly obvious proposition that studies upon which an agency relies in promulgating a rule must be made available during the rulemaking,” with sufficient granularity to allow for “meaningful commentary” and a “genuine interchange” of views. *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 236-37 (D.C. Cir. 2008) (“ARRL”); *see also Appalachian Power Co. v. EPA*, 249 F.3d 1032, 1054–55 (D.C. Cir. 2001) (per curiam) (agency may use “predictive models ... only so long as it explain[s] the assumptions and methodology used in preparing

the model and provide[s] a *complete analytic defense* should the model be challenged”) (emphasis added); *New Orleans v. SEC*, 969 F.2d 1163, 1167 (D.C. Cir. 1992) (agency must “ascertain[] the accuracy of the data” it relies on).

The FCC’s reliance on the CableLabs “study” flunks that test. Given the centrality of that study to the *Order*, one might have expected this record to contain a serious quantitative analysis by CableLabs, complete with spreadsheets, formulas, detailed datasets, and transparent explanations of how those datasets were obtained. But CableLabs, an organ of the cable industry, submitted nothing of the sort.²¹ Instead, it submitted two summary PowerPoint presentations with conclusory talking points.²² Those PowerPoints contained only the bare outlines of CableLabs’ Monte Carlo simulation and thus provided no basis for the FCC or interested parties to vet CableLabs’ conclusions.

For example, we know that CableLabs purported to measure the probability that 80,000 hypothetical 6 GHz devices “[d]istributed across the NYC market” would interfere with a single microwave receiver located somewhere in Manhattan,

²¹ CableLabs “is funded by” and “exists for the benefit of the cable industry.” See <https://www.cablelabs.com/about-cablelabs/member-companies> (visited Dec. 15, 2020).

²² In addition to the December 2019 PowerPoint (JA__-__) on which the *Order* primarily relies, see *Order* ¶117 (JA__), CableLabs submitted a PowerPoint on January 17, 2020 to contest the findings of the AT&T case studies discussed above. See JA__-__. That second PowerPoint was even more cryptic and conclusory and filled none of the explanatory gaps discussed here.

but we do not know the actual modeled locations of those devices within the five boroughs of the “NYC market” or of the potential victim receiver in Manhattan. CableLabs 12/23/2019 PowerPoint 17-18 (JA__-__). For all we know, most of the modeled device locations were miles away from the receiver, and too few were nearby or within its main beam—yet those in the latter categories are precisely the ones that should have been modeled.

We also do not know critical facts about how CableLabs derived an “activity factor” for its modeled 6 GHz devices—*i.e.*, the percentage of time a given device will be transmitting signals, and thus potentially interfering with microwave links, rather than sitting dormant. *See* CableLabs 12/23/2019 PowerPoint 4 (JA__). CableLabs posited—and the *Order* accepts—a projected “average activity factor of 0.4%” for these devices, meaning they are assumed to transmit only one minute out of every 250. *Order* ¶121 (JA__). Where does that strikingly low figure come from? CableLabs borrowed it from a similarly conclusory PowerPoint presentation from Broadcom, an intervenor here that also lobbied for these rules. Although Broadcom claimed to have measured transmissions “from ~500,000 unique residential access points”²³—*i.e.*, present-day Wi-Fi devices—it never submitted the data. Accordingly, we cannot know whether this sample was

²³ Broadcom, *Duty Cycle Data*, 2-3 (Dec. 5, 2019) (attached to Apple *et al.* 12/9/2019 Letter) (JA__-__).

representative even of real-world device behavior today, much less 6 GHz device behavior in the years to come, after the radical surge in bandwidth demand that the *Order* projects.²⁴

It is also impossible to determine what methodology CableLabs used for estimating interference probabilities. CableLabs claimed to have run “over 1500 iterations” of its model to identify the likelihood of interference. CableLabs 12/23/2019 PowerPoint 8 (JA__). We do not know for certain what CableLabs meant by “iterations” because it did not define the term. Presumably CableLabs meant that it modeled 1500 different permutations of different interference-related inputs for its hypothetical devices (*e.g.*, whether on or off, what channel, what power level, etc.) at 1500 different time periods to determine whether, in any of those periods, conditions would line up to cause harmful interference. If so, we do not know how long of an interval CableLabs modeled for each “iteration.” And that variable is critical.

For example, the risk that a device with a low “activity factor” will transmit one of its occasional, potentially interfering bursts at some point during a given interval is obviously much greater if that interval is a minute, hour, or day rather

²⁴ Broadcom conceded one reason its study might *not* be representative: it reflects only residential usage, and commercial usage “can exhibit different and higher duty cycles.” *Id.* at 1 (JA__). Remarkably, and arbitrarily, the FCC ignored that concession when it concluded that commercial operations might have *lower* duty cycles. *See Order* ¶121 (JA__).

than a fraction of a second. The shorter the duration, the greater the sample size needed for the results to have any statistical significance over the relevant time period at issue—*e.g.*, the next decade. For all we know, each CableLabs “iteration” asked only whether any given device would be transmitting during an infinitesimally short snapshot in time. If so, the CableLabs simulation, with only 1500 snapshots, is wholly insufficient to capture the severe *accumulating* risks posed by hundreds of millions that 6 GHz devices will pose over the course of the next decade—a point to which we return below.

These are only a handful of the methodological errors that the black-box nature of CableLabs’ submission may obscure; beyond those, CableLabs may also have made basic math errors in running whatever undisclosed formula it used to generate predicted interference levels for different combinations of inputs. We do not know, and the FCC did not know, because CableLabs did not show its work.

The opacity of the CableLabs Study makes this case indistinguishable from *ARRL*, where this Court invalidated an FCC order that likewise relied on a black-box “study” to dismiss the serious interference concerns presented by another unlicensed consumer-broadband technology. 524 F.3d 227. The FCC has violated the same administrative law principle again—notably, without even acknowledging *ARRL*, even though petitioners highlighted that case in warning the FCC not to rely on the CableLabs “study.” *See* AT&T 4/16/2020 Letter 3 (JA__).

2. *The CableLabs Study Relied on Flawed Assumptions.*

Even the limited information that CableLabs *did* provide shows that its “study” rested on badly flawed input values, quite apart from the activity factor value noted above. Of particular significance, CableLabs assumed that a very substantial degree of building loss would *always* blunt the power levels of signals emitted by 6 GHz devices before they could reach microwave receivers. *Order* ¶122 (JA__). But that assumption is false, as even the FCC recognized.²⁵ In the FCC’s words, CableLabs should “have used the full statistical distribution” of building-loss values from the industry-standard distribution curve noted in Section I.B above, which includes atypical but nonetheless highly relevant cases where building walls do not significantly weaken a device’s signals at all.²⁶

²⁵ See *Order* ¶122 (JA__) (“it would be more appropriate for CableLabs to have used the full statistical distribution” for building loss, including low-end departures from the mean). As noted in Section I.B, *supra*, the FCC forgot that it had criticized the CableLabs Study on this ground when it manipulated the same building-loss input in AT&T’s studies to assume that building loss for all buildings everywhere will always cluster around the mean.

