As technology advances, state surveillance capacity continuously multiplies. That increased capacity lands on historically overpoliced communities. It fuels mass incarceration and chills speech. Fourth Amendment doctrine has struggled to keep pace with these new threats. And the Supreme Court’s attempts to address accelerating technological change — exemplified by its 2018 decision in Carpenter v. United States — have left the doctrine unsettled. Recently, in United States v. Moore-Bush, the en banc First Circuit attempted to navigate post-Carpenter Fourth Amendment doctrine when it considered whether long-term “pole-camera” surveillance of a home’s exterior constituted an unconstitutional search. The court decided the case on other grounds but split evenly across two concurrences on the Fourth Amendment issue. The first concurrence, authored by Chief Judge Barron and Judges Thompson and Kayatta, correctly held that the surveillance qualified as a search. However, the opinion’s reasoning primarily centered on the duration of the surveillance, rather than the multidimensional risks posed by pole-camera monitoring. The opinion therefore

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6 138 S. Ct. 2206 (2018); see Hecht-Felella, supra note 1, at 7–8.


8 36 F.4th 320 (1st Cir. 2022) (en banc) (per curiam).

9 Id. at 321 (Barron, C.J., and Thompson & Kayatta, JJ., concurring).

10 See id. at 321–22.

11 Id. at 321.
missed the chance to develop a doctrine better equipped to constrain the rapid proliferation of technologically enhanced state surveillance.

In January 2017, the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) began investigating Nia Moore-Bush on suspicion that she was selling arms and narcotics from the house she shared with her mother. In May 2017, ATF agents installed hidden cameras on utility poles (“pole cameras”) across from her mother’s house and began eight months of constant surveillance of the home’s curtilage. The camera footage supported wiretap applications and search warrants that led to the indictment of Moore-Bush and her mother, Daphne Moore, on arms and narcotics trafficking charges.

Moore-Bush and Moore moved to suppress the pole-camera evidence and its fruits, arguing the surveillance constituted a warrantless search. Prior to Carpenter, the First Circuit had held in United States v. Bucci that pole-camera surveillance was not a search because there was no reasonable expectation of privacy in a home’s exposed exterior. In considering the suppression motions, the district court confronted whether Bucci still applied post-Carpenter.

The Carpenter Court held that police collection of cellphone-location data qualified as a search. In reaching that holding, it performed two moves that shifted the reasonable expectation of privacy analysis derived from the Supreme Court’s decision in Katz v. United States — the method long used to determine whether police conduct qualifies as a search. First, the Court utilized a version of “mosaic” theory, which proposes that individual inquiries, each of which are not a search taken alone, may constitute a search when aggregated. Although no reasonable privacy interest exists in a single movement through public space, the Court held that cumulative cellphone-location data reveals something more fundamentally private: the “whole of [one’s] physical movements.” Second, the Court limited third-party doctrine, which posits that “[w]hat a person knowingly exposes to the public, even in [their]
own home or office, is not a subject of Fourth Amendment protection.”26 The Court held that sharing data with a third-party cellphone company did not negate the reasonableness of the privacy expectation, given that cellphone data sharing has become nearly obligatory in modern life.27

The district court integrated both Carpenter moves into its analysis of the Moore-Bush suppression motions. First, the district court applied a version of Carpenter’s mosaic logic, holding that aggregated, long-term pole-camera surveillance also captured something uniquely private.28 Second, the district court found that Moore-Bush and Moore could hold a reasonable privacy expectation in their home’s exterior because Carpenter rejected the assumption that one lacks privacy “in items or places . . . expose[d] to the public.”29 Thus, the district court concluded that Bucci no longer applied, found that the surveillance was a warrantless search, and granted both motions to suppress.30

A panel of the First Circuit reversed,31 finding that Carpenter did not “undermine[] Bucci” but instead “reaffirm[ed]” Bucci’s analysis.32 The panel noted that the Carpenter Court had described its holding as “narrow”33 and inapplicable to “conventional” tools of surveillance.34 The panel then determined that pole cameras are a form of “conventional” technology analogous to “security cameras” and therefore not subject to a Carpenter aggregation analysis.35 It also contended that a home’s exterior remains a fundamentally publicly exposed location.36

On rehearing, the en banc First Circuit also unanimously agreed that the motions to suppress should be denied37 — but offered fractured reasoning, splitting across two concurrences. The Barron concurrence denied the suppression motions not on the Fourth Amendment merits but under a good faith exception.38 The opinion reasoned that the ATF officers commenced the surveillance of the Moore home pre-Carpenter, when Bucci was still good law, and so relied in good faith on the circuit’s law at the time — although the opinion also found that Bucci was no longer good law post-Carpenter and the surveillance now qualified as a search.39 The second concurrence, written by Judges Lynch, Howard,‐