²⁶ See §I.B.1, *supra*; see also AT&T 11/12/2019 Letter 6 (JA__) (displaying ITU P.2109 distribution chart). The FCC suggested that “even if the analysis were conducted assuming the full statistical range of ITU P.2109,” it would “skew” the building loss value only “by a few decibels.” *Order* ¶122 n.317 (JA__). That could be true only if “a few” means “ten.” The CableLabs Study assumed that building loss would always be 10 dB or more, whereas the P.2019 statistical range includes values approaching 0 dB, a point that the *Order* nowhere denies. That 10 dB discrepancy reflects an enormous ten-fold difference in power levels.

This error was inexplicable and highly material. The entire point of any Monte Carlo analysis is to consider the whole range of possible conditions for each variable, in combination with the likelihood of other variables, to help determine the overall likelihood of interference. If the various conditions needed for harmful interference line up only rarely, the output of a properly conducted Monte Carlo analysis will reflect that fact. But discarding low-probability conditions before conducting the analysis defeats the purpose of the exercise and invalidates the result.

By analogy, consider weather conditions in Washington, D.C. On more than 90% of days, the temperature remains above freezing, and precipitation occurs only on approximately 30% of the days in a year. In forecasting a need for salt trucks and snowplows, it would make no sense to ignore, as “worst cases,” the 10% of days in which the temperature falls below freezing and then conclude that roads will sometimes be wet but never icy. Yet that is exactly the type of statistical illogic that CableLabs committed in excluding all scenarios with low building loss.

After acknowledging that CableLabs had made this error, the FCC tried to sweep the problem under the rug by stating that “[t]here are many probabilistic factors that must be considered” besides building loss. *Order* ¶122 n.317 (JA___). That is true but irrelevant: adjustments to any input’s value may flip a model’s output even if there are other inputs in the formula. The illogic of this “many

factors” line is especially glaring given *this* factor’s unusual importance. Again, the FCC itself has created a new class of “indoor” devices without any Automated Frequency Coordination requirement because it assumed that building loss—the very factor that makes indoor devices “indoor”—will play a critical role in shielding microwave receivers from interference. Although the FCC acknowledged that CableLabs had botched its treatment of that input, it placed dispositive reliance on the CableLabs Study anyway, without any coherent explanation.

3. *The CableLabs Study Failed to Assess Accumulating Risks Over Time.*

As noted, CableLabs purported to run “over 1500 iterations” of its model to identify the likelihood of interference. CableLabs 12/23/2019 PowerPoint 8 (JA__). Although neither CableLabs nor the FCC defined “iterations,” *see* §I.C.1, *supra*, the term presumably means that CableLabs modeled 1500 different permutations of various interference-related inputs to determine whether, at any of 1500 modeled points in time, conditions would line up to cause harmful interference. But even if (counterfactually) CableLabs’ input values were all known and valid, there would still be 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. *See, e.g.*, AT&T 3/26/2020 Letter 1-2 (JA__-__); AT&T 4/16/2020 Letter 5-6 (JA__-__). The *Order* does not coherently

respond to that concern; indeed, it ignores this question of statistical significance altogether.

An analogy helps illustrate the importance of this statistical error. Suppose that a town considers raising the speed limit on all residential streets from 20 to 45 miles per hour but is concerned about pedestrian safety. A consulting firm performs a Monte Carlo analysis that purports to model all relevant variables. The firm estimates how many cars will pass through the town on a given day, how many pedestrians will be walking on the town's streets on that day, the likelihood that a given pedestrian will be walking on the same street as a given car, the trajectory of the car vis-à-vis that of the pedestrian, and the likelihood that the car will be traveling below rather than at the new 45 mile-per-hour speed limit. The consultancy announces that it has conducted 1500 "iterations" of this model, simulating 1500 different snapshots in time with different permutations of streets, cars, pedestrians, velocities, and relative trajectories. And it reports that no car struck any pedestrian during any of those iterations.

Could the town reasonably rely on this report to conclude it can raise the speed limit to 45 without materially increasing the risk of pedestrian accidents? Of course not. The fact that one can take 1500 snapshots of simulated activity on the town's streets without capturing an accident proves very little about the *cumulative* likelihood that some car somewhere will strike some pedestrian at some point in

the foreseeable future. Indeed, all 1500 snapshots could easily be taken at distinct hypothetical moments on *the same day*. Because of the limited sample size, the study thus would have only a small chance of capturing pedestrian accidents even if they would predictably occur as often as once a month.

Nothing in the *Order* suggests that the FCC avoided this type of statistical error. Again, all that the *Order* ultimately derived from the CableLabs Study was that “the probability that every parameter (*e.g.*, building entry loss, clutter loss, same channel operation, being located in the same area, etc.) is worst case at the same place and time is extremely low.” *Order* ¶122 n.317 (JA__). Yet in our analogy, we could as easily say there is an “extremely low” probability that “every parameter” (vehicle location and velocity, pedestrian location, relative trajectories, etc.) would all line up “at the same place and time” to injure a pedestrian. Neither proposition—the FCC’s about case-specific interference odds, or ours about case-specific pedestrian-injury odds—tells us anything about the *cumulative* risks that ultimately matter: the probability of a worst-case scenario arising somewhere, sometime, with potentially catastrophic results.

D. The FCC’s Choice of a 5 dBm/MHz Power Limit Was Arbitrary.

In only one passage of the *Order* did the FCC acknowledge, albeit obliquely, that its interference analysis had missed the big picture. In that passage, the FCC conceded that “the presence of [tens of thousands of microwave links] across the

U.S. would suggest that some number” of “worst case[.]” interference scenarios “would occur” if the power limit were set at 8 dBm/MHz, the value assumed by CableLabs. *Order* ¶132 (JA__). The FCC further conceded that it could not know which or how many links would fail because “we cannot conduct an analysis for every fixed [microwave] station and each of their [sic] link paths,” *id.*, particularly given the thousands of dispersed devices that could potentially interfere with each link. To its credit, the FCC acknowledged that such threats to the integrity of the nation’s communications infrastructure are unacceptable.

Unfortunately, the FCC chose a “solution” that cannot rationally solve the problem it recognized. Petitioners had urged the FCC to adopt, among other safeguards, the *Notice*’s original proposal to mandate Automated Frequency Coordination for any device operating on the 6 GHz sub-bands used by fixed-microwave systems. But the FCC abandoned that proposal without conducting any cost-benefit analysis or, indeed, offering any explanation whatsoever. Instead, to reduce the “worst case[.]” interference scenarios it suggested “would occur” under CableLabs’ 8 dBm/MHz approach, it simply adopted a 5 dBm/MHz power limit instead, labeled that approach “conservative,” and called it a day. *Order* ¶132 (JA__); *see also id.* ¶110 (JA__).

The FCC never even tried to justify this figure, let alone substantiate the assertion that it is “conservative.” The FCC simply plucked the number 5 out of

thin air, citing nothing beyond familiar generalities about its own “experience” and “engineering judgment.” *Id.* ¶110 (JA__). Nowhere did the FCC 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. Again, this because-we-said-so approach to rulemaking is a paradigm of arbitrary agency action. *See, e.g., United Mine Workers*, 626 F.3d at 93 (no deference to agency “knowledge and expertise” where agency failed to “identify what this knowledge and expertise is, [or] point to a study or comparison”); *U.S. Tel. Ass’n v. FCC*, 188 F.3d 521, 524-26 (D.C. Cir. 1999) (invalidating insufficiently supported choice of 6.0% “X factor” used to adjust price caps); *WorldCom, Inc. v. FCC*, 238 F.3d 449, 461 (D.C. Cir. 2001) (“Like any agency, the FCC must provide a rational basis when setting a number for a standard.”).

II. THE FCC PROVIDED NO REASONED BASIS FOR ASSUMING THAT ITS RESTRICTIONS WILL KEEP NOMINALLY “LOW-POWER” DEVICES INDOORS.

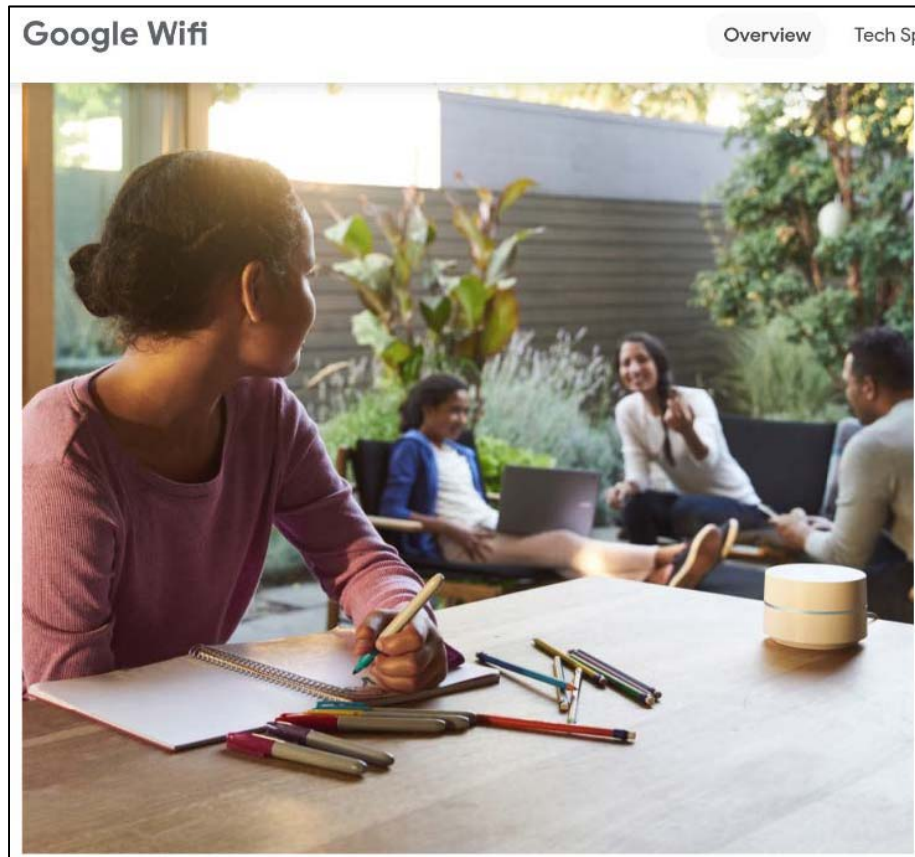
Our discussion to this point has assumed that these devices will always be used indoors, as the FCC intended. Even on that assumption, the FCC identified no reasoned basis for deeming it unlikely that some of these hundreds of millions of devices will someday interrupt critical microwave links. We now show that this threshold assumption of indoor-only use is itself wrong, dramatically increasing the odds of harmful interference further still, and that the FCC acted arbitrarily in

concluding otherwise. That concern arises for two types of devices: 6 GHz “access points” (e.g., Wi-Fi routers) and the innumerable “client devices” that will be connected to them, such as laptops, phones, and tablets.

Outdoor use of access points. As discussed, the FCC authorized a new class of “indoor” devices without Automated Frequency Coordination on the assumption that they will never operate outdoors and will thus always be subject to “building attenuation.” *Order* ¶107 (JA__). The FCC did not dispute that those devices will present a major risk of harmful interference if operated outdoors. Yet the FCC adopted only partial measures designed to make outdoor use “impractical and unsuitable,” *id.* ¶108 (JA__), rather than impossible or even unlikely. Specifically, it prohibited manufacturers from giving 6 GHz access points certain outdoor-friendly characteristics, such as weather-resistant design, battery operation, and the ability to support external antennas. *Id.* ¶107 (JA__). The FCC also required that device labels and instruction manuals urge consumers to use these devices for “indoor use only.” *Id.*

Although these measures might help discourage outdoor use of 6 GHz access points, they cannot possibly prevent it. *E.g.*, NAB Comments 12 (JA__); APCO Comments 14-15 (JA__-__). For example, none of the FCC’s requirements will prevent consumers from taking these highly portable devices outside on sunny days to conduct Zoom calls from their laptops on porches, balconies, and decks.

See NAB Comments 12 (JA__). Indeed, advertisements in the record *encourage* consumers to take existing access points outside, where they can be plugged into ubiquitous outdoor electrical outlets (or connected to indoor outlets through extension cords):²⁷



²⁷ This ad for a Google “Mesh Wi-Fi Router,” reprinted in CTIA’s 4/14/2020 Letter 17 (JA__), illustrates one of many portable access points that consumers can easily connect to outdoor outlets. The router here uses a USB power cord visible just to the right of the device, draped over the table.