27 Carpenter, 138 S. Ct. at 2218.
29 Id. at 144 (quoting United States v. Bucci, 582 F.3d 108, 117 (1st Cir. 2009)); see id. at 144–46.
30 Id. at 143–44, 146, 150.
31 United States v. Moore-Bush, 963 F.3d 29, 47 (1st Cir. 2020).
32 Id. at 39.
33 Id. at 35 (quoting Carpenter v. United States, 138 S. Ct. 2206, 2220 (2018)).
34 Id. at 40.
35 See id.
36 See id. at 42.
37 Moore-Bush, 36 F.4th at 320 (en banc) (per curiam).
38 Id. at 321 (Barron, C.J., and Thompson & Kayatta, JJ., concurring).
and Gelpí, found the opposite: *Carpenter* did not apply, *Bucci* remained binding, and the surveillance still did not qualify as a search.40

The Barron opinion applied a duration-focused version of *Carpenter*’s analysis to find that the pole-camera surveillance qualified as a search. On the first prong of the *Katz* analysis, the Barron opinion argued that Moore and Moore-Bush subjectively manifested a privacy expectation in their home’s curtilage, given the absence of an invitation to surveil.41 It emphasized that duration distinguished this surveillance from the glimpses of passersby42: casual observers could not “take in all that occurs in a home’s curtilage over the course of eight months.”43 Thus, although the defendants never affirmatively impeded neighbors’ views of their front yard, they could still hold a reasonable expectation of privacy in relation to longer-term surveillance.44

Proceeding to the second *Katz* prong, the Barron opinion again looked to duration.45 The opinion found the privacy expectation objectively reasonable given that the observations occurred over a “lengthy period of time.”46 Because modern pole cameras removed practical barriers that once made long-term police observation of a home “rare[ly]”47 — such as the staff and funding needed for a months-long stakeout — the cameras permitted much longer-term surveillance.48 That longer-term viewing created an aggregate picture of something fundamentally private, similar to the “whole of [one’s] physical movements” captured in *Carpenter*.49 By enabling longer-term observations, the pole cameras invaded a reasonable privacy interest; the surveillance therefore qualified as a search.50

The Lynch concurrence argued that the Barron opinion misapplied *Carpenter* and that the surveillance was not a search.51 First, the Lynch concurrence contended that pole cameras are “conventional” surveillance tools to which *Carpenter* did not apply.52 Second, the opinion argued that no privacy interest exists in a publicly exposed curtilage, despite *Carpenter*’s selective narrowing of third-party doctrine.53 Finally, the opinion distinguished pole-camera surveillance from cellphone-location data. Because pole cameras observe a single location, they cannot collect

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40 See id. at 361, 363 (Lynch, Howard & Gelpí, JJ., concurring).
41 See id. at 329–30 (Barron, C.J., and Thompson & Kayatta, JJ., concurring).
42 See id.; see also id. at 357. The Supreme Court has suggested that no subjective privacy expectation exists in curtilage observable by the “casual, accidental observ[er].” California v. Ciraolo, 476 U.S. 207, 212 (1986).
44 Id. at 329–30.
45 See id. at 333.
46 Id. at 332.
47 Id. at 334 (quoting *Carpenter* v. United States, 138 S. Ct. 2206, 2217 (2018)).
48 Id. at 333–35.
49 Id. at 332 (quoting *Carpenter*, 138 S. Ct. at 2217); see also id. at 334–35, 337.
50 Id. at 359.
51 See id. at 363 (Lynch, Howard & Gelpí, JJ., concurring).
52 Id. at 363–64.
53 See id. at 368–69.
the whole of one’s movements. And unlike a retrospective search of previously collected cellphone data, pole-camera surveillance occurs in real time. Thus, the surveillance was not a search.

By applying Carpenter to the pole-camera context, the Barron opinion demonstrated that the Moore-Bush surveillance constituted a Fourth Amendment search. Pole-camera video differs from conventional security footage. Such footage could not be indefinitely stored or rapidly searched by police, as some pole-camera footage now can be; and security cameras were used to surveil definitively public spaces, not to monitor and zoom in on homes. The Barron opinion also correctly applied Carpenter’s third-party doctrine limit. There is a clearer traditional privacy interest in the home’s curtilage than there is in cellphone-location data, and exposing one’s home to public viewing is at least as unavoidable as using a cellphone. However, in arriving at the correct holding, the Barron opinion deployed a primarily unidimensional, duration-focused analysis. That analysis underemphasized other crucial elements of the Carpenter extensiveness inquiry, thus incompletely cognizing the privacy invasion wrought by pole cameras and other surveillance technologies. By focusing on duration, the Barron opinion forfeited the opportunity to build a more robust Fourth Amendment search doctrine capable of reckoning with “seismic shifts in digital technology.”