The *Order* does not even address these concerns, let alone justify the FCC’s assumption that its rules will always and everywhere succeed in “restrict[ing]” these devices “to indoor operations.” *Order* ¶107 (JA__).

The error in that assumption presents massive interference risks, given the expected scale of 6 GHz device deployment. For example, suppose that 500 million 6 GHz access-point devices begin operating in the United States, consistent with the FCC’s prediction that such devices “will become a part of most peoples’ everyday lives.” *Order* ¶3 (JA__); *see also* note 4, *supra*. Even if the FCC’s indoor-use measures were 99% effective, the remaining 1%—five million devices—would still be used outside, blasting the surrounding area with orders of magnitude greater transmission power than the FCC assumes. *See* §I.B.1, *supra* (discussing magnitude of building-loss assumptions). The FCC’s conclusion that its measures would “ensur[e] that licensed incumbent operations ... are protected from harmful interference” from all of these hundreds of millions of devices, *Order* ¶1 (JA__), is wishful—and deeply arbitrary—thinking.

Outdoor use of client devices. The *Order* focuses primarily on the interference potential of *access point* devices and devotes hardly any attention to likely interference from *client* devices. Yet for every access point, there will be multiple client devices—as illustrated by the multiplicity of smartphones, laptops, and tablets that consumers connect to their home Wi-Fi routers today. It would of

course be impossible to prevent consumers from taking these devices outside or from running them on battery power. The FCC thus imposed on these devices none of the “indoor-only” restrictions it imposed for access points.

These client devices, however, will be running Zoom calls and other high-bandwidth applications using the same 6 GHz band used by the access points to which they are connected. As petitioners explained to the FCC, every outdoor client device’s transmissions will pose substantial interference risks of their own to microwave links in the vicinity. *See, e.g.*, AT&T 4/16/2020 Letter 12-13 (JA__-__). The *Order* essentially ignores that concern.

To be sure, the *Order* does require that client devices transmit at lower power levels than their associated access points. *Order* ¶¶103, 189 (JA__, __). But the increased interference risk associated with taking any client device outdoors will not only offset but completely overwhelm any decreased interference risk associated with those lower power levels. Specifically, whereas the Commission required client devices to operate at power levels 6 dB below their associated access points, the Commission found that taking any indoor device outside will on average increase its outdoor power levels by approximately 20 dB. *See id.* ¶¶127-128 (JA__-__); *see also* §I.B.1, *supra* (discussing FCC’s 20 dB building loss assumption). The result is a net 14 dB (20 – 6 dB) increase, which equates to more than a 25-fold power differential.

In other words, countless client devices will operate outdoors at power levels *more than 25 times greater* than the power levels that the FCC concedes will be felt outdoors from indoor operation of 6 GHz access points subject to the FCC's building-loss assumptions. *See* AT&T 4/16/2020 Letter 13 (JA__). Yet the *Order* never coherently addresses this concern even though harmful interference from these ubiquitous client devices presents at least as grave a concern as the *Order*'s failure to grapple reasonably with the interference potential of access points. That is another textbook example of arbitrary and capricious decisionmaking.

III. THE REQUIRED USE OF A “CONTENTION-BASED PROTOCOL” WILL DO NOTHING TO PREVENT HARMFUL INTERFERENCE TO MICROWAVE LINKS FROM NOMINALLY “LOW-POWER” DEVICES.

The third of the FCC's three “restrictions designed to prevent harmful interference” is a requirement that these 6 GHz devices “use a contention-based protocol.” *Order* ¶99 (JA__). But that requirement is not even plausibly capable of protecting microwave links from harmful interference.

Rather than consult an online database to avoid co-channel operations, as Automated Frequency Coordination does, the “listen-before-talk” mechanism required here will use the same technology designed to keep today's unlicensed Wi-Fi routers from interfering *with each other*. *See id.* ¶101 (JA__). Using that technology, a router “listens” to discover whether another router is using a particular frequency channel; if so, it either switches to a different channel or

remains dormant until the other router stops transmitting. *Id.* Petitioners observed, however, that a consumer 6 GHz device will be able to “hear” only other such devices, which—like today’s Wi-Fi routers—will radiate energy in all directions. The device will *not* be able to detect the narrow point-to-point beams transmitted between microwave towers outside.²⁸

The FCC did not dispute that point and, more generally, did not explain why it chose this ineffective approach rather than (among other safeguards) an effective Automated Frequency Coordination mechanism to reduce the risk of co-channel transmissions. *See Order* ¶101 (JA__). That, too, is the epitome of arbitrary and capricious decisionmaking.

In a later passage, the FCC suggested that the use of contention-based protocols may indirectly reduce the risk of interference with microwave receivers by keeping any given 6 GHz device from transmitting continuously—thereby lowering its “activity factor”—if other such devices are also transmitting nearby. *Id.* ¶120 (JA__); *see also* §I.C, *supra* (discussing “activity factor”). But such “politeness” *among multiple unlicensed devices* in the same vicinity will not protect a microwave receiver from harmful interference from one or another of

²⁸ *See, e.g.*, AT&T 4/16/2020 Letter 5 (JA__); Fixed Wireless Communications Coalition 4/13/2020 Letter 3 (JA__). In contrast, an access point can interfere with point-to-point microwave beams because its own transmissions are *not* point-to-point. *See* AT&T Comments 9 (JA__).

those devices, each of which, by hypothesis, will be transmitting if the others are not. Indeed, because all consumers will continue using the internet, mutual politeness among proximate devices will not even cause any *given* device to transmit less than it otherwise would; it will simply drag out each device's transmissions over a longer period. The *Order* does not contend otherwise.

Similarly unavailing is the *Order*'s statement that “[a]n interference source with a lower activity factor”—the presumed consequence of a contention-based protocol—“will have a lower impact than a continuous source.” *Order* ¶131 (JA__). That sentence is tautologically true, and does nothing to assuage interference concerns, if it means that a device that transmits only occasionally will pose interference risks only occasionally—*i.e.*, when it is transmitting—rather than continuously. But the sentence is nonsensical, and in all events completely unsupported, if it means that a device transmitting during one time period (*e.g.*, 8:00-8:15) is less likely to cause harmful interference *during that time period* if it then becomes dormant during a later period (*e.g.*, 8:15-8:30). *See, e.g.*, AT&T 1/23/2020 Letter 9-10 (JA__-__) (a “device’s impact on [a licensed] receiver will be due to instantaneous ... power, not power-time averaged”).²⁹

²⁹ Although an accompanying footnote suggests this implausible latter interpretation, *see Order* ¶131 n.339 (JA__), the source it cites in fact supports the former interpretation, not the latter. *See* Telecomms. Indus. Ass’n, *Interference Criteria for Microwave Systems; Telecommunications Systems Bulletin TSB-10-F* (May 31, 1994).

Given the FCC’s heavy reliance on “activity factors,” both in its analysis of interference models and in its assumptions about the value of contention-based protocols, incumbent licensees asked the FCC to put its money where its mouth was—to limit every unlicensed device to the improbably low 0.4% activity factor assumed in the CableLabs model. *E.g.*, Fixed Wireless Communications Coalition 4/13/2020 Letter 3-4 (JA__-__). Without clearly acknowledging that request, the FCC rejected it in a single oblique sentence. It said that “while the adopted rules do not limit the activity factor,” the rules would nonetheless “requir[e] devices to use a contention-based protocol[,] which will prevent devices from transmitting at extremely high duty cycles.” *See Order* ¶120 (JA__). This is a non-sequitur. Even if “contention-based protocols” might prevent devices from operating at “extremely high duty cycles,” those devices will likely still be operating far more continuously than the 0.4% premise of the CableLabs study.

IV. ARGUMENTS OF INDIVIDUAL PETITIONERS.

A. APCO: The FCC Violated Its Statutory Mandate to Consider the Impacts on Public Safety By Both Low-Power and Standard-Power Devices.³⁰

1. The FCC Unlawfully Failed to Consider Public Safety.

Congress created the FCC “for the purpose of promoting safety of life and property through the use of wire and radio communications.” 47 U.S.C. §151.

³⁰ Petitioners AT&T and CenturyLink do not join Section IV.A.

“The [FCC] is required to consider public safety by ... its enabling act,” *Nuvio Corp. v. FCC*, 473 F.3d 302, 307-08 (D.C. Cir. 2006), and failure to do so renders FCC rulemaking arbitrary and capricious. This Court’s recent decision in *Mozilla* reaffirms that “the [FCC’s] decisions must take into account its duty to protect the public.” *Mozilla*, 940 F.3d at 60 (internal quotation marks omitted); *id.* at 61 (partially vacating FCC action that did not appropriately consider the effect on public safety, noting “substantial concerns about the [FCC’s] failure to undertake the statutorily mandated analysis ... on public safety.”).³¹

The FCC’s statutory obligations are at their apex where the FCC has adopted rules forcing public safety incumbents to share heavily encumbered spectrum with a massive influx of new incompatible uses absent adequate consideration and protections. Yet just as in *Mozilla*, the FCC failed to properly analyze its *Order*’s impact on public safety despite warnings the decision had dire public safety implications and would imperil the ability of first responders to communicate during a crisis. APCO explained that certain 6 GHz public safety systems have heightened reliability requirements of 99.9999% availability, amounting to no

³¹ In contrast to the FCC’s deliberations on 6 GHz, the FCC’s rules elsewhere give special solicitude to “safety services.” Interference is deemed “harmful” when it “degrades, obstructs or repeatedly interrupts” ordinary services, but it is proscribed when it merely “endangers” public safety. 47 C.F.R. §15.3(m). The *Order* did not acknowledge, let alone act upon, the much higher burden the FCC’s rules require in the public safety context.

more than 30 seconds of downtime per year. *See* APCO Comments 4 (JA__). A single instance of harmful interference would defeat this reliability by causing an outage of 15 minutes or more while the public safety receiver resets. There is a legitimate risk that interference will incapacitate public safety use of the band on an ongoing basis. *Id.* at 4-5 (JA__-__). As a result, police, fire, or emergency medical personnel may never reach a 911 caller in need, and may lose contact with each other during emergencies.

Despite significant public safety concerns in the record, the FCC failed to analyze the *Order*'s impact on public safety. To satisfy its statutory requirement, the FCC should have analyzed factors such as:

- How many public safety agencies rely on the 6 GHz band;
- How public safety agencies use the 6 GHz band and how harmful interference to agencies' systems would harm public safety;
- How frequently harmful interference will occur and the estimated duration of disruption to public safety systems; and
- The costs and methods for promptly detecting, locating, and mitigating sources of harmful interference to public safety licensees and the public they serve and protect.

The FCC did not consider these factors and did not include potential costs for public safety in the cost-benefit analysis. The FCC's lack of consideration constitutes reversible error.

When APCO cited these concerns in seeking a stay of the *Order* from the FCC, Commission staff attempted without success to rationalize this failure to

consider public safety. In their denial of the stay request, staff argued that concerns of all incumbents mattered equally, noting that “[p]ublic safety agencies are only one set of incumbents among several different entities that use the 6 GHz band for point-to-point microwave links” and that the discussion of microwave links “applied in full measure to public safety systems.” *Stay Denial Order* ¶21 (JA__).

That argument is an “off-limits *post hoc* rationalization” that must be ignored because blanket consideration of affected entities cannot satisfy the FCC’s duty to evaluate the implications for public safety. *See Mozilla*, 940 F.3d at 61-62. “[A]fter-the-fact reasoning entirely misses the fact that, whenever public safety is involved, lives are at stake. ... People could be injured or die.” *Id.* at 62. The FCC itself must specifically address and resolve public safety issues.

Although the *Order* acknowledged some public safety input in passing, *see Stay Denial Order* ¶22 (JA__) (citing passages), that does not constitute consideration of the “multi-faceted public safety concerns” involved. *See Mozilla*, 940 F.3d at 63. Further, the FCC cannot dispute that it failed to address some public safety concerns altogether. For example, neither the *Order* nor any FCC staff statement since has addressed the fact that the new rules effectively strip public safety agencies of protection from harmful interference while operating microwave links under emergency special temporary authority, an important public

safety use of the 6 GHz band, particularly in the wake of major disasters. *See* APCO Comments 11 (JA__) (warning of this scenario).

The FCC has alleged that *Mozilla* is “inapt.” FCC Stay Opp. 24. To the contrary, the circumstances underpinning the *Order* call for a *more* rigorous analysis of public safety impacts than was required in *Mozilla*. There, the FCC gave insufficient consideration to the public safety implications of blocking or throttling Internet communications. *See Mozilla*, 940 F.3d at 60-61. Here, the *Order* directly threatens public safety agencies’ own dedicated infrastructure for reliable life-safety communications.