Carpenter “opened the door” for lower-court mosaic analyses and suggested multiple factors that courts might consider in performing those analyses. Duration was one such factor, but it was not the exclusive thrust of Carpenter. For instance, the Carpenter Court also

54 Id. at 368.
55 Id. at 366.
56 See id. at 372–73.
59 See ACLU Brief, supra note 57, at 14.
60 See Tokson, supra note 58 (manuscript at 6); see also Moore-Bush, 36 F.4th at 323 n.3 (Barron, C.J., and Thompson & Kayatta, JJ., concurring).
62 See ACLU Brief, supra note 57, at 10.
63 As Justice Sotomayor has suggested, government use of modern technology has the potential to “chill[] associational and expressive freedoms” because those technologies allow for government access to “a substantial quantum of intimate information,” United States v. Jones, 565 U.S. 400, 416 (2012) (Sotomayor, J., concurring), and not mainly because they enable longer-term police information gathering;
66 See Carpenter, 138 S. Ct. at 2217.
considered the technology’s capacity to reveal intimate information;\textsuperscript{67} to facilitate cheap, widespread surveillance of much of society; to enable permanent storage and retrospective searches of data; and to provide information inaccessible via traditional police observation.\textsuperscript{68} The Barron opinion acknowledged multiple dimensions of the Carpenter analysis\textsuperscript{69} — but primarily did so when responding to the government’s counter-offensives,\textsuperscript{70} rather than when affirmatively interpreting Carpenter’s doctrinal implications for the Katz analysis. At base, the Barron opinion’s assessment of the reasonableness of the defendants’ privacy interest focused on duration: because the pole cameras could surveil the curtilage for an especially long time, third-party doctrine did not apply and a reasonable privacy interest existed.\textsuperscript{71} Thus, the Barron opinion centered one element of Carpenter’s potentially more capacious mosaic framework.\textsuperscript{72}

By taking this duration-based approach, the Barron opinion did not fully capture the privacy harms posed by pole cameras, particularly given the new storage capacities and software pairings that accompany even brief bursts of footage. Today’s pole-camera observations differ from traditional observation not primarily because of the duration of surveillance they enable, but because of the kind of data they can collect. Pole-camera recordings are difficult to erase\textsuperscript{73} and can be recalled easily and accurately.\textsuperscript{74} The footage may be subjected to technologically enhanced analysis\textsuperscript{75} and may be used in combination with vast pools of data that casual observers cannot access — and that police could not easily search prior to recent technological advancements.\textsuperscript{76} For instance,

\textsuperscript{67} See id. (quoting Jones, 565 U.S. at 415 (Sotomayor, J., concurring)); see also Tokson, supra note 58 (manuscript at 17).

\textsuperscript{68} See Carpenter, 138 S. Ct. at 2217–19.

\textsuperscript{69} See, e.g., Moore-Bush, 36 F.4th at 335–36 (Barron, C.J., and Thompson & Kayatta, JJ., concurring) (describing the potentially intimate details revealed when the home’s curtilage is observed).

\textsuperscript{70} See, e.g., id. at 355 (noting pole cameras’ “expansive memories and the emergence of facial recognition technology” to respond to the argument that other precedent counsels ignoring Carpenter).

\textsuperscript{71} See id. at 332–36.

\textsuperscript{72} Where the Barron opinion discussed other threats posed by pole cameras, it still frequently tied those risks back to duration. See, e.g., id. at 349 (suggesting pole-camera observations “of sufficient duration” may permit Fourth Amendment–violative retrospective searches).

\textsuperscript{73} Even state-captured video may be shared with third parties, or leaked inadvertently, as some state entities use insufficiently secure cloud storage. See, e.g., Chris Pagliarella, Comment, Police Body-Worn Camera Footage: A Question of Access, 34 YALE L. & POL’Y REV. 533, 537 (2016).

\textsuperscript{74} See ACLU Brief, supra note 57, at 20–23.

\textsuperscript{75} For instance, pole-camera footage may be subjected to facial-recognition technologies, which compound the risks of long-term storage. See generally Sherwin Nam, Note, Bend and Snap: Adding Flexibility to the Carpenter Inquiry, 54 COLUM. J.L. & SOC. PROBS. 131, 143–60 (2020).