The FCC should have analyzed and accounted for the impact of its decision on public safety. The FCC is opening the door for hundreds of millions of untraceable devices into a band that serves as the backbone of 911 and first-responder communications across the United States. Yet the FCC did not take even basic steps to carry out its fundamental responsibility to protect the safety of life and property. As APCO stressed, the FCC should have required real-world testing to determine the frequency and duration of interruptions to public safety communications resulting from the sharing framework and required adequate mechanisms not only to prevent harmful interference (as through Automated

Frequency Coordination) but to promptly detect and eliminate harmful interference occurring to public safety during an emergency.³²

2. *The FCC Arbitrarily Disregarded Automated Frequency Coordination Limitations.*

As the sole petitioner representing public safety entities licensed to operate in the 6 GHz band, APCO is focused on the dangerous impacts of interruptions to 911 and first-responder communications. Given the life-or-death nature of these communications, APCO is concerned that the FCC's reliance on Automated Frequency Coordination to prevent *all* interference from standard-power devices is flawed. *See* APCO 4/10/2020 Letter 3, 5-6 (JA__, __-__). Preventing interference depends on a coordination technology's ability to stop unlicensed devices from transmitting in locations where they could interfere with licensed users. *See* APCO Comments 6 (JA__). A coordination technology should not permit an unlicensed device to share the channel used by a public safety receiver unless the device is outside of the area that would pose a threat to the receiver. *See, e.g., Order* ¶32 (JA__).

The *Order* fails to ensure this will be the case. The *Order* requires standard-power access points' estimated locations to be reported to an Automated

³² APCO also suggested a phased implementation to minimize the harm to public safety should the mechanisms for addressing interference prove inadequate once hundreds of millions of unlicensed devices have been introduced to the band. *See* APCO 4/10/2020 Letter 6 (JA__). This, too, was ignored by the FCC.

Frequency Coordination mechanism but does not set an accuracy requirement describing how close the estimate must be to the true location. *See id.* ¶41 (JA___). Thus, some standard-power access points will be authorized by an Automated Frequency Coordination to transmit on the same channel being used by public safety in a location that should be off-limits. The FCC's failure to establish an accuracy requirement violates its own logic in requiring that some unlicensed devices be controlled by Automated Frequency Coordination, and without real-world testing, any accuracy requirement established by the FCC would be arbitrary.

Further, as mentioned above, the FCC failed to address the need to prevent interference to public safety links operating under emergency special temporary authority because the locations of such links will not be known to Automated Frequency Coordination mechanisms. This means that such mechanisms cannot prevent harmful interference to these public safety links. Stripping public safety of this important use of the 6 GHz band with no explanation is arbitrary and capricious.

B. *Edison et al.*: The FCC Arbitrarily Rejected Studies Submitted by Electric Power Utilities.

As noted, the APA requires any agency “to respond meaningfully’ to objections raised by a party” to an agency’s proposed course of action. *PPL Wallingford Energy*, 419 F.3d at 1198. The FCC violated that duty not only in the

ways described in Sections I-IV above, but also in its treatment of the separate interference studies submitted by petitioner Edison and Southern Co., an electric utility. In each case, the FCC mischaracterized the relevant study in the *Draft Order*, and the study's sponsor then submitted detailed objections to the mischaracterizations. But in the *Order*, the FCC ignored the objections and replicated the *Draft Order*'s treatment of the studies verbatim, as though the objections had never been raised.

First, the FCC arbitrarily dismissed Southern's technical study on the ground that it inadequately dealt with clutter loss.³³ As Southern explained, its models inherently accounted for clutter loss yet demonstrated that power levels reaching fixed microwave receivers would exceed the Commission's interference protection benchmark. Southern 2/14/2020 Letter at Attachments B (at 4) and C (JA__, __-__). The *Draft Order* ignored this, deeming Southern's study "not ... convincing" because it supposedly "applie[d] a clutter loss to only a few of the scenarios." *Draft Order* ¶135 (JA__). The *Draft Order* also criticized the study for failing to incorporate a Monte Carlo analysis. *Id.*

³³ Southern first submitted its study on February 6, 2020 and, in response to staff requests, supplemented it with further technical reports. Southern 2/6/2020 Letter (JA__-__); Southern 2/14/2020 Letter (JA__-__); Southern 2/27/2020 Letter (JA__-__).

In response, Southern reiterated to the FCC in detail (1) that its analysis “inherently include[d] clutter loss” and (2) that a Monte Carlo analysis was irrelevant to, and would not have changed, the “study’s most significant finding” of interference from a single source. Southern 4/9/2020 Letter 3-4 (JA__-__). On both points, the FCC ignored Southern once again. It inexplicably replicated in the *Order* the exact discussion of the Southern study it had used in the *Draft Order*, making no effort to address Southern’s detailed objections. *Compare Order* ¶135 (JA__) *with* Southern 4/9/2020 Letter 3-4 (JA__-__).

The FCC likewise acted arbitrarily in rejecting the interference study proffered by petitioner Edison and others in the Critical Infrastructure Industry (“CII”) coalition. *Order* ¶138 (JA__); *see* Edison 1/13/2020 Letter (JA__-__) (presenting study); Edison 3/20/2020 Letter 2-18 (JA__-__) (addressing study). In the *Draft Order*, the FCC tentatively found that the CII study was “flawed and unreliable” because it made “certain assumptions that significantly detract from its value.” *Draft Order* ¶138 (JA__). Edison promptly responded that the *Draft Order* “fail[ed] to appropriately acknowledge our subsequent participation through numerous technical dialogues with the [FCC’s Office of Engineering and Technology], as well as our comprehensive technical submissions clarifying, responding to criticisms, and defending the [CII] Study.” Edison 4/15/2020 Letter 2 (JA__). Edison further explained in detail why each of the *Draft Order*’s

criticisms was flawed, identifying specific record citations and technical documents that the *Draft Order* had ignored. *Id.* at 2-8 (JA__ - __) (refuting the *Draft Order*'s criticisms regarding i) outdoor operations and power levels; ii) path loss; iii) building loss; and iv) access point density and usage). Edison also asked in each instance that its "response on this issue be reflected in the text of the final *Order*." *Id.* at 3, 6, 7, 8 (JA__, __, __, __).

The final *Order*, however, simply ignored Edison's detailed responses. It made no material changes to the *Draft Order* as it related to the CII study.³⁴ As with its treatment of Southern's study, it did not even acknowledge Edison's objections to the *Draft Order*, let alone explain why those objections were insufficient. This, too, is a textbook APA violation, and requires reversal.

C. NAB: The FCC Arbitrarily Refused to Protect Mobile Licensed Operations in the 6 GHz Band.

NAB supports the arguments in Sections I-III and V and additionally explains that the *Order* uniquely fails to protect broadcasters' licensed *mobile* operations from harmful interference.

³⁴ The only "substantive" change in the final *Order* was to add a footnote acknowledging that Edison had on March 20, 2020 supplemented its January 13, 2020 study, but dismissing that supplemental study—without any analysis whatsoever—as "not substantively address[ing] our concerns or our conclusions." *Order* ¶138 n.364 (JA__).

Mobile operations in the 6 GHz band are itinerant by nature. They include television pick-up stations used for electronic newsgathering, which transmit footage from a news event back to a microwave receiver, which in turn is connected to a studio. These mobile microwave operations often have long transmission paths covering dozens of miles. NAB Comments 9 (JA__).

Television broadcasters also use low-power transmitters on portable cameras to contribute audio and video to television programming:



NAB Comments 3 (JA__). Licensed mobile operations may occur indoors or outdoors, and the antennas receiving these transmissions are subject to harmful interference from nearby unlicensed transmitters. *Id.*

The *Order's* infirmities detailed in Sections I and II above—including, for example, the arbitrary and excessive power limit for indoor devices, the improper

use of mean building losses and low activity factors, the misplaced reliance on a study not introduced into the record, and the infeasibility of ensuring that such devices remain indoors—apply to mobile licensed operations as well. But the interference risks to mobile operations are unique in two respects, each of which the FCC largely ignored.

First, 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. The *Order* seeks to downplay that concern by asserting that, using an unspecified contention-based protocol, “unlicensed devices [can] sense the energy from nearby indoor licensed operations and avoid using that channel.” *Order* ¶168 (JA__). But NAB had explained that a contention-based protocol has failed to protect licensed users in a different spectrum band (2.4 GHz), rendering that band partially unusable by licensed operators. *See, e.g.*, NAB 3/23/30 Letter 2-3 (JA__-__); NAB 3/27/20 Letter 1-2 (JA__-__); NAB 4/10/20 Letter 3-4 (JA__-__). The FCC never acknowledged that evidence. Instead, it claimed without support that “instances of harmful interference have been effectively identified and addressed,” *Order* ¶147 (JA__), despite uncontroverted record evidence to the contrary.

Second, as the FCC acknowledged, Automated Frequency Coordination cannot protect mobile microwave operations as it protects fixed microwave

operations because there is no way to keep track of them in a database. *See Notice* ¶20 (JA__); *see also* p. 7, *supra*.³⁵ For that reason and others, NAB asked the FCC to preserve a narrow sliver of 6 GHz spectrum—as little as 80 megahertz out of the available 1200—for the exclusive use of mobile licensed operations. *See* NAB Reply Comments 2, 12 (JA__, __); NAB 11/7/2019 Letter 1 (JA__); NAB 1/27/20 Letter 1-2 (JA__-__); NAB 4/15/20 Letter 1-2 (JA__-__). The FCC rejected that request. After repeating its erroneous finding that there was “little potential of ... harmful interference,” it claimed that prohibiting unlicensed operations within this preserved sliver of spectrum would “have the unintended effect of actually increasing the potential interference to other [licensed] users as more unlicensed devices would have access to fewer channels” elsewhere in the 6 GHz band. *Order* ¶158 (JA__).

This rationale is untenable and unwittingly concedes the illogic of the *Order*'s treatment of interference risks more generally. Eliminating all interference risks to mobile licensed operations by granting NAB's proposal would have reduced the total spectrum available for unlicensed devices by only 6.7%—from 1200 to 1120 megahertz. If that minor reduction could significantly increase the potential for interference elsewhere in the band, the mathematical corollary is

³⁵ The *Order* precludes standard-power devices, which rely on Automated Frequency Coordination, from transmitting in the sub-bands used for mobile microwave operations.

clear: even a *slightly* larger-than-predicted number of unlicensed devices operating in the band generally, or even a *slightly* larger-than-average number of devices operating at one specific location, would also materially raise the risk of harmful interference to *any* licensed user. Indeed, the same conclusion would follow if the activity factor of proximate unlicensed devices is even slightly higher than the implausibly low 0.4% figure assumed by the FCC (*see* §I.C.2, *supra*).

This passage provides further confirmation that the *Order* is a house of cards built on unsupported assumptions about the prevalence and intensity of unlicensed operations in the band. Alternatively, if granting NAB's proposal would *not* increase interference risks elsewhere in the band, there would be no reason not to reserve a portion of the band for ongoing mobile operations.

In a one-sentence footnote, the FCC tried to muddy the issue by asserting that reserving 80 megahertz for exclusive use by mobile licensees would reduce the number of 160 megahertz channels in the 6 GHz band from seven to six—a 14.3% decrease. *Order* ¶158, n. 425 (JA__). This appears mathematically incorrect. Reserving 80 megahertz would leave 1120 megahertz for unlicensed operations, which would still permit seven, not six, 160 megahertz channels ($1120/160 = 7$). The *Order* also identifies no reason for focusing exclusively on 160 MHz channels in the first place; the *Order* permits a number of different sized channels, setting only a maximum but no minimum width. *Id.* ¶185 (JA__).

In all events, whether the reduction of available unlicensed spectrum is 6.7% or 14.3%, the FCC's logic for rejecting NAB's proposal would still reveal the extreme sensitivity of the *Order*'s "no significant risk of interference" premise to even minor variations in assumptions about the number and intensity of unlicensed device transmissions. Because that concern flows directly from the FCC's rationale for rejecting NAB's proposal, and because the FCC did not even acknowledge it, the *Order* should be vacated and remanded on this ground as well.

V. THE FCC FAILED TO ADOPT EFFECTIVE MECHANISMS FOR REMEDIATING INTERFERENCE THAT DOES OCCUR.

Section 301 of the Communications Act and the FCC's implementing rules require any operator of an unlicensed device to cease transmissions if the device causes harmful interference with licensed operations. *See* 47 U.S.C. §301; 47 C.F.R. §15.5(c). And Section 1 requires the FCC to "promot[e] the safety of life and property." 47 U.S.C. §151. Petitioners thus told the FCC that it could not allow this new class of unlicensed devices to operate unless, among other things, it created an effective mechanism for immediately detecting, identifying, and turning off any device that does cause harmful interference to licensed operations. *See, e.g.,* APCO 4/10/2020 Letter 3-5 (JA__-__). The FCC all but ignored that point because it erroneously assumed that its rules "eliminate[d] any significant risk" that such harmful interference would arise in the first place. *Order* ¶146 (JA__).

The FCC did assert in passing that, if this assumption turned out to be wrong, its Enforcement Bureau was available to “investigate reports of [harmful] interference and take[s] appropriate enforcement action as necessary.” *Id.* ¶149 (JA__). But that assurance is meaningless for reasons that petitioners explained but the FCC ignored.