\textsuperscript{76} Governments analyze troves of data that they already possess, such as driver’s license records. See, e.g., Drew Harwell, FBI, ICE Find State Driver’s License Photos Are a Gold Mine for Facial-Recognition Searches, WASH. POST (July 7, 2019, 3:54 PM), https://www.washingtonpost.com/technology/2019/07/07/fbi-ice-find-state-drivers-license-photos-are-gold-mine-facial-recognition-searches [https://perma.cc/MB97-DGF4]. Private-public partnerships also fuel mass data access. See, e.g., Mariana Oliver & Matthew B. Kugler, Surveying Surveillance: A National Study of Police
some local police departments compare videos against enormous databases of biometric information and can automatically identify those captured on camera using artificial facial-recognition intelligence.77

The Barron opinion’s duration analysis also incompletely captures the society-wide privacy invasions potentially created even by shorter footage collection. Pole-camera technology could be used to create an extensive network of widespread observation at relatively low cost to the police.78 Pole cameras can simultaneously collect data from hundreds of locations — more than could likely be collected by the entirety of a traditional police force. Even if any one target has their home’s curtilage only briefly observed, because pole cameras can view many spaces simultaneously without suspicion, they can invade a different privacy interest than exists in any one of these locations — tracking your every move from your porch, to your friend’s backyard, to your parking spot at work.79 Like GPS-data collection, pole-camera surveillance enables easy government assembly of “a wealth of detail about [one’s] familial, political, professional, religious, and sexual associations.”80 Police have always been able to use cameras or binoculars to watch what we do. But never before could they so easily ascertain who we are.

Carpenter’s application to other technologies and impact on Fourth Amendment search doctrine remain unsettled.81 As such, courts applying Carpenter have room to maneuver and may shape the doctrine’s future.82 However, the Barron opinion did not seize that opportunity, as its duration-based analysis not only failed to fully capture the dangers of pole cameras but also translates poorly to other technologies and is therefore largely unworkable as a basis for doctrinal development.83 For instance, a duration-based approach is inherently inconsistent, as different duration thresholds map onto different technologies.84 A duration-based approach also creates a constant line-drawing problem: for each technology, how long is too long? And for many technologies, duration


77 Many local police, see Oliver & Kugler, supra note 76, at 130, and about half of federal law enforcement agencies, see Turner Lee & Chin, supra note 2, possess facial recognition technology.

78 See Tokson, supra note 58 (manuscript at 7).


81 See, e.g., Tokson, supra note 7, at 1804–05; Fairbanks, supra note 65, at 75.

82 See Tokson, supra note 7, at 1805–06.

83 The Barron opinion even acknowledged that Carpenter had “emphasized” that courts should consider technology’s evolution when developing this doctrinal line. See Moore-Bush, 36 F.4th at 349 (Barron, C.J., and Thompson & Kayatta, JJ., concurring) (citing Carpenter v. United States, 138 S. Ct. 2206, 2223 (2018)).

84 For example, the Carpenter data collection spanned far less time than the Moore-Bush surveillance. See Carpenter, 138 S. Ct. at 2218.
does not apply. For instance, the privacy interest at stake in biometric-data collection or the risks posed by “ShotSpotter” technology are unrelated to duration. Thus, a duration-based framework incompletely captures the risks posed both by pole cameras and by “more sophisticated [surveillance] systems that are already in use or in development.”

To begin developing a stronger line of doctrine, the Barron opinion might have taken alternate routes. The opinion could have made clearer that duration is only part of Carpenter’s holding. It could have more explicitly emphasized that the multidimensional nature of the technology should form the basis for the privacy expectation analysis in a new mosaic-esque doctrine post-Carpenter. Alternatively, the Barron opinion could have commenced a more fundamental shift away from reasonable expectation analysis and toward a more explicitly privacy-protective method. Carpenter can be read as skeptical of reasonable expectation analysis. That skepticism is warranted: in a world in which less and less is expected to be private, reasonable expectation analysis will soon constrain few state overreaches. Seizing upon prior pragmatic attempts to rework Katz, the Barron opinion might have instead been more explicitly normative and simply asked which “risks [one] should be forced to assume in a free and open society.”

Ultimately, the Moore-Bush opinions leave vital questions about modern surveillance unanswered. The case leaves open the possibility that police may warrantlessly watch all homes, upending protection of the spaces where people are most able to express their personhood. The case also provides little guidance for constraining potential threats posed by new technologies. Such guidance is needed — and soon. Rapidly evolving surveillance technology is expanding the reach of the carceral state, entrenching racial inequities in policing, and threatening the rights of protestors. Without additional doctrinal checks, such surveillance threatens to unravel the many social fabrics that depend on privacy, forever “alter[ing] the relationship between citizen and government.”

88 Cf. Ohm, supra note 23, at 385–86.
90 See Levinson-Waldman, supra note 79, at 551–52. The Barron opinion acknowledges this problem, Moore-Bush, 36 F.4th at 349 (Barron, C.J. & Thompson & Kayatta, JJ., concurring), but does not fully integrate its implications.