The FCC’s post-hoc enforcement mechanisms are designed to locate interference caused by pirate radio transmitters or enterprise-grade machinery, not the types of portable, sporadically transmitting consumer devices bought by hundreds of millions of consumers at Amazon or Walmart. When one of those devices creates harmful interference, neither 6 GHz licensees nor the FCC will have any ready means of tracing that degraded performance to interference from any unlicensed 6 GHz device, let alone identifying *which* unlicensed device, out of thousands of nearby suspects, is the one responsible for interrupting the link. *See, e.g.*, APCO Comments 4 (JA__); AT&T Comments 14-15 (JA__-__).

Indeed, even if all unlicensed 6 GHz devices stayed in fixed locations, “resolving just one instance of interference can take weeks” and “rack[] up costs easily in excess of tens of thousands of dollars,” as petitioners explained. AT&T Comments 15 (JA__). Meanwhile, the interference source will continue impairing the services that depend on the affected links, such as 911 emergency calling or the integrity of critical utility infrastructure. But chasing down the sources of

interference will be even more challenging because these devices will be portable. The interference these devices cause will thus often be transitory, as in the case of people who take their 6 GHz-enabled laptops onto their decks or who temporarily place their routers near windows to ensure outdoor coverage. *See, e.g., id.* (JA__). There will be no way for microwave system operators or the Enforcement Bureau to determine who placed what device in the wrong place at the wrong time, nor will they be able to keep the responsible parties—let alone likeminded others—from engaging in similar conduct in the future. Owners of these devices—mainly, consumers—will continue to operate their devices as before, causing interference to recur.

Further compounding these concerns, unlicensed 6 GHz devices will almost all be located on private property. *See, e.g.,* APCO 4/10/2020 Letter 4 (JA__). Neither a microwave system operator nor FCC officials can demand entry into people's homes to see exactly where they have put their devices. And even if an interfering user *could* be identified, there is not a straightforward way to stop the interfering transmissions in these circumstances. It is one thing to serve a cease-and-desist order on a few companies with enterprise-grade equipment found to interfere with licensed uses, but quite another to serve potentially thousands of ordinary consumers.

The practical consequences of episodic interference from unlicensed devices will be particularly severe for public safety agencies. When 6 GHz devices create harmful interference, public safety officials will know only that *something* has degraded or completely halted the communications of their critical microwave links; these links are not designed to detect interference. *See, e.g.,* APCO Comments 4 (JA__); APCO 4/10/2020 Letter 4-5 (JA__-__). In those unfortunate circumstances, public safety officials will often turn their immediate attention to addressing the operational impacts of disruptions to 911 callers and first responders who depend on this spectrum band. But they have no means of tracing such degraded performance to particular unlicensed devices. *See, e.g.,* APCO Comments 4 (JA__). An enforcement case released nearly contemporaneously with the *Order* illustrates this concern. There, the FCC’s Enforcement Bureau spent *weeks* attempting to mitigate harmful interference caused by unlicensed devices to FAA radars. *See* Notice of Apparent Liability, *Buzzer Net LLC San Juan, P.R.*, DA 20-439, 2020 WL 1943545 (Enforcement Bur. Apr. 22, 2020).

Finally, the FCC likewise failed to adopt effective mechanisms for promptly detecting, identifying, and shutting down *standard-power* devices (in addition to “low-power” devices), in violation of its statutory duty to protect licensed operations—and especially those operated by public safety entities—from harmful

interference. *See* §IV.A, *supra*.³⁶ Instead of adopting such mechanisms, it casually encouraged a then-hypothetical and merely voluntary stakeholder group with developing procedures to resolve interference concerns. *Order* ¶84 (JA__). But the FCC itself bore the burden of ensuring fully effective protection for public safety operations before authorizing the operation of either “low”- or standard-power devices. It unlawfully abdicated that responsibility.

CONCLUSION

This Court “ha[s] not hesitated to vacate a rule when the agency has not responded to empirical data or to an argument inconsistent with its conclusion.” *Comcast Corp. v. FCC*, 579 F.3d 1, 8 (D.C. Cir. 2009). Here, the Court should vacate the *Order* because the FCC has identified no way to reconcile its current rules with petitioners’ acknowledged legal right, *see* §I.A., *supra*, to conduct their licensed operations without episodic harmful interference by unlicensed 6 GHz devices. The Court should likewise remand for consideration of stronger device rules that would protect licensees from harmful interference while promoting the FCC’s policy goal of freeing up 6 GHz spectrum for unlicensed uses.

³⁶ This paragraph is specific to petitioner APCO, which alone challenges the FCC’s rules for standard-power devices.

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CIRCUIT RULE 32(a)(2) ATTESTATION

In accordance with D.C. Circuit Rule 32(a)(2), I hereby attest that all other parties on whose behalf this joint brief is submitted concur in its filing.

/s/ Jonathan E. Nuechterlein
Jonathan E. Nuechterlein

CERTIFICATE OF COMPLIANCE

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and type-style requirements of Fed. R. App. P. 32(a)(6) because it has been prepared in a proportionally spaced typeface using Microsoft Word in 14-point Times New Roman font.

This brief complies with the word-count limitation of Fed. R. App. P. 32(e) and this Court's November 23, 2020 scheduling order. This brief contains 16,960 words, not counting the parts excluded by Fed. R. App. P. 32(f) and Circuit Rule 32(e)(1).

/s/ Jonathan E. Nuechterlein
Jonathan E. Nuechterlein

CERTIFICATE OF SERVICE

I hereby certify that, on December 23, 2020, I will cause the foregoing to be electronically filed through this Court's CM/ECF system, which will send a notice of filing to all registered users.

/s/ Jonathan E. Nuechterlein
Jonathan E. Nuechterlein

STATUTORY AND REGULATORY ADDENDUM

47 U.S.C. §151 Add-1

47 U.S.C. §301 Add-2

47 C.F.R. §15.3(m) Add-3

47 C.F.R. §15.5(c)..... Add-4

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. §301**§301. License for radio communication or transmission of energy**

It is the purpose of this chapter, among other things, to maintain the control of the United States over all the channels of radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any State, Territory, or possession of the United States or in the District of Columbia to another place in the same State, Territory, possession, or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or possession of the United States; or (c) from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel or aircraft of the United States (except as provided in section 303(t) of this title); or (f) upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this chapter and with a license in that behalf granted under the provisions of this chapter.

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.

* * *

47 C.F.R. §15.5(c)

§15.5 General Conditions of Operation

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(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.

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